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Quick Digest - 2020

Science and Technology

(Recent Developments)



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Science and Technology

(Recent Developments)

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S&T- Application of S&T in Human life

1. PLASMA THERAPY FOR CORONA / COVID-19

Several countries, including India, are seriously watching plasma therapy as a possible treatment for Covid-19, the disease caused by the novel coronavirus. Plasma therapy uses blood donated by recovered patients to introduce antibodies in those under treatment.

What is Convalescent plasma therapy and the way does it work to fight COVID-19?

- Convalescent Plasma Therapy, also referred to as passive antibody therapy, provides an individual with already developed antibodies to fight an epidemic.
- Under the Plasma Therapy, the COVID-19 patients are going to be infused with an antibody-rich plasma of the people that have recovered from the novel Coronavirus.
- The Convalescent Plasma Therapy is predicated on the antibodies and proteins developed by the system that protects the body from any potential harm.
- When any virus attacks the body, the system produces antibodies to attack the virus. These antibodies are produced by immune cells 'B lymphocytes', found in plasma .
- The one that recovers from an epidemic has developed antibodies that stay in blood to fight an equivalent virus, if it returns. And if these antibodies are infused into other person infected with an equivalent virus, they recognise the virus and attack it. However, these antibodies stay for brief period in other person's blood.
- Some antibodies neutralize the virus and a few work by mobilizing the immune cells to combat a disease.

WHO guidelines during this regard:

WHO guidelines in 2014 mandate a donor's permission before extracting plasma. Plasma from only recovered patients must be taken, and donation must be done from people not infected with HIV, hepatitis, syphilis, or any infectious disease. If blood is collected, the plasma is separated by sedimentation or centrifugation, then injected within the patient. If plasma must be collected again from an equivalent person, it must be done after 12 weeks of the primary donation for males and 16 weeks for females, the WHO guidelines state.

Collab CAD:

Atal Innovation Mission, NITI Aayog and National Informatics Centre (NIC) jointly launched CollabCAD, a collaborative network, computer-enabled software , providing a complete engineering solution from 2D drafting & detailing to 3D product design.

Key Features:

- A customized version of CollabCAD for ATLs with features that are most relevant to high school students to materialize their ideas and creativity into physical solutions has been developed to enable designing without constraints and, thus, allowing creativity and innovation to thrive.
- It would enable students to make innumerable 3d designs.
- CollabCAD which can be employed by around 5000 schools where Atal Tinkering Labs are established.

2. TriboE Mask

Why in News?

- A team of researchers at the Centre for Nano and Soft Matter Sciences (CeNS), Bangalore, have come up with a recipe for creating face masks, termed as TriboE Mask, which will hold electric charges to limit the entry of infections.

- The recent innovation is predicated on electrostatics.
- It uses principles of Triboelectricity.
- When two non-conducting layers are rubbed against one another, the layers develop positive and negative charges instantly and still hold the fees for a few time.
- This field which is sort of strong at proximity are often wont to deactivate or possibly even kill the germs.

TriboE Mask:

- The mask is three-layered –a layer of nylon cloth sandwiched between polypropylene layers.
- Polypropylene layers are sourced from commonly used non woven grocery bags.
- In place of nylon, silk fabric from an old saree or shawl can also be cut and used. When layers are rubbed against one another, the outer layers develop negative charges, while nylon will hold the positive charges.
- This will act as double electric wall protection against the infectious entities crossing.
- As the mask is formed out of commonly available fabrics, it are often washed a bit like the other cloth and may be reused.
- At this stage, the mask is, however, not recommended to healthcare professionals and patients.

What is triboelectric effects?

Also referred to as triboelectric charging, it's a kind of contact electrification on which certain materials become electrically charged after they're separated from a special material with which they were in touch. Rubbing the 2 materials each with the opposite increases the contact between their surfaces, and hence the triboelectric effect.

3. Reverse Vaccinology and its benefits

The Tamil Nadu Dr. MGR Medical University has developed a vaccine candidate against SARS-CoV-2 through 'reverse vaccinology'.

Reverse Vaccinology

- Reverse vaccinology is an improvement on vaccinology that employs applied bioinformatics.
- The basic idea behind it's that a whole pathogenic genome are often screened using bioinformatics approaches to seek out genes.
- Some traits that the genes are monitored for may indicate antigenicity.
- Those genes are filtered for desirable attributes that might observe vaccine targets like outer membrane proteins.
- Once the candidates are identified, they're produced synthetically and are screened in animal models of the infection.
- Since then, it's been used on several other bacterial vaccines.

4. ANTIMICROBIAL RESISTANCE (AMR) AND COVID-19

In the wake of latest challenges to human health worldwide thanks to COVID-19, it becomes imperative to return up with future solutions keeping in mind a much bigger threat of Antimicrobial Resistance. The scientists and pathologists play a key role during this pursuit.

- The government had too, commissioned a 9.3 crore study to assess the microbial diversity along the whole length of the Ganga and test if stretches of the two, 500 km long river contain microbes which will promote "antibiotic resistance".
- The project aims at indicating the sort of contamination within the river and therefore the threat to human health.
- The project, expected to last two years, will identify sources of Eschericia coli.

What is Antimicrobial Resistance (AMR)?

- AMR may be a global public health threat, consistent with the planet Health Organization, which mutates the microbes rapidly to become immune to a drug is within the inherent nature of a microbe.

How Antimicrobial Resistance works?

- AMR happens when microorganisms (such as bacteria, fungi, viruses, and parasites) change once they are exposed to antimicrobial drugs (such as antibiotics, antifungals, antivirals, antimalarials, and anthelmintics).
- Microorganisms that develop antimicrobial resistance are sometimes mentioned as “superbugs”.

What results in AMR?

- Indiscriminate use of antibiotics against infections
- Misuse of antibiotics in humans, animals, and aquaculture.
- Poor management of waste from farms, factories, healthcare settings and households.
- Over the counter purchase of antibiotics without doctor’s prescription.
- Partial completion of antibiotics dosage
- Comorbidity

5. RaiDer-X

Defence Research and Development Organisation (DRDO) and IISc Bangalore recently unveiled a replacement explosive detection device. a replacement explosive detection device – RaiDer-X was recently showcased during the National Workshop on Explosive Detection.

Features of RaiDer-X

- DRDO’s new explosive detection device RaiDer-X can detect explosives from a selected range and inform the operator.
- It also can detect bulk explosives located during a hidden place.
- The device has been developed by DRDO and IISc’s High Energy Materials lab .
- DRDO believes that it's really important to detect explosives to save lots of the country and mankind.

Benefits of RaiDer-X

It is a transportable device which will be taken to anywhere along side the military contingent. This device also will help security agencies to figure efficiently and safely. DRDO said that RaiDer-X will help Indian Security Agencies to save lots of people from anti-social elements. RaiDer-X also will enhance the Indian Army’s power within the field to figure more efficiently.

6. In-Flight Connectivity: On-Board Internet

The Telecom Commission recently allowed in-flight connectivity of Internet and mobile communications on aircrafts within the Indian airspace.

How in- flight connectivity works?

In-flight connectivity systems use two sorts of technologies- terrestrial and satellite internet services.

1. Once flight mode is activated, the plane’s antenna will link to terrestrial Internet services provided by telecom service providers.
2. Then, when the aircraft has climbed to three ,000 m, the antenna will switch to satellite-based services.

