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- [Global Financial Stability Report highlights the doubling of cyberattacks since the pandemic began.](#)
- [CBDT signs record number of 125 Advance Pricing Agreements in FY24.](#)
- [Bitcoin Halving 2024: How mega crypto event impacted BTC price, investors.](#)
- [Net direct tax collections surge 17.7% YoY to Rs 19.58 trillion in FY24.](#)
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- [World Trade Organization \(WTO\) is celebrating 30 years of the Marrakesh Agreement.](#)
- [UNCTAD marks 60th anniversary with rebranded as UN Trade and Development.](#)
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- **Union Environment Ministry announced the rules for its Green Credit Programme (GCP)**
- **IMD raises alert for extreme heat wave weather.**
- **First comprehensive national-scale assessment of soil erosion and sediment yield mapping across India**
- **The forest department is monitoring an outbreak of mange among a pack of Asiatic wild dogs in the Mudumalai Tiger Reserve (MTR) in the Nilgiris**
- **Plastic Overshoot Day Report 2024 by Swiss-based research consultancy 'Earth Action (EA)'**
- **"Early Warnings for All" initiative (EW4All)**
- **Adani Green Energy Ltd (AGEL) recently established the world's largest renewable energy park in Gujarat's Khavda region.**
- **Government to operationalize gas-based power plant to meet high electricity demand during summer.**
- **Tiny biodegradable straw forts could protect new coral from fish who snack on it 'like popcorn'**
- **NOAA's Coral Reef Watch (CRW), ICRI confirm fourth global mass coral bleaching event in 2023-2024.**
- **India Achieves Record Growth in Renewable Energy Capacity: Adds 18.48 GW in 2023-24, Aims for Ambitious 500 GW Target.**
- **Three new fish species spotted using tools in the Laccadive Sea.**
- **The Arctic's Plastic Crisis.**
- **World Earth Day is celebrated annually on April 22nd to support environmental conservation efforts.**
- **GAIA Asia Pacific, in collaboration with other environmental organisations, ASEAN to take decisive action in response to plastic pollution.**
- **50 Years of India's Chipko (Hug the Trees) Movement.**

GEOGRAPHY

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- [168 roads closed in Himachal Pradesh as snow and rain hit region](#)
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- [Jalpaiguri disaster: Tornadoes a symptom of warming & anomalous wind patterns](#)
- [Swell waves inundate coastal areas in southern, central Kerala](#)
- [Massive earthquake hits Taiwan: What is the Ring of Fire?](#)
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- [US National Oceanic and Atmospheric Administration has predicted an 83% probability of the Oceanic Niño Index \(ONI\) transitioning to a neutral range by April-June 2024.](#)
- [Russia Declares Federal Emergency As Ural River Floods Orsk, Thousands Evacuated.](#)
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- [Acidification may strip Indian soils of 3.3 billion tonnes of essential carbon, affecting crop growth, sequestration: Study](#)
- [A recent study has discovered that the desert formed by the drying Aral Sea has significantly increased dustiness in Central Asia.](#)
- [A Gigantic Ocean 700 km under the Earth Discovered by Scientists.](#)
- [World Meteorological Organization's \(WMO\) report - "State of the Climate in Asia 2023".](#)
- [Antarctica's France-Sized Ice Shelf Makes Daily Jumps, Raising Icequake Concerns.](#)
- [IMD Study warns of 'decreasing trend' in solar radiation for electricity in India](#)
- [INCOIS scientists map Indian Ocean floor to study currents](#)
- [Deepest "blue hole" on Earth is discovered in Mexico.](#)

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- [Study finds one way statins can cause diabetes, and a solution](#)
- [Punnett square: A genetics puzzle](#)
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- [A Century of discovering the electroencephalogram \(EEG\)](#)
- [The launch of AgniKul 'Agnibaan SOrTeD' has been postponed again.](#)
- [Lab-grown 'minibrains' help reveal why traumatic brain injury raises dementia risk.](#)
- [Forever Chemicals in Band-Aids](#)
- [The World Health Organisation published the 2024 Global Hepatitis Report](#)
- [Higgs Boson : God's Particle](#)
- [Dark Energy Spectroscopic Instrument \(DESI\)](#)
- [Toxic hand sanitisers! US recalls several lots of methanol \(CH₃OH\)-containing products over risk of 'permanent blindness, coma'](#)
- [ICAR-Indian Institute of Spices Research \(ICAR-IISR\), Kozhikodei has developed and validated three new microbial formulations based on granular lime and gypsum](#)
- [The President of India, Smt Droupadi Murmu launched India's first home-grown gene therapy \(NexCAR19\) for cancer at IIT Bombay](#)

