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1 Cyclonic Storm "Tauktae"

CONTEXT:

- Recently, an unusually powerful tropical cyclone named Tauktae struck Gujarat.

ABOUT

- Tauktae is the fifth-strongest storm observed in the Arabian Sea since 1998.
- Winds of that strength can easily snap trees, topple power lines, and damage homes.
- The North Indian Ocean generates only about 7 percent of the world's tropical cyclones, but storms can be quite devastating when they occur because of the large number of people who live along low-lying coastlines.

Why Arabian Sea witnesses less cyclones?

- Compared to the Bengal Sea to the east, cyclones are uncommon in the Arabian Sea, an area that typically sees one or two storms per year.
- Cool water temperatures, dry air, and unfavorable upper-level winds typically make storms in the Arabian Sea weak and short-lived, though powerful storms occasionally come together under the right environmental conditions.
- In Tauktae's case, conditions were ideal. Upper-level winds were calm and conducive to storm formation.
- Sea surface temperatures in the Arabian Sea were about 31° Celsius (88° Fahrenheit) as the storm approached Gujarat, a few degrees warmer than usual for mid-May.
- A rule of thumb among scientists is that ocean temperatures should be above 27° C to sustain a tropical cyclone.
- During the past few decades, a group of the National Oceanic and Atmospheric Administration (NOAA) researchers have observed an increase in the intensity of tropical cyclones in the Arabian Sea, particularly in the post-monsoon season.
- The group's modeling results indicate that global warming and rising ocean temperatures are among the reasons for the change.

National Oceanic and Atmospheric Administration (NOAA):

- The National Oceanic and Atmospheric Administration (NOAA) is an American scientific agency within the United States Department of Commerce that focuses on the conditions of the oceans, major waterways, and the atmosphere.
- NOAA warns of dangerous weather, charts seas, guides the use and protection of ocean and coastal resources and conducts research to provide the understanding and improve stewardship of the environment.

2 Addressing Vulnerabilities of rural India in combating COVID-19 pandemic

CONTEXT:

- Panchayati Raj Ministry gears up to address vulnerabilities of rural India in combating COVID-19 pandemic

Why the role of Panchayat is important?

- While as a country we have abandoned the Five-year plan, each Panchayat has to make at least five such plans for five years: One each for-
  - sanitation
  - water security
  - education
  - development under the Mahatma Gandhi National Rural Employment Guarantee Act
  - overall village development
- Panchayats implement close to 80 per cent of the rural development schemes evolved by the governments, making them a unique elected body that also function as an executive.
- At their disposal is a dedicated fund under the Finance Commission, like that of states and also close to Rs 90,000 crore annually for implementing various rural-development schemes.

3 Sustainable Development Goal 3 on good health and well-being

CONTEXT:

- India highlighted its efforts in preventing the spread of corona virus and development of new drugs, vaccines, and other innovative measures for curing the covid-19 patients at a high-level roundtable on 'Using Science, Technology, and Innovation to close the gap on Sustainable Development Goal 3 on good health and well-being'.

What are Sustainable Development Goals (SDGs)?

- The Sustainable Development Goals (SDGs) or Global Goals are a collection of 17 interlinked global goals designed to be a "blueprint to achieve a better and more sustainable future for all".
- The SDGs were set up in 2015 by the United Nations General Assembly and are intended to be achieved by the year 2030. They are included in a UN Resolution called the 2030 Agenda or what is colloquially known as Agenda 2030.
- The SDGs were developed in the Post-2015 Development Agenda as the future global development framework to succeed the Millennium Development Goals which ended in 2015.