7. Potential Fishing Zone (PFZ)

News: INCOIS has said that the Oceansat Satellite data are wont to prepare the Potential Fishing Zone (PFZ) advisories on the potential rich fishing areas and supply to the ocean faring fishermen altogether states.

About Potential Fishing Zone(PFZ):

- Potential fishing zones (PFZ's) are those regions where the fishes aggregate thanks to an abundance of food and that they are demarcated by tracing those regions within the ocean.
- These zones are identified using chlorophyll concentration(Chl) obtained from ISRO's Oceansat-2 satellite and therefore the sea surface temperature from National Oceanic Atmospheric Administration (NOAA / USA satellites).

8. SOPHISTICATED ANALYTICAL & TECHNICAL HELP INSTITUTES (SATHI)

The Department of Science & Technology has launched a singular scheme called Sophisticated Analytical & Technical Help Institutes (SATHI) to deal with the necessity for building shared, professionally managed and powerful Science and Technology infrastructure within the country.

- These Centres are expected to deal with major analytical instruments to supply common services of high-end analytical testing, thus avoiding duplication and reduced dependency on foreign sources. These would be operated with a transparent, open access policy.
- DST has already found out three such centres within the country, one each at IIT Kharagpur, IIT Delhi and BHU at a complete cost of Rs 375 Cores. it's planned to line up five SATHI Centres per annum for subsequent four years.
- SATHI will address the issues of accessibility, maintenance, redundancy and duplication of pricy equipment in our Institutions, while reaching bent the less endowed organizations in need, e.g., industry, MSMEs, startups and State Universities.

9. Vikram Sarabhai founding father of ISRO 101st Birthday

On 12 August Nation is celebrating Vikram Sarabhai's 100th birthday.

He is the founding father of ISRO (Indian Space Research Organisation) and is understood because the Father of the Indian program . He was a physicist, industrialist and innovator.

Even the lander of Chandrayaan-2 has been named after him. ISRO has announced a gift within the name of Vikram Sarabhai on his 100th birthday.

Let us read more about Vikram Sarabhai, youth , inventions etc.

10. Classical swine fever

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

What is Classical Swine Fever (CSF)?

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

About the vaccine and it's significance:

It is a live attenuated CSF cell culture vaccine (indigenous strain).

The indigenously developed vaccine will help in saving rabbits because the currently used vaccine (lapinized CSF vaccine) is produced by sacrificing large numbers of rabbits.

Besides, the new vaccine gives immunity for 2 years as compared to three to six months protection under the currently used vaccines.

The new vaccine are going to be a neighborhood of the government's One Health Initiative.

11. COALBED METHANE (CBM)

The 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 within the next 2 to three years.

- Coalbed methane, coalbed gas, seam gas or coal-mine methane may be a sort of gas extracted from coal beds.
- In recent decades it's become a crucial source of energy in us , Canada, Australia, and other countries.
- The term refers to methane adsorbed into the solid matrix of the coal. it's called 'sweet gas' due to its lack of hydrogen sulphide.
- The presence of this gas is documented from its occurrence in underground coal mining, where it presents a significant safety risk.
- India has fifth-largest proven coal reserves within the world. So it's significant prospects for exploiting CBM.

How is coalbed methane extracted from coal?

- When water is faraway from a seam , it lowers the reservoir pressure.
- Methane that was held in situ by water pressure tends to follow the water because it is pumped to the surface, where it's captured and transported through pipelines to storage facilities or shipped.
- This relatively inexpensive and easy procedure has made coalbed methane a useful, easily accessible sort of energy.

What are the uses of CBM?

- CBM has been checked out as a clean alternative fuel with significant prospects.
- CBM are often used for power generation, as compressed gas (CNG) auto fuel, as feedstock for fertilisers, industrial uses like in cement production, rolling mills, steel plants, and for methanol production.

12. FASTags : National Electronic Toll Collection (NETC)

What is FASTag? FASTag may be a frequency Identification (RFID) enabled sticker affixed on the windscreens of vehicles. frequency Identification (RFID) technology is employed to form toll payments directly from an account, which is linked to the FASTag, while the vehicle is in motion.

It comes under the National Electronic Toll Collection (NETC) program that was launched by National Payments Corporation of India (NPCI), National Highways Authority of India (NHAI) and Indian Highways Management Company Limited (IHMCL).

How does FASTag work?

Whenever a vehicle passes through the Electronic Toll Collection (ETC) lane of the tract , the tract system will capture the FASTag details like Tag ID, vehicle class, etc., and send them for processing to the acquiring bank.

The Acquiring bank will send the request to the National Electronic Toll Collection (NETC) Mapper to verify the tag details. Once the Tag ID is validated, NETC Mapper responds with details like Tag Status, Vehicle class, VRN, etc. If the Tag ID isn't present within the NETC Mapper, it'll respond because the Tag ID not registered. The acquirer host.

13 HOG technology

Indian Railways makes big savings as more trains adopt HOG technology.

- The Railway Ministry has announced that it might be upgrading all existing Linke Hofmann Busch (LHB) coaches with the top on Generation (HOG) technology, a move that might cause the trains to become more cost-efficient and fewer polluting.

- Some of the benefits of the HOG system are as follows:
 - ✓ With HOG system, the background level reduces from 100 dB to noiseless
 - ✓ Till now, there has been a big reduction of CO₂ (over 2500 Ton) also as NO_x (over 10 Ton) emissions
 - ✓ The HOG system reduced consumption of diesel, resulting in huge savings in operational costs to the tune of over Rs 1,100 crore once a year
 - ✓ Compared to EOG Power, which is Rs 22/unit, the HOG Power is economical at Rs 6/unit
- Since the HOG-fitted trains don't require power from diesel generators in the least, they only have one emergency generator car attached, rather than two regular generator cars.
- The Railways has said that the additional space created would now be used for an LSLRD (LHB Second Luggage, Guard & Divyaang Compartment) meaning more passengers are often accommodated.

14. rare-earth element elements

The us Army has planned to fund the development of a Rare Earths processing facility to secure the domestic supply of minerals. the choice comes after China threatened to prevent exporting rare-earth element materials to the US.

Rare Earth Elements

- Rare earth elements (REEs) are a gaggle of seventeen chemically similar metallic elements on the table. It comprises of 15 lanthanides elements (lanthanum to lutetium), plus scandium and yttrium.
- Characteristics: REEs are characterized by high density, high freezing point, high conductivity, and high thermal conductance. REEs are classified into Heavy REE and lightweight REE.
- **Sources:** REEs don't occur during a free state. they're found in mineral oxide ores. The principal sources of rare-earth element elements are bastnaesite, xenotime commonly found in mineral sand deposits, loparite which occurs in alkaline igneous rocks and monazite.

Use of REEs

- Aerospace and Defence: utilized in precision-guided munitions in missiles, high-power sonar on ships and submarines, stealth helicopters, etc.
- Health care: utilized in medical imaging devices, like MRIs, modern surgical machines
- Clean Energy: utilized in wind turbines, electric batteries and energy-efficient lights (LEDs and CFLs)
- Nuclear Energy: useful for controlling nuclear reactions and is employed on top of things rods.
- Electronics: Used as phosphors in beam tubes, fluorescent lamps and X-ray intensifying screens.
- Chemicals, Oil Refining, and manufacturing: Make the refining of petroleum into gasoline more efficient and are utilized in many specialty metal alloys

Production and Trade: China possesses one-third of the world's known deposits of rare-earth element metals and is that the world leader in REE supply comprising 90% of the worldwide market.