- [Command Hospital in Pune conducted two piezoelectric Bone Conduction Hearing Implants \(BCI\)](#)
- [India's Web3 developer share surges to 12% globally, leads emerging markets: Report](#)
- [Researchers at the Indian Institute of Science \(IISc\) have designed a sustainable hydrogel to remove microplastics.](#)
- [Doxxing incidents are increasing over the internet across the globe.](#)
- [Whooping cough cases outbreak reported around the world.](#)
- [How fast is the universe expanding? Scientists from Germany and the U.K. led with a radical explanation for the Hubble tension.](#)
- [World's First Orbiter that allows Smartphones to make direct Satellite Calls.](#)
- [April 14 is observed as World Chagas Disease Day.](#)
- [A patient suffering from Parkinson's plus syndrome has undergone a high cervical spinal cord stimulation.](#)
- [World Health Organization \(WHO\) has approved a new oral cholera vaccine called Euvichol-S.](#)
- [The Food Safety and Standards Authority of India \(FSSAI\) has commissioned quality checks on the spice mixes of 2 leading spice brands in India.](#)
- [Amending nuclear law to spur 'pink' hydrogen generation.](#)
- [A few days after Meta unveiled its Llama 3 Large Language Model \(LLM\), Microsoft unveiled the latest version of its 'lightweight' AI model – the Phi-3-Mini.](#)
- [Fiat to monitor use of liquid nitrogen in food items.](#)
- [Biohacking is picking up in India especially in metro cities like Delhi and Mumbai and also slowly making inroads into Tier II and III cities too.](#)
- [Research conducted on using drugs to target H3 and H4 receptors for the potential treatment of neurological and immunological disorders.](#)
- [Internet economy should embrace NaaS.](#)

- [The Ministry of Mines will hold a two day “Critical Minerals Summit: Enhancing Beneficiation and Processing Capabilities”](#)
- [UK pharmaceutical giant AstraZeneca has acknowledged that its Covid-19 vaccine can lead to a rare side effect known as Thrombosis with Thrombocytopenia Syndrome \(TTS\).](#)

SOCIETY

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- [Political affiliation of applicant institution does not influence selection process on new Sainik Schools: Defence Ministry](#)
- [Climate activist Sonam Wangchuk and Leh Apex Body called off the border march aimed at highlighting the Changpa nomadic tribes' plight.](#)
- [UNHRC adopts first resolution to protect rights of intersex people.](#)
- [Union govt sets up six-member committee to examine concerns of queer community.](#)
- [Alarming Study Reveals Only 13.5% of STEM Faculty in India Are Women.](#)
- [The UNFPA's State of World Population report 2024 “Interwoven Lives, Threads of Hope: Ending Inequalities in Sexual and Reproductive Health and Rights”.](#)
- [Great Nicobar's particularly vulnerable tribal group, Shompen, cast their vote for the first time.](#)
- [Srinagar vies for global craft city tag as World Craft Council International team tours craft clusters.](#)
- [Bombay High Court in its verdict dismissed a suit challenging Syedna Mufaddal Saifuddin's position as the 53rd religious leader of Dawoodi Bohra Community.](#)
- [Global Report on Food Crises: acute hunger remains persistently high in 59 countries.](#)

ART & CULTURE

- [Nuggets of history from Sannati village in Kalaburagi district](#)
- [Kumittipathi Rock Paintings at Pathimalai, TN](#)
- [An earthen pot containing lead coins from Ikshvaku period unearthed in Phanigiri, Suryapet.](#)
- [The Bihar government took an initiative to promote the Kesariya Stupa, as a major tourist attraction worldwide.](#)
- [Fossils of massive prehistoric snake found in lignite mine in Gujarat.](#)
- [Three new archaeological sites discovered in Telangana.](#)

MISCELLANEOUS

- [Union Health Ministry launches myCGHS iOS app](#)
- [Bollywood actor-turned-politician Kangana Ranaut recently stirred up a storm after she claimed that Netaji Subhas Chandra Bose was the first prime minister of India.](#)
- [WHO launches gen-AI powered digital health promoter S.A.R.A.H. for public health](#)
- ['Voluntary Code of Ethics' for social media platforms.](#)
- [Nestlé's baby food sold in Asian, African countries had added sugars: Why is sugar harmful?](#)
- [FSSAI order has raised the Maximum residue limit \(MRL\) of pesticides in herbs.](#)
- [Recently, Indian Air Force's MI 17 V5 helicopter was deployed to extinguish the raging forest fires in Nainital district, Uttarakhand.](#)
- [The US Secretary of State during his three-day visit to China spoke about the production and export of "synthetic opioid precursors" specifically the drug fentanyl.](#)

POLITY

Administrative Tribunals Act | Appeal Against CAT Order In Contempt Proceedings Lies Before Supreme Court, Not High Court: Allahabad High Court

About Central Administrative Tribunal (CAT):

- It had been established under **Article 323-A** of the Constitution.
- **Mandate:** To adjudicate disputes and complaints with respect to the recruitment and conditions of service of persons appointed to public services and posts in connection with the affairs of the Union or other authorities under the control of the Government.
- In addition to the **Ministries and Departments of Central Government**, the Government has notified about 214 organizations under the jurisdiction of the CAT from time to time.
- **Composition:** A bench consists of one **Judicial Member** and one **Administrative Member**. There are 17 Benches and 21 Circuit Benches in the CAT all over India.
- The **conditions of service** of the Chairman and Members of CAT are the same as applicable to a Judge of High Court.
- **Salaries, Allowances and Conditions** of Service of the officers and other employees of the Tribunal are specified by the Central Government.
- **Powers:**
 - It exercises **jurisdiction only in relation to** the service matters of the parties covered by the **Administrative Tribunals Act 1985**.
 - The Tribunal is **guided by the principles of natural justice** in deciding cases and is not bound by the procedure prescribed by the Civil Procedure Code.
 - It is empowered to **frame its own rules of procedure** and practice.
 - It has been conferred with the **power to exercise the same jurisdiction** and authority **in respect of contempt of itself as a High Court**.