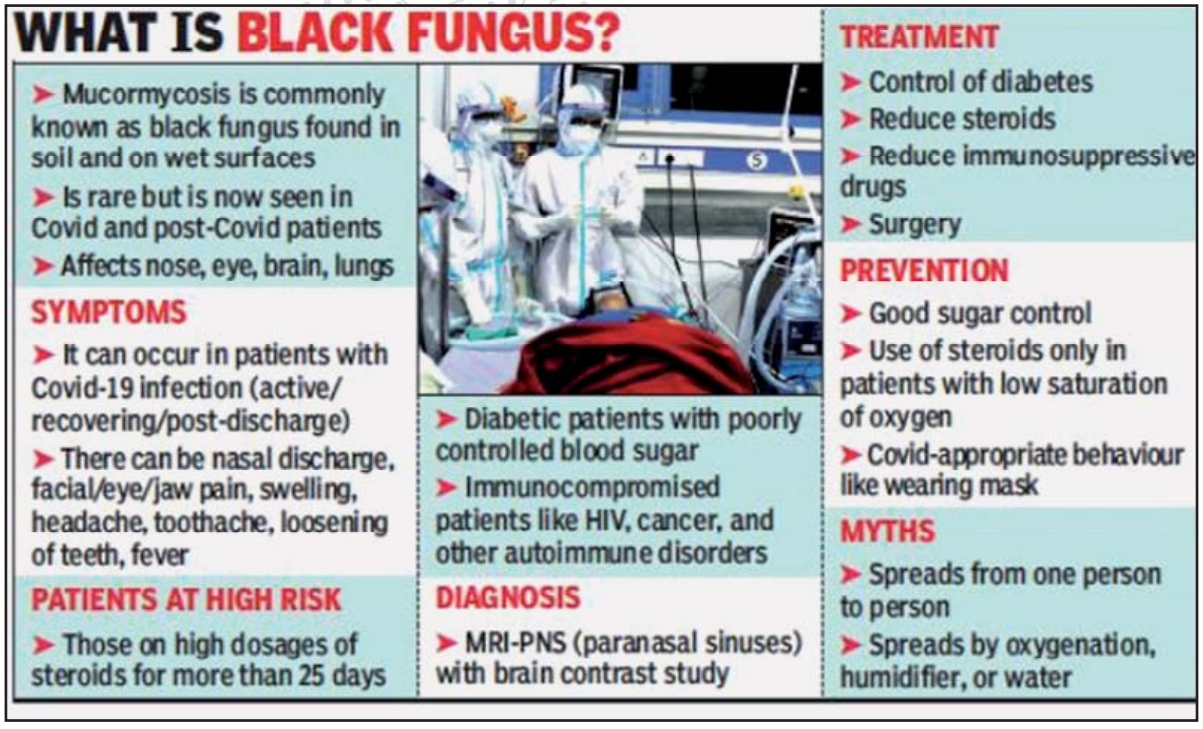
4 Efforts to ramp up treatment of Black Fungus disease

CONTEXT:

- Government of India proactively makes all round efforts to ramp up supply and availability of Amphotericin-B anti-fungal drug for treatment of Black Fungus disease.

What is Mucormycosis?

- Mucormycosis (previously called zygomycosis) is a serious but rare fungal infection caused by a group of molds called mucormycetes.
- Mucormycosis is a very rare infection. It is caused by exposure to mucor mould which is commonly found in soil, plants, manure, and decaying fruits and vegetables. "It is ubiquitous and found in soil and air and even in the nose and mucus of healthy people.
- It affects the sinuses, the brain and the lungs and can be life-threatening in diabetic or severely immunocompromised individuals, such as cancer patients or people with HIV/AIDS.
- Doctors believe mucormycosis, which has an overall mortality rate of 50%, may be being triggered by the use of steroids, a life-saving treatment for severe and critically ill Covid-19 patients.
- Steroids reduce inflammation in the lungs for Covid-19 and appear to help stop some of the damage that can happen when the body's immune system goes into overdrive to fight off coronavirus. But they also reduce immunity and push up blood sugar levels in both diabetics and non-diabetic Covid-19 patients.
- It's thought that this drop in immunity could be triggering these cases of mucormycosis.



5 Oxygen Expresses

CONTEXT:

- On Mission Mode, Oxygen Expresses deliver nearly 14500 MT of Liquid Medical Oxygen in more than 884 tankers by 224 Oxygen Expresses to the Nation

What is Liquid Medical Oxygen?

- Liquid oxygen—abbreviated LOx, LOX or Lox in the aerospace, submarine and gas industries—is the liquid form of molecular oxygen.
- Liquid Medical Oxygen is high purity oxygen used for medical treatment. It has been developed for use in the human body.
- Due to its low melting and boiling points, oxygen is in a gaseous state at room temperature.
- Liquification enables storage in larger volume and easier transportation.

How is liquid medical oxygen produced?

- There are various methods through which LMO can be produced.
- The most common production method is the separation of oxygen in Air Separation Units (ASUs).
- ASUs are production plants that separate large volumes of gases.
- ASUs use a method known as the 'Fractional Distillation Method' to produce pure oxygen from atmospheric air.