15. Definition of kilogram

Context: The CSIR-NPL, which is India's official reference keeper of units of measurements released a group of recommendations requiring that school textbooks, engineering-education books, and course curriculum update the definition of the kilogram.

- Kilogram derived its provenance from the load of a block of a platinum-iridium alloy housed at the International Bureau of Weights and Measures in France. All other prototypes that served as national reference standards, including the one at New Delhi's CSIR-National Physical Laboratory (NPL), were calibrated thereto

The Definition of the Kilogram is modified by redefining the international system of units (SI) on World Metrology Day (20 May, 2019).

About

- The Kilogram will not derive its provenance from the load of a block of a platinum-iridium alloy housed at the International Bureau of Weights and Measures in France.
- The Kilogram has joined other standard units of measure like the second, metre, ampere, kelvin, mole and candela that might not be defined by physical objects.
- It now hinges on the definition of the Planck Constant, a continuing of nature that relates to how matter releases energy.

Significance

- Earlier, the change in definition of the second has helped in easing communication across the planet via technologies like GPS and therefore the Internet.
- In an equivalent way, the change within the definition of the kilogram will led to practical advantages for scientists to form very precise measurements. This measure is now defined on the idea of unchanging universal, physics constants.
- Thus, to answer the question what proportion may be a kilogram, we'll not need to compare blocks of platinum or worry about scratching them. But this doesn't mean that weights everywhere are going to be thrown off balance. For everyday measurements, consumers eager to calibrate their instruments – whether it's for high-precision drug manufacturing or retail weighing machines- will continue doing it an equivalent way.

16. SnowEx

For a far better understanding of what proportion water is contained in each winter's snowfall and the way much are going to be available when it melts within the spring, NASA has launched a seasonal campaign — a part of a five-year programme called SnowEx, initiated in 2016-17.

About:

- SnowEx may be a five year program initiated and funded by NASA.
- The goal is to deal with the foremost important gaps in our snow remote sensing knowledge, and thus lay the groundwork for a future snow satellite mission
- The geographical focus of SnowEx is proposed as North America, which contains the six broad snow climate categories identified within the literature: tundra (alpine or Arctic), taiga (Boreal forest), warm (temperate) forest, maritime, prairie, and ephemeral.
- Within its geographic range, SnowEx assesses where snow has fallen, what proportion there's and the way its characteristics change because it melts.

17. Project NETRA

ISRO has initiated 'Project NETRA' – an early warning system in space to detect debris and other hazards to Indian satellites.

What is Project NETRA?

- Project NETRA is an early warning system in space to detect debris and other hazards to Indian satellites.
- The project is estimated to cost ₹400 crores.
- NETRA's eventual goal is to capture the GEO, or geosynchronous orbit, the scene at 36,000 km where communication satellites operate.
- Under NETRA, or Network for space object Tracking and Analysis, the ISRO plans to place up many observational facilities:
 - ✓ connected radars, telescopes
 - ✓ data processing units
 - ✓ a control centre
- They can, among others, spot, track and catalogue objects as small as 10 cm, up to a variety of three ,400 km and adequate to an area orbit of around 2,000 km.

18. Li-S battery- super-capacity prototype

Researchers from Australia have claimed that they need developed the world's most effective lithium-sulfur (Li-S) battery, capable of powering a smartphone for five continuous days. With this equivalence, an electrical car would be ready to drive a distance of over 1,000 km in one charge.

Advantages of the Li-S batteries

- Li-S batteries are generally considered to be the successors of the Lithium-ion (Li-ion) batteries due to their lower cost of production, energy efficiency and improved safety.
- Their cost of production is lower because sulfur is abundantly available.
- Even so, there are some difficulties when it involves commercialising these batteries, mainly thanks to their short life cycle and poor instantaneous power capabilities.

19. Hyperloop

It is a transportation where a pod-like vehicle is propelled through a near-vacuum tube connecting cities at speeds matching that of an aircraft.

The hyperloop concept may be a brainchild of Tesla founder Elon Musk.

What was the proposed Hyperloop route in India?

- The proposed Hyperloop route in India are going to be connecting Mumbai and Pune in Maharashtra.
- The proposed system will cut time period between Mumbai and Pune to 25 minutes from the three hours it now takes by road.
- Mumbai-Pune Hyperloop is estimated to attach 26 million people, support 150 million passenger trips per annum , and reduce greenhouse gas emissions by up to 86,000 tonnes over 30 years.

What is Hyperloop?

- Hyperloop may be a proposed system of transport that might see pods or containers travel at high speeds through a tube that has been pumped into a near-vacuum.
- The train pods would either float using maglev technology.
- The pods would be ready to travel at immense speeds with a projected top speeds of 760mph.
- The pod would initially launch using an electrical motor before levitation takes place and therefore the pod can glide at cruising speed within the low-pressure environment.
- Hyperloop One is that the company which is functioning on this technology, has proposed routes in UK, Netherlands, Finland and Dubai, where it's backing from the governments to explore the potential of the system.

20. REVERSE OSMOSIS(RO)

- The Union Environment Ministry has issued a draft notification that seeks to regulate membrane-based water filtration systems in areas where the source of water meets drinking water norms of the Bureau of Indian Standards.
- This primarily affects reverse osmosis (RO)-based water filtration systems and therefore the rules, a minimum of in letter, effectively prohibit homes from installing domestic RO systems.

What is reverse osmosis?

- Osmosis is that the movement of solvent molecules from the region of pure solvent (area of low solute concentration) towards the answer (area of upper solute concentration) through a membrane .
- Using the concept of osmosis and pressure , a process called reverse osmosis (RO) has been devised.
- RO may be a process during which an outsized pressure is applied to the answer side so on overcome the pressure .
- This pushes the pure solvent under pressure, out of the solution through the membrane .
- This process finds variety of practical applications like purification of drinking water, removal of salt from water molecules, removal of effluents from water, etc.

21. Ease 3.0 for tech-enabled Banking

This move is predicted to vary the customer's experience at the public Sector Banks (PSBs).

What is EASE?

- EASE is about of technology-based banking reforms. It aims at improvising banking sector with technology.
- It ensures wider financial inclusion, better banking experience and easier credit distribution.

Background:

- PSB Reforms EASE Agenda may be a common reform agenda for PSBs aimed toward institutionalizing clean and smart banking.
- It was launched in January 2018, and therefore the subsequent edition of the program — EASE 2.0 built on the inspiration laid in EASE 1.0 and furthered the progress on reforms.
- In EASE 2.0, the govt had proposed pushing liquidity within the public sector banks, reconstituting the management committee and possible mergers among the perfect partners within the Indian banking sector.

EASE 3.0

- EASE 3.0 aims at providing smart, tech-enabled public sector banking experience for aspiring India, by establishing paperless and digitally-enabled banking at places where people visit the foremost like malls, stations etc.
- With EASE 3.0, the govt is trying to reinforce the customer experience with the introduction of features like Dial-a-loan, credit at a click, alternate-data-based lending or other analytics-based credit offers.

EASE 3.0 reforms agenda include facilities like:

- Palm Banking for “End-to-end digital delivery of monetary service”.
- “Banking on Go” via EASE banking outlets at frequently visited spots like malls, stations, complexes and campuses.
- Digitalizing the experience at public sector bank branches

22. POLYCRACK

Indian Railways has commissioned country's first governmental Waste to Energy Plant, having capacity of 500 Kg waste per day, in Mancheswar Carriage Repair Workshop at Bhubaneswar in East Coast Railway.