SC Notice To Election Commission on VVPAT Plea, Congress Says "Important First Step"

About Voter Verifiable Paper Audit Trail (VVPAT):

- It was **first introduced** in India in the **2014 Lok Sabha elections**. It is an independent system that consists of two parts, namely, a VVPAT Printer and VVPAT Status Display Unit (VSDU) attached to the Electronic Voting Machines (EVMs), that **allow the voters to verify** that **their votes** are cast as intended.
- **When a vote is cast**, a **slip is printed** containing the serial number, name, and symbol of the candidate and remains exposed through a transparent window for 7 seconds. Thereafter, this printed slip automatically gets cut and falls into the sealed drop box of the VVPAT.
- **How is VVPAT used for verification?**
 - The results of EVMs can be verified **using the slips kept in the drop boxes** of VVPAT machines. It can be accessed by the polling officials, but not by the voters.
 - The paper slips are deemed to be **more authoritative than EVM tallies** in cases where VVPAT slips are utilised to verify votes.
 - **Voter verification**, however, is only **done in extreme circumstances**, such as when there are accusations of fraud or miscalculation.
 - **The ECI** has the **authority to request** that votes be verified using VVPAT slips in response to such complaints.
 - **At present**, the **VVPAT slips are counted in a randomly-selected polling station** in each Assembly constituency or Parliamentary constituency, depending upon the nature of the elections being held.
- The ECI has clarified that **EVMs and VVPATs are separate entities** and are not connected to any network.
- These machines are **developed by the Electronics Corporation of India Limited (ECIL) and Bharat Electronics Ltd (BEL)**.

What is the Sixth Schedule of the Indian constitution that Sonam Wangchuk wants in Ladakh?

About Sixth Schedule of the Indian Constitution:

- It provides autonomous powers in terms of administration of tribal areas in **Assam, Meghalaya, Tripura, and Mizoram**. Its provisions are present in **Articles 244(2) and 275(1)** of the Indian Constitution.
- **District Councils and Regional Councils:**
 - The **tribal areas** in the four states of Assam, Meghalaya, Tripura, and Mizoram are to be **administered as Autonomous Districts**.
 - If there are different Scheduled Tribes in an autonomous district, the **Governor can divide the district** inhabited by them **into Autonomous Regions**.
 - The **Governor is empowered to organize** and reorganize the autonomous districts. He can also increase, decrease the boundaries, or alter the name of any autonomous district. There are presently three ADCs in Assam, Mizoram and Meghalaya, respectively, while Tripura has one.
 - According to the Sixth Schedule, each autonomous district will have a **District Council with a maximum of 30 members**, of whom not **more than four** persons shall be **nominated by the Governor**, and the rest shall be elected on the basis of adult suffrage.
 - There shall be a **separate Regional Council for** each area constituted as an **autonomous region**.
 - The **Governor** will also **decide the rules** of the District Councils and Regional Councils in consultation with the existing tribal councils or other representative tribal organisations within the autonomous districts or regions concerned.
- **Powers:**

- Both councils can **make laws related to the occupation**, allotment, and **use of lands other than** any land which is a reserved forest.
- They can also **make laws** regarding the management of non-reserve forests, the use of canals or another **water source for agriculture**, the **regulation of jhum** and other forms of cultivation, the **formation of village or town councils** and those related to their administration, the **inheritance of property**, and social customs.
- These councils are also empowered to make **laws for the regulation** and control **of money-lending or trading** by any person other than Scheduled Tribe residents in that Scheduled District.
- Both councils have **other legislative, executive, judicial and financial powers**, but they vary from one state to another. However, the laws they make **should receive the Governor's assent**.
- These Councils are empowered to **assess and collect land revenue** and **impose taxes** on professions, trades, animals, vehicles, etc.
- The Councils are given the power to **grant licenses** or leases for the **extraction of minerals** within their jurisdiction.
- They are given the **power to establish, construct, or manage primary schools, dispensaries, markets**, cattle ponds, fisheries, roads, road transport, and waterways in the districts.
- To autonomous districts and autonomous regions, the **acts of Parliament** or the state legislature do not apply or apply with specified modifications and exceptions.
- **Administration of justice in autonomous districts and autonomous regions:**
 - The District and Regional Councils are empowered to **constitute Village and District Council Courts** for the trial of suits and cases where all parties to the dispute belong to Scheduled Tribes within the district.
 - The **High Courts have jurisdiction over the suits** and cases which are specified by the Governor.