6 UV Disinfection technology to combat SARS-CoV-2

CONTEXT:

- CSIR-Central Scientific Instruments Organisation (CSIO) transfers the UV Disinfection technology to combat SARS-CoV-2 to 27 indigenous manufacturers

ABOUT:

- CSIR-CSIO has developed an UV-C air duct disinfection system.
- The disinfection system can be used in auditoriums, large conference rooms, classrooms, malls etc. which will provide a relatively safer environment for indoor activities in the current pandemic.
- The technology has been developed according to the requirements for deactivation of SARS COV-2 virus contained in an aerosol with necessary ventilation measures, necessary safety and user guidelines and tested Bio-safety standards etc.
- UV-C deactivates over 99 % of viruses, bacteria, fungus and other bio - aerosols etc. with appropriate dosages using 254nm UV light.
- Use of UV-C may also help in ameliorating the fungal infections being witnessed during the current wave of the pandemic.

Ultraviolet(UV)):

- Ultraviolet is a form of electromagnetic radiation with wavelength from 10 nm to 400 nm, shorter than that of visible light, but longer than X-rays.
- UV radiation is present in sunlight, and constitutes about 10% of the total electromagnetic radiation output from the Sun.

The Various Uses for UV Light:

- **Tanning and skin treatment:** UV light is used for tanning. It can be used to imitate the impact of sunlight on the skin. For indoor tanning, use of UV light is very common.
- **Fluorescent inspection**: UV lamps can be used to inspect various materials and surfaces. Materials react in different ways when they are exposed to the UV light. Some substances absorb the UV light's energy and change it into visible light. It is called fluorescence. For example, the ink of a highlighter pen has fluorescent dye.
- **Disinfection and germ control:** The ultraviolet light can inactivate the small creatures in the water. So, it is used for disinfecting drinking water. This process is absolutely chemical free and can effectively destroy bacteria that have a wavelength of 240 to 280 nanometers. The light destroys the bacteria's capacity to reproduce. So, no more bacteria grows in the water. UV light is widely used in water treatment facilities.
- **Air Cleaning and bug eradication**: Mold growth inside the house can affect the indoor air quality. If you can install UV air purification unit in your air conditioner duct then the quality of air can be improved. The UV-C light, which is in the 280 to 100 nm range, is used for air purification. This UV light can kill mold, mildew, germs, viruses, and bacteria that float in the air.
- **Indoor Gardening**: UV lights are used in the production of polyphenols. It is a very beneficial plant and is said to prevent cancer. It can also make you look young. It can help in raisin production as well. It can also help in the production of medical cannabis. In fact, the UV light helps in improving the medicinal properties of cannabis.

7 Pradhan Mantri Garib Kalyan Anna Yojana" (PM-GKAY III)

CONTEXT:

- Advisory has been issued by Department of Food and Public Distribution to all States/UTs to keep the Fair Price Shops open preferably on all days of the month and distribute PMGKAY III and NFSA foodgrains to beneficiaries.

Pradhan Mantri Garib Kalyan Anna Yojana:

- Pradhan Mantri Garib Kalyan Anna Yojana is a food security welfare scheme announced by the Government of India in March 2020, during the COVID-19 pandemic in India.
- The program is operated by the Department of Food and Public Distribution under the Ministry of Consumer Affairs, Food and Public Distribution.
- The scheme aims to feed the poorest citizens of India by providing grain through the Public Distribution System, to all the priority households (ration card holders and those identified by the Antyodaya Anna Yojana scheme).
- PMGKAY provides 5 kg of rice or wheat (according to regional dietary preferences) per person and 1 kg of dal to each family holding a ration card. The scale of this welfare scheme makes it the largest food security program in the world.

8 Cairn Legal Dispute

CONTEXT:

- Government of India Condemns False Reporting on Cairn Legal Dispute.

What is the Cairn Energy-Indian government dispute all about?

- The dispute stems from the much debated retrospective taxation issue.
- Fifteen years ago, in 2006-2007, Cairn UK had, as part of an internal rearrangement process, transferred shares of Cairn India Holdings to Cairn India.
- Income-Tax authorities then decided that since Cairn UK had made capital gains, it ought to pay capital gains tax up to Rs 24,500 crore.
- The company interpreted Indian laws on capital gains differently, and refused to pay. Several rounds of litigation at the Income-Tax Appellate Tribunal (ITAT) and the High Court followed. Cairn lost the case at ITAT; a case on the valuation of capital gains is pending before Delhi High Court.
- While Cairn Energy sold the majority of its India business, Cairn India, to mining giant Vedanta in 2011, income-tax authorities barred it from selling about 10 per cent, citing pending taxation issues.
- The payment of dividend by Cairn India to Cairn Energy was also frozen.