Polycrack Technology

- It is world's first patented heterogeneous catalytic process which converts multiple feed stocks into hydrocarbon liquid fuels, gas, carbon and water.
- The process may be a closed loop and doesn't emit any hazardous pollutants into the atmosphere.
- Polycrack Plant are often fed with all kinds of plastic, petroleum sludge, un-segregated MSW (Municipal Solid Waste) with moisture up to 50%, e-waste, automobile fluff, organic waste including bamboo, garden waste etc., and Jatropha fruit and palm bunch.

Polycrack has the subsequent advantages over the traditional approach of treating solid waste:

- Pre-segregation of waste isn't required to reform the waste. Waste as collected are often directly fed into Polycrack.
- It is an indoor unit hence the working environment is dust free.
- All constituents are converted into valuable energy thereby making it Zero Discharge Process.

S & T - Developments in Space

22. 'Accretion Burst Event'

- Observing a star formation has been difficult because they form in close proximity to other massive stars.
- Stars are formed by rotating disc of gases, funneling matter into the centre of a growing star causing it to accumulate more mass. Recently, astronomers found that the rate at which the funnelling of matter occurs differs from time to time.
- Periods during which the forming star swallows up an enormous amount of matter leads to a burst of activities. this is often termed as an accretion burst event.
- Accretion burst types which will depend upon the mass and evolutionary stage of the forming star.
- It's an incredibly rare event that throughout our history we've been ready to observe only three such events albeit Milky Way possesses billions of massive stars.
- Since the primary detection of an accretion burst in 2016, astronomers of the planet have close to make the Maser Monitoring Organisation (M2O). the aim of which is to validate reported bursts and follow it up with more observations.
- NEONs are computationally created virtual humans — the word derives from NEO (new) +human.
- For now the virtual humans can show emotions when manually controlled by their creators.
- But the thought is for NEONs to become intelligent enough to be fully autonomous, showing emotions, learning skills, creating memories, and being intelligent on their own.

23. Gravity Recovery And Climate Experiment (GRACE) Mission

Gravity Recovery And Climate Experiment (GRACE) Mission

- It was launched in March of 2002, and was a second mission under the NASA Earth System Science Pathfinder (ESSP) Program.
- Aim of the GRACE mission was accurately mapping variations in Earth's gravity field.
- GRACE consists of two identical spacecraft that fly about 220 kilometers apart during a polar orbit 500 kilometers above Earth.
- GRACE maps Earth's gravity field by making accurate measurements of the space between the 2 satellites, using GPS and a microwave ranging system.

Gravity Recovery And Climate Experiment-Follow-on (GRACE-FO) Mission

- GRACE-FO may be a successor to the first GRACE mission, and was launched in 2018.
- The mission may be a partnership between NASA and therefore the German Research Centre for Geosciences (GFZ).
- GRACE-FO works within the field of tracking Earth's water movement to watch changes in underground water storage, the quantity of water in large lakes and rivers, soil moisture, ice sheets and glaciers, and water level caused by the addition of water to the ocean.

24. Artificial Neural Networks based global Ionospheric Model

Researchers from Indian Institute of Geomagnetism (IIG), Navi Mumbai, an autonomous institute of the Department of Science & Technology, Govt. of India, have developed a worldwide model to predict the ionospheric electron density with larger data coverage, an important need for communication and navigation.

About the Model:

- A new Artificial Neural Networks based global Ionospheric Model (ANNIM) (ANNIM) has been developed by using long-term Ionospheric observations to predict the Ionospheric electron density and therefore the peak parameters.

- The ANNIM can capture the overall morphological features of the Ionosphere during the disturbed space weather periods, like Geomagnetic storms which occurs when the magnetic cloud originated from Sun (known as Coronal Mass Ejection (CME)) interacts with the Earth's magnetosphere.

What are Artificial Neural Networks(ANNs)?

They help in replicating the processes within the human brain (or biological neurons) to unravel problems like pattern recognition, classification, clustering, generalization, linear and nonlinear data fitting, and statistic prediction.

25. GW190412.

For the first time since it started functioning, the gravitational wave observatories at LIGO scientific collaboration have detected a merger of two unequal-mass black holes.

About:

- The event, dubbed GW190412, was detected nearly a year ago, and this is often almost five years after the primary ever detection of gravitational wave signals by these powerful detectors.
- The event involved two black holes of unequal masses coalescing, one among which was some 30 times the mass of the Sun and therefore the other which had a mass nearly 8 times the solar mass.
- The actual merger happened at a distance of two .5 billion light years away.

26. Geofencing

The government has tested an application that triggers e-mails and SMS alerts to an authorised agency if an individual has jumped quarantine or escaped from isolation, supported the person's mobile phone's cell tower location.

More about the app:

- Government has assessed an application that generates E-mails and SMS alerts to an authorised agency if an individual has jumped quarantine or Escaped from Isolation, supported the person's mobile phone's cell tower location.
- Centre is using powers under the Indian Telegraph Act to "fetch information" from Telecom Companies every quarter-hour to trace COVID-19 cases across the Country.
- On March 29, the Department of Telecommunications (DoT) shared a standard operating procedure (SOP) with all Telecom service providers regarding the appliance called COVID-19 Quarantine Alert System (CQAS).
- Kerala was one among the first States to use Geo-Fencing to trace COVID-19 cases.

27. SunRISE mission

About

- The Sun radio interferometer Space Experiment (SunRISE) will check out how Sun generates and releases the enormous weather storms, referred to as the solar particle storms, into space.
- The SunRISE mission is to know how such storms affect region can help protect spacecraft and astronauts.
- NASA designed it to find out more about how the sun generates and throws off giant space weather storms, referred to as solar particle storms.
- SunRISE will gather information on how the system works. Knowing this might help NASA protect astronauts traveling to the Moon and Mars.

28. Betelgeuse, a red supergiant star

Using the european Space Organisation's (ESO) Very Large Telescope (VLT), astronomers have noticed the unprecedented dimming of Betelgeuse, a red supergiant star (over 20 times bigger than the Sun) within the constellation Orion.

- Betelgeuse was born as a supermassive star many years ago and has been "dramatically" and "mysteriously" dimming for the last six months.

- What has intrigued some astronomers is that the incontrovertible fact that along side the dimming, the star's shape has been changing also . rather than appearing round, the star now appears to be "squashed into an ova."
- While Betelgeuse's behaviour is out of the standard , it doesn't mean that an eruption is imminent since astronomers predict the star to blast sometime (supernova explosion, which is that the largest explosion to require place in space) within the next 100,000 years approximately .

About VLT:

It is the world's most advanced instrument , consisting of 4 Unit Telescopes with main mirrors of 8.2m diameter and 4 movable 1.8m diameter Auxiliary Telescopes.

- The telescopes can work together, to make an enormous 'interferometer', the ESO Very Large Telescope Interferometer, allowing astronomers to ascertain details up to 25 times finer than with the individual telescopes.
- Location: Atacama Desert , Northern Chile.
- The VLT consists of 4 individual telescopes. they're generally used separately but are often used together to realize very high angular resolution.
- The four separate optical telescopes are referred to as Antu, Kueyen, Melipal, and Yepun, which are all words for astronomical objects within the Mapuche language.