- However, the **Council Courts** are not given the power to decide cases involving offenses punishable by death or imprisonment for five or more years.
- The Governor can appoint a commission to investigate and provide a report on any issue pertaining to the management of the autonomous districts or regions.

Zero FIR registered against KTR for making objectionable comments against Telangana CM

About Zero FIR:

- It refers to a First Investigation Report (FIR) that is **registered irrespective of the area** where the offense is committed. The police in such a case can no longer claim that they have no jurisdiction. It is later **transferred to** the police station that has the **actual jurisdiction** so that the investigation can begin.
- It was introduced on the recommendation of the **Justice Verma Committee** formed at the backdrop of the brutal Nirbhaya gang rape in Delhi in 2012.
- This puts a legal obligation on the police to begin an investigation and take quick action without the excuse of the absence of jurisdiction.
- **Objective:** It is to ensure the victim doesn't have to run from pillar to post to get a police complaint registered. The provision is meant to **provide speedy redressal** to the victim so that timely action can be taken after the filing of the FIR.
- **What is an FIR?**
- It is information recorded by a police officer on duty given either by the aggrieved person or any other person to the commission of an alleged offence.
- It is **not defined** in the Indian Penal Code (IPC), Code of Criminal Procedure (CrPC), 1973, or in any other law.

- In police regulations or rules, information recorded under **Section 154 of CrPC** is known as First Information Report (FIR).

Postal ballot facility for personnel engaged in poll duty

About Postal ballot:

- It is also known as **absentee voting**, is a method of voting in which electors cast their ballots by mail rather than in person at a polling station.
- **Eligibility:**
- **Service voters:** Members of the armed forces, paramilitary forces and other government employees deployed on election duty far from their home constituencies.
- **Absentee voters:** Individuals who are unable to vote in person due to reasons such as being away from their home constituency for work, illness or disability.
- **Electors on election duty:** Government officials and polling staff who are assigned duties at polling stations other than their own.
- **Electors under preventive detention:** Individuals who are detained under preventive custody orders during the election period.
- To apply for a postal ballot, eligible voters must submit an application to the **Returning Officer (RO)** of their respective constituency.
- The application form typically requires personal details, voter identification information, and the reason for seeking a postal ballot. The RO verifies the eligibility of the applicant and issues the postal ballot if the criteria are met.
- **Counting of Postal Ballot :**
- Postal ballots are **counted separately** from votes cast at polling stations.
- The RO and election officials scrutinise the postal ballots to ensure their validity and integrity. Valid postal ballots are then added to the respective candidate's vote count.

India dismisses allegations of abusive conditions at shrimp farms

About Marine Products Export Development Authority:

- It is a **statutory body** entrusted with the primary task of **promotion of export of marine products**.
- **History:** It was set up **by an act of Parliament** during 1972. The erstwhile Marine Products Export Promotion Council established by the Government of India in September, 1961 was converged into MPEDA on 24th August, 1972.
- **Functions:**
 - **Developing and regulating** off-shore and **deep-sea fishing** and undertaking measures for the conservation and management of off-shore and deep-sea fisheries;
 - **Registering fishing vessels**, processing plants or storage premises for marine products and conveyances used for the transport of marine products; fixing of standards and specifications for marine products for purposes of export;
 - Regulating the export of marine products; registering of exporters of marine products on payment of such fees as may be prescribed;
- It has set up five full-fledged **Quality Control Laboratories**, at Kochi, Nellore & Bhimavaram, Bhubaneshwar and Porbandar. In addition, fifteen **ELISA Screening Laboratories** set up by MPEDA in the maritime states.
- In order to reach out to the exporters in different parts of the Country, it has set up 18 – Regional / Sub Regional Divisions / Desk offices.
- **Headquarter:** Kochi, Kerala
- It has **Trade Promotion offices** at New Delhi, Tokyo and New York.
- **Nodal Ministry:** Ministry of Commerce and Industry

MBBS Internship : Supreme Court Directs NMC To Submit Details Of Stipend Paid To Interns By Medical Colleges In All States

About National Medical Commission (NMC):

- It has been constituted by the **National Medical Commission Act, 2019**, which came into force on September 25, 2020.
- It **replaced** the erstwhile **Medical Council of India (MCI)**. It regulates medical education and medical professionals in the country.
- It grants recognition of medical qualifications, gives **accreditation to medical schools**, grants **registration to medical practitioners**, monitors medical practice, and assesses the medical infrastructure in India.
- **Headquarters:** New Delhi
- **Functions:**
 - **lay down policies** for maintaining high quality and high standards in medical education and make necessary regulations on this behalf;
 - lay down policies for **regulating medical institutions, medical researches** and **medical professionals** and make necessary regulations in this behalf;
 - **assess the requirements in healthcare**, including human resources for health and healthcare infrastructure
 - take such measures, as may be necessary, to ensure compliance by the **State Medical Councils** of the guidelines framed
 - exercise **appellate jurisdiction** with respect to the decisions of the Autonomous Boards;
 - lay down policies and codes to ensure observance of **professional ethics in the medical profession** and to promote **ethical conduct** during the provision of care by medical practitioners;
 - frame **guidelines for determination of fees** and all other charges in respect of fifty percent of seats in private medical institutions and deemed to be universities which are governed under the provisions of this Act;
- **Composition:**
 - It consists of **33 members**, including the Chairperson (medical professionals only), 10 ex-officio members and 22 part-time members.