9 FDI inflow

CONTEXT:

- India attracted highest ever total FDI inflow of US$ 81.72 billion during 2020-21, 10% more than the last financial year

Key-highlights

- Measures taken by the Government on the fronts of Foreign Direct Investment (FDI) policy reforms, investment facilitation and ease of doing business have resulted in increased FDI inflows into the country.
- FDI equity inflow grew by 19% in the F.Y. 2020-21 (US$ 59.64 billion) compared to the previous year F.Y. 2019-20 (US$ 49.98 billion).
- In terms of top investor countries, 'Singapore' is at the apex with 29%, followed by the U.S.A (23%) and Mauritius (9%) for the F.Y. 2020-21.
- 'Computer Software & Hardware' has emerged as the top sector during F.Y. 2020-21 with around 44% share of the total FDI Equity inflow followed by Construction (Infrastructure) Activities (13%) and Services Sector (8%) respectively.
- Gujarat is the top recipient state during the F.Y. 2020-21 with 37% share of the total FDI Equity inflows followed by Maharashtra (27%) and Karnataka (13%).

Foreign direct investment (FDI):

- A foreign direct investment (FDI) is an investment in the form of a controlling ownership in a business in one country by an entity based in another country.
- It is thus distinguished from a foreign portfolio investment by a notion of direct control.
- The origin of the investment does not impact the definition, as an FDI: the investment may be made either "inorganically" by buying a company in the target country or "organically" by expanding the operations of an existing business in that country.

Foreign institutional investor (FII):

- A foreign institutional investor (FII) is an investor or investment fund investing in a country outside of the one in which it is registered or headquartered.
- The term foreign institutional investor is probably most commonly used in India, where it refers to outside entities investing in the nation's financial markets.

10 Magnetometer

CONTEXT:

- Scientists develop magnetometer for low cost, reliable & real-time measurements of magnetic fields

ABOUT:

- The low-cost digital receiver system can make precise measurements of magnetic fields.
- The hardware of digital receiver systems is built with standard silicon-based memory devices.
- Computer codes are implemented that make these devices perform mathematical operations on the signal they receive, enabling DRS systems to measure fundamental properties of matter like 'Spin'.
- The spin of electrons determines the magnetism of most of the objects around us.

Magnetic field:

- A magnetic field is a vector field that describes the magnetic influence on moving electric charges, electric currents, and magnetic materials.
- A moving charge in a magnetic field experiences a force perpendicular to its own velocity and to the magnetic field.
- A permanent magnet's magnetic field pulls on ferromagnetic materials such as iron, and attracts or repels other magnets. In addition, a magnetic field that varies with location will exert a force on a range of non-magnetic materials by affecting the motion of their outer atomic electrons.
- Magnetic fields surround magnetized materials, and are created by electric currents such as those used in electromagnets, and by electric fields varying in time.
- Since both strength and direction of a magnetic field may vary with location, they are described as a map assigning a vector to each point of space or, more precisely—because of the way the magnetic field transforms under mirror reflection—as a field of pseudovectors.

11 Plasma- the fourth state of matter

CONTEXT:

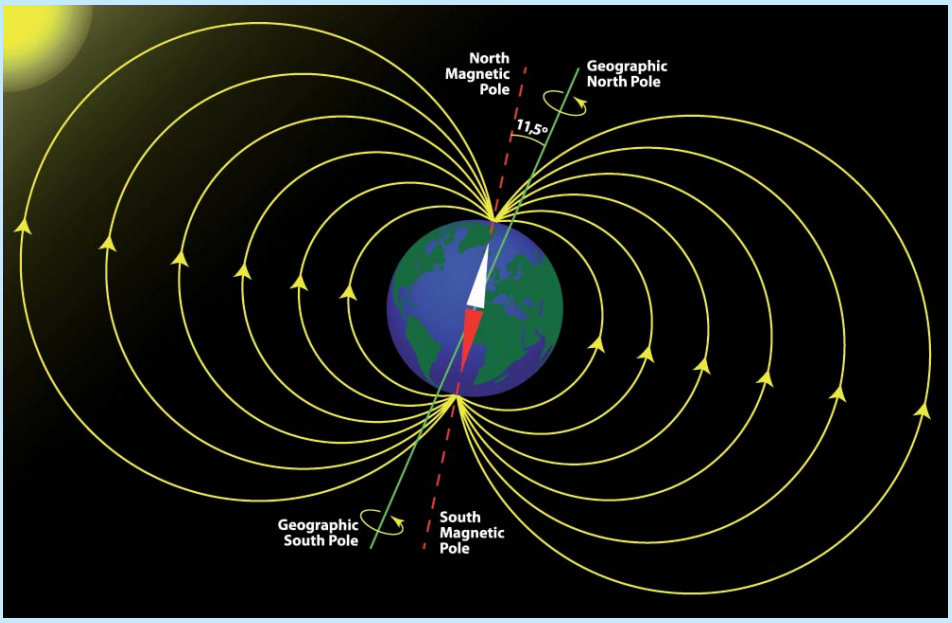
- Indian Scientists have recently developed a theory that helps understand the complicated nature of Sun-Earth interaction's happening in the magnetosphere- an area of space around Earth that is controlled by the Earth's magnetic field.