29. Aditya- L1 mission

- The ISRO is preparing to send its first scientific expedition to review the Sun.
- Named Aditya-L1, the mission, expected to be launched early next year, will observe the Sun from an in depth distance, and check out to get information about its atmosphere and magnetic flux .

What is L1?

- L1 refers to Lagrangian/Lagrange Point 1, one among five points within the plane of the Earth-Sun system.
- Lagrange Points, named after Italian-French mathematician Joseph-Louis Lagrange, are positions in space where the gravitational forces of a two-body system (like the Sun and therefore the Earth) produce enhanced regions of attraction and repulsion.
- These are often employed by spacecraft to scale back fuel consumption needed to stay in position.

30. Artemis Mission

NASA has announced new decide to establish a permanent lunar presence and put an American on the Moon. The project is known as Artemis.

What is Artemis?

Artemis- Acceleration, Reconnection, Turbulence and Electrodynamics of Moon's Interaction with the Sun. It is NASA's next mission to the Moon.

Objective: to live what happens when the Sun's radiation hits our rocky moon, where there's no magnetic flux to guard it.

Artemis was the dual sister of Apollo and goddess of the Moon in Greek mythology.

How this project is different from earlier moon missions?

- The femininity of the name may be a deliberate choice also . The Apollo missions were crewed exclusively by men, though they relied on many ladies for his or her success.
- This time things are different. Both women and men have explored and set records in space, and little question those of other identifications will do so soon also .
- In the history of Moon landings, it had been test pilots from the 1960s and 1970s, fighter pilots, and there have been no opportunities for ladies some time past . This program goes to enable a replacement generation of young girls to pursue their dream of touching down on moon.

31. VOYAGER 2

Voyager 2 has now penetrated faraway from the system into region.

What is interstellar space?

- In astronomy, the interstellar space is that the matter and radiation that exists within the space between the star systems during a galaxy

The mission

- The Voyager mission was launched within the 1970s, and NASA's probes were intended only to explore the outer planets.
- Voyager 2 departed Earth on 5 September 1977, a couple of days after Voyager 1 and left our system in 2013.
- The mission objective of the Voyager Interstellar Mission (VIM) is to increase the NASA exploration of the system beyond the neighbourhood of the outer planets to the outer limits of the Sun's sphere of influence, and possibly beyond.
- They are said to be the successors of Pioneer series.
- Voyager 2 is that the only probe ever to review Neptune and Uranus during planetary flybys.
- It is that the second man-made object to go away our planet after Voyager 1, which is 6 years before it.
- Voyager 2 is that the only spacecraft to possess visited all four Jovian planet planets Jupiter, Saturn, Uranus and Neptune — and discovered 16 moons.

32. PSLV-C47 :Cartosat 3 Satellite

Recently, Cartosat 3 was launched by ISRO. Cartosat-3 is that the third generation Earth observation satellite built by ISRO.

It is one among the foremost advanced imaging satellites built by the organization thus far .

It has the potential to supply high resolution aerial images within the world.

CARTOSAT-3 will provide high-resolution images for remote sensing with a ground resolution of 25 cm: it can devour an object of a minimum of 25 cm size from a height of around 500 km.

- CARTOSAT-3 became referred to as the 'Sharpest Eye' in civil remote sensing satellites by breaking the record of a US-based satellite WorldView-3 that provided a ground resolution of 31cm.

33. Hera Mission

European ministers responsible of the ESA space agency have approved Hera, a mission which will test whether deflection could save humanity from a rogue asteroid.

- Hera Mission is that the asteroid deflection mission of European Space Agency (ESA)
- Asteroid hit is widely acknowledged together of the likeliest causes of extinction of life on Earth
- There are around 25,000 near-Earth objects (NEOs) that orbit the Sun on a trajectory that brings them on the brink of our planet's orbit. NASA tracks such near-Earth objects to make sure they are doing not become threats. However, certain near-Earth objects are classified as "potentially hazardous" which are 140 metres or more in size and are available within 0.05 AU (astronomical unit) to Earth.
- The twin-asteroid system Didymos may be a binary near-Earth asteroid. consistent with NASA, while the first body of Didymos is approximately 780 meters across, its secondary body or "moonlet" is about 160-meters in size, which is more typical of the dimensions of asteroids that would pose the foremost likely significant threat to Earth. So, Didymos makes an appropriate target for NASA and ESA's mission.

- Scientists have suggested alternative ways to keep off such successful , like berating the asteroid before it reaches Earth, or deflecting it off its Earth-bound course by hitting it with a spacecraft
- In an ambitious double-spacecraft mission to deflect an asteroid in space, NASA and therefore the European Space Agency (ESA), have come up with Asteroid Impact Deflection Assessment (AIDA).
- NASA is building the Double Asteroid Impact Test (DART) spacecraft for launch in summer 2021. it's planned to hit the target at 6.6 km/s in September 2022. Flying along side DART are going to be an Italian-made miniature CubeSat, called LICIAcube, to record the instant of impact.
- ESA's contribution may be a mission called Hera, which can perform a close-up survey of the post-impact asteroid, acquiring measurements like the asteroid's mass and detailed crater shape. Hera also will deploy a pair of CubeSats for close-up asteroid surveys and therefore the very first radar probe of an asteroid. All this is able to allow researchers to model the efficiency of the collision. this will help turn this experiment into a way that would be repeated, as needed, within the event of a true threat

34. RISAT-2BR1

India's Polar Satellite Launch Vehicle, in its fiftieth flight (PSLV-C48), has successfully launched RISAT-2BR1 alongside nine commercial satellites from the Satish Dhawan Space Centre (SDSC) SHAR, Sriharikota. This is PSLV's 50th successful mission and therefore the 75 th launch vehicle mission from SDSC SHAR, Sriharikota.

What is RISAT-2BR1?

It is a radar imaging earth observation satellite.

It provides services within the field of agriculture, forestry and disaster management.

Its mission life is 5 years.

35. GSAT-30

GSAT-30 communication will aim to supply high-quality telecommunications, television and broadcasting services.

India's telecommunication satellite GSAT-30 was successfully embarked on a Geosynchronous Transfer Orbit (GTO) on January 17, 2020 from Kourou launch base, French Guiana by Ariane-5 VA-251.

About:

- According to Indian Space Research Organisation (ISRO), GSAT-30 is aimed toward providing high-quality television, telecommunications and broadcasting services. With a mission lifetime of 15 years, GSAT-30 is an operational communication satellite for DTH, television uplink and VSAT services.
- GSAT-30 will function replacement to the aging INSAT-4A spacecraft services with enhanced coverage. The 3,357-kg GSAT-30 derives its heritage from ISRO's earlier INSAT/GSAT satellite series, and is provided with 12 C and 12 Ku band transponders.
- The satellite will provide Indian mainland and islands coverage in Ku-band and extended coverage in C-band covering Gulf countries, an outsized number of Asian countries and Australia.

S&T- IT, AI & Bio- Tech

36. RAPID ANTIGEN AND ANTIBODY TEST

Antigen and antibody tests became significant in determining positivity rate for the COVID-19 infections also on determine if those affected have developed antibodies and immunity.

How antibody tests are done?

Antibodies are proteins that the body's white blood cells produce to fight an infection. They bind to a virus, preventing it from infecting a cell, and may remain in blood long after the infection clears. Antibody tests are commonly wont to test for exposure to other viruses.