- **Medical Advisory Council:** It provides the platform through which the States or UTs can put forth their views and concerns before the NMC and advises the NMC on measures to determine and maintain minimum standards of medical education.
- **Four autonomous boards:**
 - Under-Graduate Medical Education Board
 - Post-Graduate Medical Education Board
 - Medical Assessment and Rating Board
 - Ethics and Medical Registration Board

SC held that an election candidate has a right to privacy from voters.

Rights of the Voters' in India

- The voter's have **certain rights that are bestowed on them by the Election Commission of India (ECI).**
- These rights are **safeguarded by the Constitution of the country** and are provided to all the citizens of the country. Such Voter rights are -
- Right to Know:
 - The voter has the right to know about the candidates contesting the elections.
 - The voters have the right to get the details of the past records of the candidate (criminal records, if any), financial position of the candidate, their election manifesto, etc.
- Voting rights of NRIs:

- **The NRIs are those citizens of the country** that are not present at their place of residence for reasons of employment or any other reasons but are still eligible to vote in the elections of the country.
- NRIs were not initially allowed to vote in the elections of the country. However, a subsequent amendment allowed the NRIs to vote for elections in India.
- **Voting rights of Prisoners:** The constitution of India and the guidelines of the ECI do not permit a person who is imprisoned to vote in the upcoming elections of the country.
- **NOTA (Right Not to Vote):**
 - None of The Above (NOTA) is another right of the voter where the voter participates in the electoral process but does not vote or choose any of the contesting candidates.
 - This right is exercised when the voter feels that none of the contesting candidates are worthy of his/her vote.
- **Tendered Voting Rights:**
 - This right can be exercised by a voter when he/she realises that another person has wrongly voted on their behalf.
 - Such a person will need to provide a valid identity proof to authenticate their voting right and vote on a separate ballot paper as per ECI.
- **Voting rights of Disabled or Infirm Citizens:** The ECI will provide assistance to such voters to cast their votes by taking their vote with the help of an Electoral Officer.
- Background of the Judgement
- The judgement came in a petition filed by an Arunachal Pradesh MLA (Karikho Kri) challenging a Gauhati HC decision. He won the elections as an independent candidate.

- Last year, the HC declared his election (to the 44-Tezu Assembly Constituency) **void for not declaring 3 vehicles as his assets** in his affidavit filed in Form No 26 appended to the Conduct of Elections Rules, 1961.
- The vehicles in question were a Kinetic Zing Scooty, a Maruti Omni van used as an ambulance and a TVS Star City motorcycle. The scooter was sold as scrap in 2009. The other two vehicles were also sold.
- The Gauhati HC did not examine the statements of the buyers.
- Supreme Court Ruling:
 - - **Voters' Right to Know is not absolute.**
 - **A candidate's choice to retain his privacy** on matters which were of no concern to the voters or were irrelevant to his candidature for public office,
 - **Did not amount to a 'corrupt practice'** under Section 123 of the Representation of People Act (RPA), 1951.
 - Such non-disclosure **would not amount to a "defect of a substantial nature"** under Section 36(4) of the RPA 1951.
 - There was no obligation for a candidate to lay his life exposed for the electorate to probe and scrutinise.
 - **It is not necessary that a candidate declare every item of movable property** that he or his dependent family members own, such as clothing, shoes, crockery, stationery and furniture, etc.
 - But the Court said **every case would turn on its own peculiarities** on what would amount to a non-disclosure of assets of a substantial nature.
 - **For example**, suppressing information about a collection of expensive watches from voters would be a substantial defect.

- However, if a candidate and his family members each own a simple watch, suppression of the value of such watches may not amount to a defect at all.

India's Regulation on Solar PV Modules

The Approved Models and Manufacturers of Solar Photovoltaic Modules (Requirement for Compulsory Registration) Order, 2019 (ALMM Order)

- Introduced by the **Ministry of New and Renewable Energy (MNRE) in 2019**.
- It requires manufacturers of solar modules to **voluntarily submit to an inspection** of their **manufacturing facilities** by the **National Institute of Solar Energy**.
- **It comprises two lists:** List-I for **solar PV modules** and List-II for **solar PV cells** (yet to be issued).
- The order mandates that companies **must be listed as "approved" manufacturing facilities** to **certify that they are legitimate manufacturers** of solar panels, rather than just **importers or assemblers**.
- It mandates that only models and manufacturers listed on the ALMM are **permissible for use in government-sponsored or subsidized solar projects in India**.
- Benefits
- The ALMM mandate, introduced in 2021 as a **non-tariff barrier**, **promotes domestic manufacturing** by **endorsing indigenous models** and **manufacturers for government-led solar development projects**.
- **Reduce dependency on Chinese imports** (controlling 80% of global supply) and **promote local manufacturing for livelihood generation**.
- India's progress in solar energy
- India **ranked fifth globally** in solar power capacity with 62.80 GW installed by the end of 2022, up from 49.34 GW in 2021.