ABOUT:

- The theory solves every bit of uncertainty regarding the conflict between the observations from Magnetospheric Multiscale (MMS) Mission -a NASA robotic space mission to study the Earth's magnetosphere and theoretical predictions.
- This new theory has opened up a plethora of opportunities to unlock the mysteries of the ion-hole structures (a localized plasma region where the ion density is lower than the surrounding plasma).
- They are now working towards a detailed study of the ion hole structures observed in various space and astrophysical environments using the developed theory.
- It provides a better understanding of their characteristics.
- It further sheds light on the generation of these structures leading to the unraveling of nature's greatest mystery that causes phenomena -plasma transport and heating of plasma - the fourth state of matter after solid, liquid, and gas, which is the most natural and widely observed state of matter in the entire universe.

Magnetic field of earth:

- The Earth's magnetic field, also called the geomagnetic field, which effectively extends several tens of thousands of kilometres into space, forms the Earth's magnetosphere.
- The magnetosphere shields the surface of the Earth from the charged particles of the solar wind and is generated by electric currents located in many different parts of the Earth.
- It is compressed on the day (Sun) side due to the force of the arriving particles, and extended on the night side.



12 BRICS Astronomy Working Group (BAWG)

CONTEXT:

- BRICS countries underline importance of enhancing collaboration among astronomers

ABOUT:

- Delegates from BRICS nations highlighted the importance of enhancing collaboration among astronomers from the countries at the seventh meeting of the BRICS Astronomy Working Group Meeting.
- Under the Science, Technology, and Innovation track of the BRICS 2021 calendar, India hosted the seventh meeting of BRICS Astronomy Working Group (BAWG) meeting of Brazil, Russia, India, China, and South Africa, as well as astronomers from these countries in online mode from 19 to 20th May 2021.
- The BAWG which provides a platform for BRICS member countries to collaborate in the field of astronomy recommended that the focal points in each country should present the scientific results of the work being carried out in each country.
- This will help seek funding support to realize the flagship project whenever funding opportunity announced by BRICS funding agencies. BAWG noted the importance of enhancing collaboration among astronomers from the BRICS countries.

Astronomy:

- Astronomy is a natural science that studies celestial objects and phenomena.
- It uses mathematics, physics, and chemistry in order to explain their origin and evolution. Objects of interest include planets, moons, stars, nebulae, galaxies, and comets.

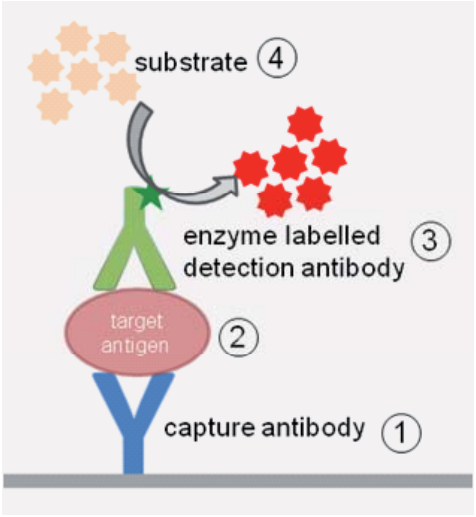
12 Electrochemical ELISA test

CONTEXT:

- DST funded start-up's Electrochemical ELISA test would help rapid & accurate estimation of total antibody concentration of COVID 19.

What is enzyme-linked immunosorbent assay (ELISA)?

- It is a commonly used analytical biochemistry assay, first described by Engvall and Perlmann in 1971.
- The assay uses a solid-phase type of enzyme immunoassay (EIA) to detect the presence of a ligand (commonly a protein) in a liquid sample using antibodies directed against the protein to be measured.
- ELISA has been used as a diagnostic tool in medicine, plant pathology, and biotechnology, as well as a quality



control check in various industries.

- In the most simple form of an ELISA, antigens from the sample to be tested are attached to a surface. Then, a matching antibody is applied over the surface so it can bind the antigen. This antibody is linked to an enzyme and then any unbound antibodies are removed.
- In the final step, a substance containing the enzyme's substrate is added. If there was binding the subsequent reaction produces a detectable signal, most commonly a color change.