- Antibody tests were particularly effective find out if an individual who had never shown symptoms had been previously infected by the virus.
- However, these tests could also help within the diagnosis of active cases.
- When patient gets infected initially , he/she make an antibody called IgM. After a couple of weekes, it gets switched to an antibody called IgD.
- If the tests find IgM, it means the patient has recently got infected.

36. ScitechAiron

JClean Weather Technologies, an incubatee company in Pune's Scitech Park has developed a replacement technology under the Nidhi Prayas program to disinfect closed spaces and rooms.

- The product is known as "ScitechAiron". it's a Negative Ion Generator.
- The technology has been developed under the NIDHI PRAYAS program initiated by the Department of Science and Technology (DST).

How does it work?

- The device works by generating approximately 100 million negative ions every eight seconds.
 - ✓ The negative ions generated by the ionizer forms clusters around microparticles like airborne mold, influenza viruses or coronaviruses, and render them inactive.
- The ions trigger a reaction by creating highly reactive OH groups called hydroxyl radicals, which act like 'atmospheric detergents'.
- The same way during which soap and water help disintegrate the outer lipid layer of the coronavirus, these 'atmospheric detergents' help break down the outer protein of the allergens, viruses and bacteria.
- The device also can pack up the air and disinfect quarantine facilities, and help better protect medical staff against infection.

37. NIDHI-PRAYAS Program:

- NIDHI-PRAYAS is National Initiative for Developing and Harnessing Innovation PRomoting and Accelerating Young and ASpiring Innovators &startups.
- This program allows the innovators to undertake their ideas without worrying of failure, hence allowing them to succeed in a stage where they need a ready product and are willing to approach incubators for commercialization.

38. COMMERCIAL CORD BLOOD BANKING

Why in News?

- Poona Citizen Doctor Forum (PCDF), a body that aims to rebuild trust among citizens and doctors, and promote ethical rational practice , has come to the fore to bust the aggressively promoted concept of cord blood banking

About

- Cord Blood:
 - ✓ Cord blood (short for umbilical cord blood) is that the blood that is still within the duct and placenta post-delivery.
 - ✓ Cord blood has an abundance of stem cells and system cells, and therefore the medical uses of those cells are expanding at a rapid pace.
 - ✓ As these cells help the body re-generate tissues and systems, cord blood is usually mentioned as regenerative medicine.
 - ✓ Cord blood is currently approved by the FDA for the treatment for nearly 80 diseases, and rope blood treatments are performed quite 35,000 times round the globe to treat cancers (including lymphoma and leukemia), anaemias, inherited metabolic disorders and a few solid tumours and orthopaedic repair.
- Cord Blood Banking:
 - ✓ Cord blood banking is that the process of collecting the cord blood and extracting and cryogenically freezing its stem cells and other cells of the system for potential future medical use.
 - ✓ Globally, cord blood banking is suggested as a source of hematopoietic stem cell transplantation for haematological cancers and disorders where its use is suggested .
 - ✓ For all other conditions, the utilization of cord blood as a source of stem cells isn't yet established.

39. Starlink network project

The SpaceX, the world's leading private company in space technology, last week fired a sprig of 60 satellites into orbit. Following last week's launch, the corporate has now deployed 122 satellites in orbit with a target of 12000 altogether .

Why Space internet services?

- This is especially to make sure that reliable and uninterrupted Internet services is ensured across the planet
- Currently, about 4 billion people, quite half the world's population, don't have access to reliable Internet networks.
- And that's because the normal ways to deliver the web — fibre-optic cables or wireless networks — cannot take it everywhere on Earth.
- In many remote areas, or places with difficult terrain, it's not feasible or viable to line up cables or mobile towers.
- Signals from satellites in space can overcome this obstacle easily.
- Space-based Internet systems have, in fact, been in use for several years now — but just for a little number of users.
- Also, most of the prevailing systems use satellites in geostationary orbit.
- This orbit is found at a height of 35,786 km over the Earth's surface, directly above the Equator.
- Satellites during this orbit move at speeds of about 11,000 km per hour, and complete one revolution of the world within the same time that the world rotates once on its axis.

41. 'Feluda Test' for COVID-19

India has approved Feluda Test for detecting COVID-19.

In-Detail

- The Drugs Controller General of India (DCGI) launched an accurate and low-cost paper-based test strip to detect COVID-19 in but half-hour for commercial use.

- The test has been named as Feluda by the research team of the Council of Scientific and Industrial Research (CSIR) and Tata Group.
- Feluda may be a fictional private detective from West Bengal created by the author and filmmaker Satyajit Ray.

New Feluda Test

- Feluda is understood as FNCAS9 Editor Linked Uniform Detection Assay.
- It uses CRISPR gene-editing technology to spot and target the genetic material of SARS-CoV2.
- The test matches the accuracy levels of RT-PCR tests and is taken into account because the gold standard within the diagnosis of COVID-19.
- It features a quick turnaround and requires cost-effective equipment.
- The US is that the first country within the world to approve a CRISPR-based test for COVID-19. This test was developed by the Massachusetts Institute of Technology and Harvard University .
- The Tata's Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) test powered by CSIR-Institute of Genomics and Integrative Biology (IGIB) Feluda has met the benchmark with 96% sensitivity and 98% specificity for detecting coronavirus.
- Feluda is that the world's first diagnostic test to deploy a specifically adapted Cas9 protein.
- To detect SARS-CoV2, the opposite CRISPR tests uses CAS12 and CAS 13 protein.
- The research team created the new test kit while working under the red blood cell mission for genome diagnostics and therapeutics.

42. Pool testing for Coronavirus

The Indian Council of Medical Research (ICMR) has issued an advisory for using 'pooled samples' for testing of COVID-19.

What is pooled testing?

- In a pooled testing algorithm, samples of multiple individuals are put together during a tube and screened through the PCR test.
- In case the pooled test seems to be positive, individual samples are tested, which is mentioned as pool de-convolution.
- If there's no positive result, all individual samples within the pool are considered negative, leading to substantial cost savings.

43. Chitra GeneLAMP- -N

In News- Chitra GeneLAMP-N may be a promising technology developed by a Department of Science and Technology (DST)-funded laboratory to accelerate coronavirus (COVID-19) testing in India.

About the Chitra GeneLAMP-N:

- It is developed by Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Trivandrum.
- It uses the Reverse Transcription Loop-mediated Isothermal Amplification (RT-LAMP) technique for detecting the diagnostic test for N-gene of COVID-19 virus.
- The Reverse transcription loop-mediated isothermal amplification (RT-LAMP) may be a technique for the amplification of RNA.
- It can detect two regions of the gene which can make sure that the test doesn't fail albeit one region of the viral gene undergoes mutation during its current spread.
- The diagnostic assay under this system is extremely fast because the detection time is merely 10 minutes and therefore the sample to result time are going to be but two hours.

About N gene test:

- Most RT-PCR kits specialise in two different genes, the E (envelope) gene and therefore the RdRP (RNA dependent RNA polymerase) gene.
- The World Health Organization recommends an E and RdRP test, while the U.S.'s Centers for Disease Control and Prevention (CDC) requires an N gene test.
- The N gene test may be a confirmatory test and widely employed in Germany and China, among other countries and it's a sophisticated design and may be expensive.
- The CDC protocol says three regions of the N gene must be analysed but the Chitra-model tests two to verify the identity of the virus.