- By June 2023, the **capacity had grown to around 70.10 GW**.
- India currently has a **solar module manufacturing capacity of approximately 50 GW**, while its **solar cell manufacturing** capacity stands at **around 6 GW**.
- Over the **past five years**, imports of solar cells and modules into **India amounted to approximately 11.17 billion USD**.
 - Notably, China has been the primary producer, accounting for **57% to 100% of Indian imports across various solar products**, including modules, cells, wafers, and solar glass, since 2021.
- **Reasons for import dependence** include **insufficient domestic manufacturing capacity**, high costs of domestic solar PV panels, and limited production of wafers or polysilicon in India.
- Initiatives facilitating domestic solar module manufacturing
- **Production Linked Incentive (PLI) Scheme** for High Efficiency Solar PV Modules by The Ministry of New and Renewable Energy (MNRE).
- **Domestic Content Requirement (DCR)** Under certain schemes of the MNRE, such as CPSU Scheme Phase-II, PM-KUSUM Component B, and Grid-connected Rooftop Solar Programme Phase-II.
- **Public Procurement (Preference to Make in India) Order**," preference is given to **"Make in India" products in public procurement**.
- **Implementation of Basic Customs Duty (BCD)** on the **import of solar PV cells and modules**.

Delhi Chief Minister has recently been imprisoned due to corruption charges related to the liquor policy in Delhi

Liquor Policy In India:

- In India, the Central Government sets guidelines for **import duties** on foreign liquor and formulates national-level **policies on alcohol advertising and marketing**.

- State Governments control liquor under the **Seventh Schedule** of the Indian Constitution, allowing them to impose **state-specific excise duties and taxes**, issue licenses for liquor sales and distribution, set **regulations** including operating hours for liquor stores and bars, and even prohibit alcohol in certain states like **Gujarat** and **Bihar**.
- The Supreme Court banned the sale of liquor on all national and state highways in 2017.
- Different states adopt varied approaches to liquor policy; for instance, Haryana and Delhi focus on revenue from alcohol sales, while Gujarat and Bihar enforce prohibition due to cultural and **socio-economic reasons** respectively. Tamil Nadu regulates sales through its **State Marketing Corporation** to enhance safety, responding to past tragedies.
- Key facts:
- India ranks as the world's **3rd largest market** for alcoholic beverages, following China and Russia.
- **Karnataka** was the largest-selling state for liquor in 2022-23.

‘Adjudicating Authority’ of Prevention of Money Laundering Act, 2002.

Adjudicating Authority:

- Under PMLA, an **adjudicating authority determines within 180 days** whether the properties attached by the ED are involved in money laundering or not.
- Functioning:
- **Section 5 of the PMLA:** It provides for the attachment of any property that is suspected to have been acquired with the proceeds of crime in a case of any offense that is listed in the schedule of the law.
- **Provisional attachment order:** It is valid for a **period of 180 days** within which the Adjudicating Authority (appointed by the central government) must confirm the attachment, failing which the property is automatically released from attachment.

- The accused can continue to enjoy the property until the Adjudicating Authority confirms the attachment, **after which the ED has the power to claim possession.**
- *What happens after the Adjudicating Authority confirms the attachment?*
- Once ED claims possessions, the property shall remain out of bounds for the owner until the trial is completed.
- Following final confirmation, in case of a residential property, the ED will ask the owner to vacate the premises along with his belongings, and will take over possession.
- **Case of a conviction:** The trial court may **order confiscation of the attached property**, and vest the rights to the property with the central government.
- **Right to Appeal:** The accused can **challenge the Adjudicating Authority's confirmation order at the PMLA's Appellate Tribunal within 45 days.** If the Appellate Tribunal too confirms the order, the accused can file a plea in the High Court, and so on.

The Election Commission of India (ECI), has provided the facility of home voting for the elderly and Persons with Disabilities in the 2024 Lok Sabha elections.

Home Voting Facility:

- The provision of home voting is a progressive measure aimed at empowering voters who encounter barriers to participating in the electoral process at the polling stations.
- Vote From Home for a 'Notified class of Electors': (A Postal Ballot Voting)
- It is the facility provided by the Election Commission of India to Absentee Voters, which is categorized to vote from home.
- Eligibility: Under Rule 27A of the Conduct of Elections Rules, 1961 has been amended to provide the optional postal ballot facility to 'Absentee Voters'.