13 Star formation and galaxy evolution

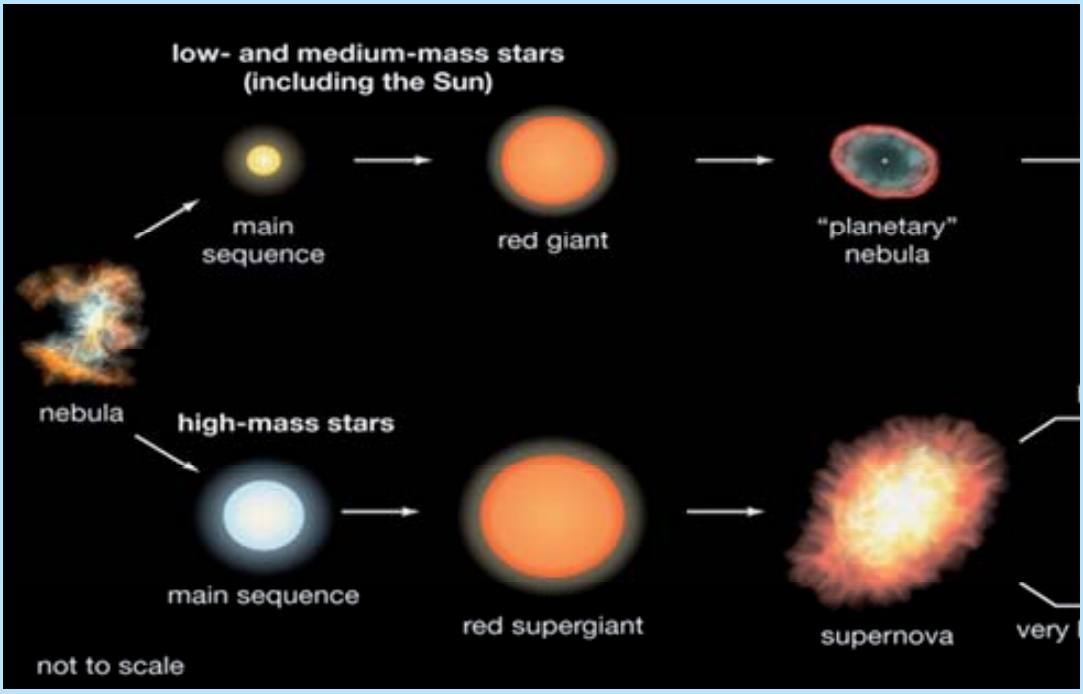
CONTEXT:

- Three-dimensional distribution of molecular & atomic hydrogen in galaxies can give clues to star formation and galaxy evolution.

ABOUT:

- Galaxies like the one we reside in, the Milky Way, consist of discs containing stars, molecular and atomic hydrogen, and helium.
- The molecular hydrogen gas collapses on itself in distinct pockets, forming stars, its temperature was found to be low --close to 10 kelvin, or -263 ºC and thickness is about 60 to 240 light-years.
- The atomic hydrogen extends both above and below the discs.
- However, more sensitive observations in the past two decades have surprised astronomers.
- They have estimated that molecular hydrogen extends farther from the disc in both directions, up to about 3000 light-years.
- This gaseous component is warmer than the one straddling the disc and has comparatively lesser densities, thus escaping earlier observations.
- They called it the 'diffuse' component of the molecular disc.

Star - Star formation and evolution:



14 BRICS meeting on Biotechnology and Biomedicine

CONTEXT:

- BRICS meeting deliberated on emerging issues in Biotechnology and Biomedicine.