44. MACS 4028

Scientists from Agharkar Research Institute (ARI), Pune, an autonomous institute under the Department of Science & Technology have developed a biofortified durum variety MACS 4028, which shows high protein content.

What is Biofortification?

- Fortification is that the practice of deliberately increasing the content of an important micronutrient, i.e. vitamins and minerals (including trace elements) during a food, so on improve the nutritional quality of the food supply and supply a public health benefit with minimal risk to health.
- Biofortification is that the process by which the nutritional quality of food crops is improved through agronomic practices, conventional plant breeding, or modern biotechnology.
- Examples of biofortification projects include:
 - ✓ iron-biofortification of rice, beans, sweet potato, cassava and legumes;
 - ✓ zinc-biofortification of wheat, rice, beans, sweet potato and maize;
 - ✓ provitamin A carotenoid-biofortification of sweet potato, maize and cassava; and
 - ✓ amino acid and protein-biofortification of sourghum and cassava.

About:

- MACS 4028 may be a semi-dwarf variety, which matures in 102 days and has shown the superior and stable yielding ability of 19.3 quintals per hectare. it's immune to stem rust, leaf rust, foliar aphids, root aphids, and brown wheat mite.
- The wheat variety shown high protein content of about 14.7%, better nutritional quality having zinc 40.3 ppm, and iron content of 40.3ppm and 46.1ppm respectively, good milling quality and overall acceptability.
- The MACS 4028 variety is additionally included by the Krishi Vigyan Kendra (KVK) programme for United Nations Children's Fund (UNICEF) to alleviate malnutrition during a sustainable way and may boost the Vision 2022 "KuposhanMukt Bharat", the National Nutrition Strategy.

45. National Mission on Quantum Technologies and Applications.

Finance minister Nirmala Sitharaman's Union allow 2020-21, presented on February 1, 2020, proposed Rs 8,000 crore over five years for National Mission on Quantum Technologies and Applications.

Quantum Technology:

- Quantum Technology is predicated on the principles of scientific theory , which explains the character of energy and matter on the atomic and subatomic level.

- It cares with the control and manipulation of quantum systems, with the goal of achieving information science beyond the bounds of the classical world.
- Its principles are going to be used for engineering solutions to extremely complex problems in computing, communications, sensing, chemistry, cryptography, imaging and mechanics.
- This key ability makes quantum computers extremely powerful compared to standard computers when solving certain sorts of problems like finding prime factors of huge numbers and checking out large databases.

NM-QTA:

- The mission will function under the Department of Science & Technology (DST).
- It are going to be able address the ever increasing technological requirements of the society, and take under consideration the International Technology Trends.
- The mission will help prepare next generation skilled manpower, boost translational research and also encourage entrepreneurship and start-up ecosystem development.

46. Genome India project

Overview of Genome India Project:

The Genome India Project (GIP) may be a gene mapping project cleared by the Department of Biotechnology.

GIP will involve 20 leading institutions of the country with the Centre for Brain Research of Indian Institute of Science (IISc) Bangalore because the nodal point.

The Rs 238-crore Genome India Project will involve 20 leading institutions including the Indian Institute of Science (IISc) in Bengaluru and a couple of IITs.

The first stage of the project will check out samples of “10,000 persons from everywhere the country” to make a “grid” which will enable the event of a “reference genome”.

The IISc’s Centre for Brain Research, an autonomous institute, will function the nodal point of the project.

Aim of GIP

The aim of the project is to create an “Indian reference genome”, supported which the traits of the various Indian population might be understood.

The GIP will add on to the prevailing database from HGP and advance the explanation for the understanding the range of the Indian population.

The diversity of the Indian population is represented by

- Horizontal diversity – ranging from the primary migrations from Africa and subsequent periodic migrations, leading to the genetic intermingling of all races and
- Vertical diversity – traits passed on within some groups as a results of endogamy.

47. Muktoshti (IET 21845)**Muktoshri**

- The new rice variety, Muktoshti — also called IET 21845 —, was developed jointly by the Rice Research Station at Chinsurah coming under West Bengal’s Department of Agriculture and therefore the National Botanical Research Institute, Lucknow.
- A gazette notification for the commercial use of Muktoshti was made by West Bengal last year.
- During our multilocational trials, it had been found that this variety uptakes very less amount of arsenic from soil and water as compared to other sorts of rice.

- The rice is long and thin, and aromatic. Across the State, thousands of farmers have started cultivation, even in areas where arsenic in groundwater isn't a problem, due to the aroma and therefore the yield.

Arsenic contamination:

- Arsenic is of course present at high levels within the groundwater of variety of nations. It's highly toxic in its inorganic form.
- Arsenic contamination of groundwater is widespread and there are variety of regions where arsenic contamination of drinking-water is critical.
- Arsenic is one among WHO's 10 chemicals of major public health concern.
- It is now recognized that a minimum of 140 million people in 50 countries are beverage containing arsenic at levels above the WHO provisional guideline value of 10 µg/L (4).
- According to the newest report of the Central spring water Board (CGWB), 21 states across the country have pockets with arsenic levels above the Bureau of Indian Standards' (BIS) stipulated permissible limit of 01 milligram per litre (mg/l).
- In India, arsenic contamination was first officially confirmed in West Bengal in 1983. On the brink of four decades after its detection, the scenario has worsened, about 9.6 million people in West Bengal are at immediate risk from arsenic contamination in groundwater.
- West Bengal is among the States with the very best concentration of arsenic in groundwater, with as many as 83 blocks across seven districts having higher arsenic levels than permissible limits.

48. Contract for the web

- Sir Tim Berners-Lee, inventor of the world Wide Web, has announced a "Contract for the Web".
- It aims at saving the longer term of his invention, which is now almost an important condition for human existence.

Who has created this Contract?

- Representatives from over 80 organisations, including governments, companies, civil society activists, and academics.
- The goal was to make a typical policy for an internet that benefits all. The nine principles emerged after a series of discussions over almost a year.

What is the "Contract for the Web"?

- Berners-Lee announced plans for this accept 2018, and therefore the World Wide Web (WWW) Foundation worked thereon.
- The idea is to make a worldwide plan of action for all stakeholders to together plan to building a far better Web.
- The Contract consists of 9 principles - three each for governments, private companies, and individuals and civil society to endorse - with 76 clauses each.
- The Contract wasn't meant to be simply aspirational. It's meant to be implemented, and meant to be an idea of action.
- The governments who are looking to manage within the digital era, can use this as a roadmap to get out their policies and laws going forward.
- The companies to try to to an equivalent when they're developing their products and services for the planet.
- The individuals to endorse the contract on the official website.

49. NMR (Nuclear Magnetic Resonance) Spectroscopy

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”.

Nuclear magnetic resonance (NMR):

- The NMR spectroscopy is a crucial technique for structural characterization of pharmaceutical and other chemical molecules.
- It is employed to infer basic structure of unknown compounds.
- It helps to work out phase changes, solubility, conformational exchange and diffusion.
- The technique is employed to watch the local magnetic fields around atomic nuclei.
- Biochemists use NMR technique to spot proteins and other complex molecules.

Zeeman effect”

Zeeman, first observed the strange behaviour of certain nuclei when subjected to a robust magnetic flux at the top of the nineteenth century, but the sensible use of the so-called “Zeeman effect” was only made within the 1950s when NMR spectrometers became commercially available.

It is a search technique that exploits the magnetic properties of certain atomic nuclei. The NMR spectroscopy determines the physical and chemical properties of atoms or molecules.