- **'Absentee voter'** has been **defined in clause (aa) of Rule-27A** of the **Conduct of Elections Rules, 1961**, and includes
 - Persons employed in essential services
 - Senior citizens above 85 years
 - Persons with Disabilities (with 40% benchmark or above disability)
 - COVID-19 suspect or affected persons .
 - By extending this optional facility to these segments of the voters, the Election Commission recognizes the need to ensure that citizens' right to vote is not encumbered by physical barriers and disabilities.
 - This upholds the Commission's motto of ensuring - **No voter is left behind.**
 - Procedure:
 - After completing all the required steps to avail the facility a dedicated team of polling officials, accompanied by security personnel, visits the voter's residence to collect their votes.
 - Voters are **informed in advance** of the scheduled visit, enabling them to prepare to exercise their voting rights in a secure and comfortable manner.
 - The complete process is **videographed** for transparency.
 - Other Steps by ECI to make voting inclusive:
 - **Systematic Voters' Education and Electoral Participation program (SVEEP):** It is the flagship program of the ECI for voter education, spreading voter awareness and promoting voter literacy in India.
 - **Proposed Multi-Constituency Remote Electronic Voting Machine (RVM):** It aims to allow migrant voters to cast their votes from their current place of residence.
 - **Postal ballot:** Permits voting by post for special voters, service voters, voters on election duty, and electors under preventive detention.

- **Service voters:** Members of the armed forces, Members of a state's police force serving outside that state, Individuals employed by the Government of India in a post outside India, Members of a force subject to the Army Act, 1950.
- **Proxy voting:** Enables registered electors to delegate their voting rights to a representative, available for service voters.
- **'Turning 18' Campaign:** ECI's "Turning 18" campaign for the 18th Lok Sabha Elections targets young and first-time voters, aiming to boost their participation and address urban and youth apathy from past elections.
- *Guiding Principles for Accessibility:*
- **Article 324** of the Constitution provides for the Election Commission, its powers and functions for maintenance of the **Electoral Roll** and conduct of elections in a free and fair manner.
- **Article 325** provides that no person shall be ineligible for inclusion in the electoral roll on the grounds only of religion, race, caste, sex or anyone of these.
- **Article 326** provides for the **Universal Adult Suffrage** to be the basis of elections.
- The Constitution and related laws mandate the ECI to ensure free, fair, and inclusive elections based on adult suffrage.

Union government has recently launched an investigation into organ transplants, focusing on violations of the Transplantation of Human Organs.

Organ transplantation in India:

- **Transplantation of Human Organs & Tissues Act THOTA, 1994** is designed to regulate the removal, storage, and transplantation of human organs and tissues exclusively for therapeutic purposes and to curb commercial transactions involving them.
- However, it **does not cover** artificial organs.
- THOTA was updated in 2011, changing its name from "Transplantation of Human Organs (Amendment) Act, 1994" to its current name and it now

acknowledges **Brain Stem death** as a legal form of death, which facilitates more organ and tissue transplants compared to natural cardiac death.

- The **National Organ & Tissue Transplant Organization (NOTTO)**, a national-level entity under the **Ministry of Health and Family Welfare**, coordinates and networks the procurement and distribution of organs and tissues across the country.
- *Data unavailability*
- Despite the Union Health Ministry writing letters to States time and again for sharing of data related to organ donation and transplantation with NOTTO, complete data were still not being received, the **DGHS** underscored the need to ensure regular collection and sharing of data of all transplant cases, including those of foreigners, with NOTTO on monthly basis.

Ayushman Bharat to cover all above 70 years, says BJP in its Election Manifesto.

Ayushman Bharat – Pradhan Mantri Jan Arogya Yojana (AB-PMJAY):

- It is a **Centrally Sponsored Scheme** under the Ministry of Health and Family Welfare (**MoHFW**).
- It is an umbrella scheme of two major health initiatives, namely
- **Health and Wellness Centers (Ayushman Arogya Mandir)**
- These centers provide comprehensive health care, including for **non-communicable diseases** and maternal and child health services.
- *National Health Protection Mission (AB-PMJAY):*
- It provides a defined benefit cover of **Rs. 5 lakh per family per year**.
- This cover will take care of almost all secondary care and most of tertiary care procedures. To ensure that nobody is left out (especially women, children and elderly) there will be **no cap on family size and age** in the scheme.
- The benefit cover will include **pre and post-hospitalisation** expenses.
- All pre-existing conditions will be covered from day one of the policy.

- A defined transport allowance per hospitalization will be paid to the beneficiary.
- Beneficiaries:
- The families covered under this scheme have been included on the basis of occupational criteria of **Socio-Economic Caste Census 2011(SECC 2011)**.
- PM-JAY also included the beneficiaries of the then existing **Rashtriya Swasthya Bima Yojana**, which were not present in the SECC 2011 database.
- Objective:
- To alleviate the burden of **out-of-pocket expenditure** on the impoverished.
- To provide the poor with access to critical medical treatments and emergency care that were previously financially unattainable.
- It aims to achieve **universal health coverage**.
- Out-of-pocket expenditure:
- It is the money paid directly by households, at the point of receiving health care. This occurs when services are neither provided free of cost through a government health facility, nor is the individual covered under any public or private insurance or social protection scheme.
- Universal health coverage (UHC):
- It means that all people have access to the full range of quality health services they need, when and where they need them, without financial hardship. It covers the full continuum of essential health services, from health promotion to prevention, treatment, rehabilitation and palliative care.
- Need for Inclusion of All Senior Citizen under Health Insurance Scheme:
- **Ageing Population:** According to the **Longitudinal Ageing Study in India (LASI)**, the population over the age of **60 years will nearly triple** from 103 million (8.6% of total population) in 2011 to **319 million** i.e. expected to increase to 19.5% of total country's population in **2050**.