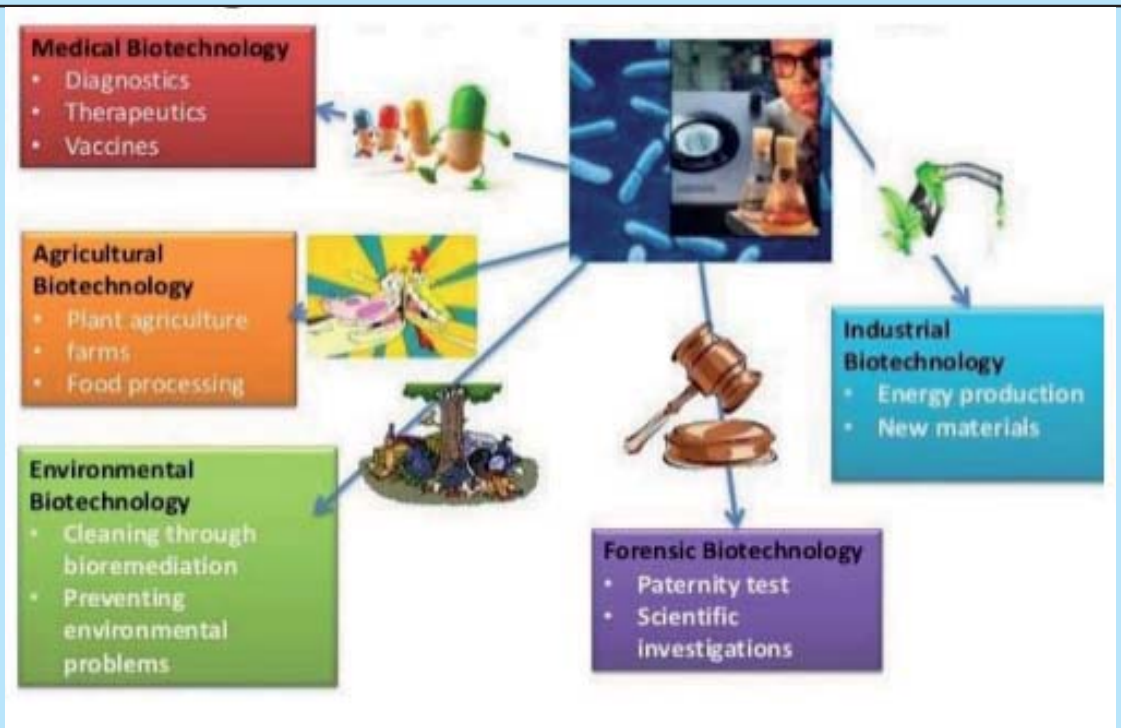
ABOUT:

- Experts deliberated on emerging issues in the various fields of Biotechnology and Biomedicine at the fourth BRICS Working Group meeting on the subject area.
- The members of the working group on Biotechnology and Biomedicine suggested future directions of research collaboration among BRICs countries in the areas such as Antimicrobial Resistance, Artificial Intelligence and Digital Health Medicine, Non-Communicable Diseases, Neurological Disorders, Agro-biotechnology, Food and Nutrition, Cancer, long Post-Covid Challenges and Complications including Molecular Pathogenesis of COVID-19 virus.

Biotechnology:

- Biotechnology is a broad area of biology, involving the use of living systems and organisms to develop or make products. Depending on the tools and applications, it often overlaps with related scientific fields.
- In the late 20th and early 21st centuries, biotechnology has expanded to include new and diverse sciences, such as genomics, recombinant gene techniques, applied immunology, and development of pharmaceutical therapies and diagnostic tests.
- The term biotechnology was first used by Karl Ereky in 1919, meaning the production of products from raw materials with the aid of living organisms.

Application of biotechnology:



15 Artificial Synaptic Network

CONTEXT:

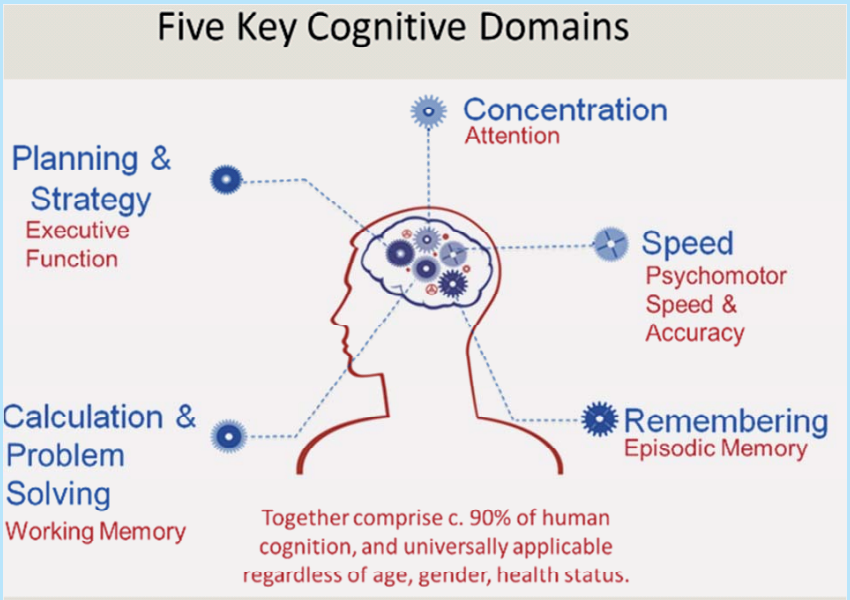
- Scientists develop efficient Artificial Synaptic Network that Mimics Human Brain.