50. GOVERNMENT INSTANT MESSAGING SYSTEM (GIMS)

The government has tested a prototype of an Indian equivalent of popular messaging platforms, like WhatsApp and Telegram, for secure internal use.

- GIMS is that the instant messaging platform for state communication.
- GIMS platform provides GIMS mobile client for fast messaging and GIMS Portal for administration and monitoring of platform.
- It is meant to suit the hierarchy and communication policies of the govt .
- Adaptable to both the central and government organizations for intra and inter organization communication.
- Designed and developed by the Kerala unit of National Informatics Centre (NIC),
- There are specific provisions in GIMS for documents and media sharing keep with the hierarchies within the government system.
- It is being developed as a secure Indian alternative without the safety concerns attached with apps hosted abroad or those owned by foreign entities.
- Like WhatsApp, GIMS employs end-to-end encryption for one-to-one messaging
- GIMS is being touted as a safer bet because the platform has been developed in India, the server hosting it's installed within the country and therefore the information stored would be in government-based cloud — NIC-operated data centres that are only meant for captive use by the govt and its departments

51. National Electronic Funds Transfer (NEFT)

Giving an enormous boost to digital funds movement, the reserve bank of India (RBI) operationalised round-the-clock (24 X 7 basis) availability of the National Electronic Fund Transfer (NEFT). RBI also asked the banks to not levy any charges on NEFT transfer from savings checking account holders.

Significance:

- Through this move, the RBI has joined an elite club of nations having payment systems that enable round-the-clock fund transfer and settlement of any value.
- The benefit to Customers: Customers can now transfer money through NEFT without paying any charges at any time of the day whereas banks charge a fee for fund transfer through cheques and Demand Draft (DD).

52. National Broadband Mission (NBM)

Minister for Communications, Law & Justice and Electronics and knowledge Technology, Shri Shankar Prasad has launched the National Broadband Mission (NBM).

National Broadband Mission

- The vision of the NBM is to means growth of digital communications infrastructure, bridge the digital divide and supply affordable and universal access of broadband for all.
- Some of the objectives of the Mission which is structured with strong emphasis on the three principles of universality, affordability and quality are:
 - ✓ Broadband access to all or any villages by 2022
 - ✓ Significantly improve quality of services for mobile and internet
 - ✓ Develop a Broadband Readiness Index (BRI) to live the supply of digital communications infrastructure and conducive policy ecosystem within a State/UT.
 - ✓ Creation of a digital fibre map of the Digital Communications network and infrastructure, including optical fiber Cables and Towers, across the country.

53. BIOSIMILAR MEDICINE : Trastuzumab

World Health Organization (WHO) had for the primary time approved a “biosimilar” medicine to form breast cancer treatment affordable to women globally.

What is Biosimilars

Biosimilars also are cheaper adaptations of basic bio-therapeutic drugs like generic medicine while their effectiveness is analogous. They are manufactured by companies when the patent of the first product has expired. Biotherapeutic medicines are those drugs that are manufactured from biological and living sources like cells, blood, blood cells, tissue, and other substances instead of synthesized chemicals.

54. Virtual human’ NEONs

The first project of Samsung’s Star Labs, NEONs are being called the world’s first artificial humans.

How do they work?

There are two core technologies behind his virtual humans.

1. First, there's the proprietary CORE R3 technology that drives the “reality, real time and responsiveness” behind NEONs.
2. Subsequent stage are going to be SPECTRA, which can complement CORE R3 with the “spectrum of intelligence, learning, emotions and memory”.

How could NEONs be used?

NEONs could be the interface for technologies and services.

- they're going to answer your queries at a bank, welcome you at a restaurant, or read out the breaking news on television at an unearthly hour.
- this type of virtual assistance would be simpler , for instance , while teaching languages, as NEONs are going to be capable of understanding and sympathising.

55. Centre of Excellence (CoE) in Blockchain Technology

In News

- a replacement Centre of Excellence (CoE) for Blockchain Technology, which will strive to adapt emerging technology to make e-governance solutions is established in Bangalore.
- The Centre of Excellence (CoE) by National Informatics Centre (NIC) is that the third such centre, following CoE for Data Analytics and AI .

Objectives:

- Adoption of Blockchain technology in sectors like health, finance, agriculture and various other sectors would aid the govt in implementing various programmes and supply trust and immutability to the assets.
- The CoE has developed Blockchain-based Proof of Concepts (PoCs) for select government use cases to know the potential benefits provided by this emerging technology.
- With National Informatics Centre (NIC) providing a strong and agile infrastructure, the CoE shall also provide Blockchain as a Service (BaaS) for efficient hosting of Blockchain network.
- The applications of Blockchain within the Governance will help in enhancing transparency, traceability and trust in e-governance systems.

S&T- IPR Related issues

56. 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 varied 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.

What is PPH?

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

PPH programme would cause the subsequent 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. a chance for Indian inventors including MSMEs and begin ups of India to urge accelerated examination of their patent applications in Japan.

Eligibility:

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

57. PepsiCo India and Protection of Plant Varieties and Farmers' Rights Act, 2001'

Context: Document referred by PepsiCo India is being reviewed by Protection of Plant Varieties and Farmers Rights Authority (PPV&FRA)

- The ongoing case at the PPV&FRA revolves around PepsiCo's FL-2027 sort of potatoes, which it grows through a collaborative farmers programme, wherein the corporate sells seeds to 12,000 farmers and has an exclusive contract to shop for back their produce to form its chips.
- The company introduced the variability to India in 2009 and registered it under the PPV&FR Act in 2016.
- The FAQ document under the act states that "only small and marginal farmers involved in subsistence farming" are eligible to say rights under the Protection of Plant Varieties and Farmers Rights (PPV&FR) Act, 2001.

About Protection of Plant Varieties and Farmers' Rights (PPVFR) Act of 2001:

- It is an act of the parliament of India that was enacted to supply for the establishment of an efficient system for cover of plant varieties, the rights of farmers and plant breeders and to encourage the event and cultivation of latest sorts of plants.
- India have ratified the Agreement on Trade Related Aspects of the intellectual property rights hasd to form provision for giving effect to agreement. So, so as to offer effect to the aforesaid objectives, the Protection of Plant Varieties and Farmers Rights Act , 2001 has been enacted in India.
- The PPV&FR Act was enacted to grant intellectual property rights to plant Breeders, researchers and farmers who have developed any new plant varieties.

Farmers' rights ensured within the Act:

- Farmers are entitled to save lots of , use, sow, re-sow, exchange or sell their farm produce including seed of a registered variety in an unbranded manner.
- Farmers, varieties are eligible for registration and farmers are totally exempted from payment of any fee in any proceedings under this act.
- The period of protection for field crops is 15 years and for trees and vines is eighteen years and for notified varieties it's 15 years from the date of notification under section 5 of Seeds Act, 1966.
- Farmers can claim for compensation if the registered variety fails to provide expected performance under given conditions.

With Courtesy :

Indian express, The Hindu, Wikipedia, The Economist, The Jagran Josh, The down to earth, Web pages of various ministry, Blogs of Shashi tharoor, Civil daily, Next IAS, Raja Mandala, J. Sai Deepak, Indiakanon.com, InsightsonindiaIAS, The Frontline, Byjus, Indiatoday, VajiramandalilIAS, Rajya Sabha tv, Lok Sabha tv, IASbaba, Gsscore, India yearbook, NextIAS