ABOUT:

- The scientists have devised a novel approach of fabricating an artificial synaptic network (ASN) resembling the biological neural network via a simple self-forming method (the device structure is formed by itself while heating).
- The new device can mimic human **brain cognitive actions**.
- It is more efficient than conventional techniques in emulating artificial intelligence, thus enhancing the computational speed and power consumption efficiency.

Brain cognitive functions:

- Brain cognitive functions are the mental processes that allow us to receive, select, store, transform, develop, and recover information that we've received from external stimuli.
- This process allows us to understand and to relate to the world more effectively.
- Cognitive functions are brain-based skills we need to carry out any task from the simplest to the most complex.
- They are related with the mechanisms of how we learn, remember, problem-solve, and pay attention, etc.



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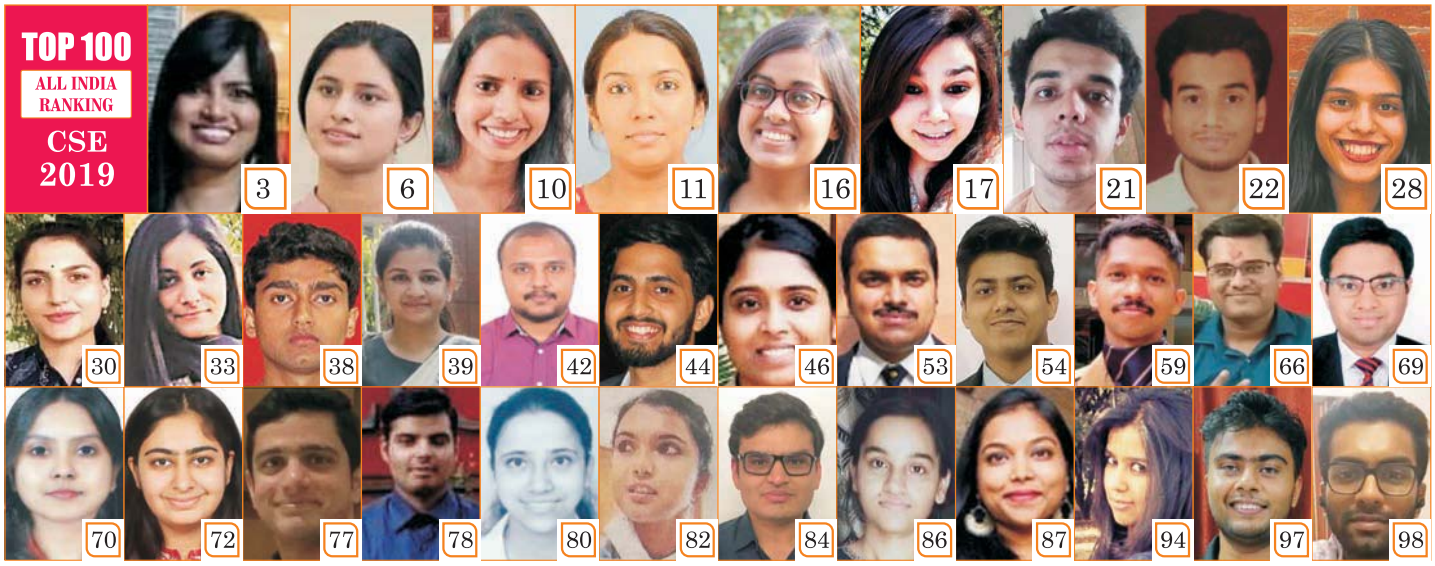

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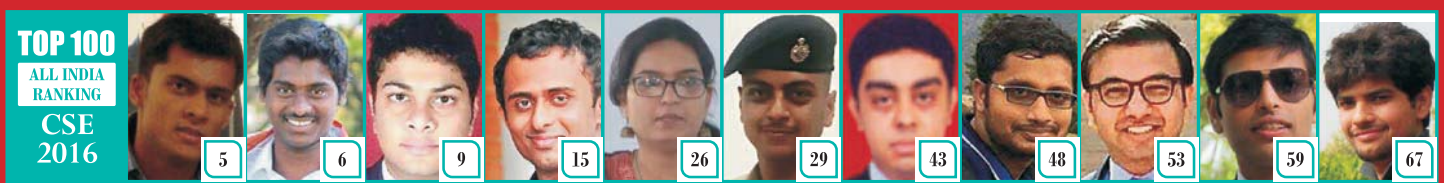

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