- **Low Insurance Cover:** According to the **India Ageing Report 2023**, Insurance coverage Just over 20% of people over the age of 60 years are covered under health schemes.
- **Health challenges:** The elderly are not only affected by chronic, non-communicable diseases and their complications, they are also more prone to infectious diseases because of a weakened immune system.
- **Out-of-Pocket Expenditure:** The out-of-pocket health expenditures account for more than 70% of health expenditures in India, leading to health vulnerabilities in the older population.
- *Significance of Expansion to All Senior Citizens:*
- **Healthcare Accessibility:** Extending insurance coverage to all senior citizens promotes overall well-being and quality of life by enhancing accessibility to healthcare services.
- **Financial Security & Economic Impact:** It will help in reducing the financial burden of healthcare expenses as it covers costs associated with medical treatments, prescription drugs, and hospitalization.
- **Social Inclusivity:** It will ensure equality and dignity among the elderly population to actively participate in societal activities without worrying about healthcare expenses regardless of financial status.
- **Reducing the Burden on Public Health Care Institutions:** It will contribute to more efficient allocation of healthcare resources and improved healthcare delivery for all segments of the Society.

Supreme Court Seeks Explanation From 2 NCDRC Members For Issuing Non-Bailable Warrants Ignoring SC's Interim Protection.

National Consumer Disputes Redressal Commission (NCDRC):

- It is a **quasi-judicial** commission in India which was set up in **1988** under the **Consumer Protection Act of 1986**.

- Mandate: To provide inexpensive, speedy, and summary redressal of consumer disputes.
- Its head office is in **New Delhi**.
- The Commission is headed by a sitting or a **retired Judge of the SC** or a sitting or a retired Chief Justice of a High Court.
- NCDRC shall have jurisdiction to entertain a complaint valued more than **two crore** and also have appellate and revisional jurisdiction from the orders of State Commissions or the District fora as the case may be.
- The provisions of this act cover '**goods**' as well as '**services**'.
- The goods are those which are manufactured or produced and sold to consumers through wholesalers and retailers.
- The services are in the nature of transport, telephone, electricity, housing, banking, insurance, medical treatment, etc.
- Eligibility to File a Claim: Any person who
- Has bought goods for consideration and finds any defect in the quality, quantity, potency, purity, or standard of the goods, or
- Has hired or availed any service for consideration and finds any fault, imperfection, shortcoming, or inadequacy in the quality, nature, and manner of performance in relation to the service.
- However, if a person has bought the goods for resale or for a **commercial purpose**, he is **not** a consumer.
- No complaint can be filed for **alleged deficiency** in any service that is **rendered free of charge** or under a contract of personal service.
- Who Can File a Complaint?
- A **consumer**
- **Any voluntary consumer** association registered under the Companies Act 1956
- The Central Government or any State Government

- One or more consumers where there are numerous consumers.
- Appeal: Any person aggrieved by an order of NCDRC, may prefer an appeal against such an order to SC **within a period of 30 days**.

The story of indelible ink, a lasting symbol of Indian elections, and who makes it?

Indelible ink:

- It contains **silver nitrate**. It is a **colourless compound** which becomes visible when exposed to **ultraviolet light**, including sunlight.
- The higher silver nitrate's concentration, the higher the ink's quality.
- For up to **72 hours** after application it can remain resistant to soap, liquids, home-cleansing, detergents, etc.
- This water-based ink also contains a solvent like alcohol to allow its faster drying... The precise protocol for making this ink including its chemical composition and the quantity of each constituent is, however, not known to many people.”
- The indelible ink was first manufactured at the Election Commission of India's request by the government's **Council of Scientific & Industrial Research (CSIR)**.
- **Mysore Paints & Varnish Ltd.** has been licensed to manufacture the ink and has been in the business since **1962**.
- It is exported to more than 25 countries that include Canada, Ghana, Nigeria, Mongolia, Malaysia, Nepal, South Africa and the Maldives
- **The Representation of the People Act (RoPA) of 1951** mentions the ink.
- **Section 61** states that rules may be made under the Act “for the marking with indelible ink of the thumb or any other finger of every elector who applies for a

ballot paper or ballot papers for the purpose of voting at a polling station before delivery of such paper or papers to him.”

- Silver nitrate?
- It is **an inorganic compound** with the chemical formula **AgNO₃**. In its solid form, silver nitrate is coordinated in a **trigonal planar** arrangement. It is often used as a precursor to other silver-containing compounds.

Recently, the Centre has issued few directions to the states with regard to NOTTO (National Organ and Tissue Transplantation Organisation)

Organ Transplant Violations Involving Foreign Nationals:

- Recently, two successive organ transplant cases involving foreign nationals came to the fore in which regulations were violated. In Rajasthan, fake NoCs were allegedly issued to Bangladeshi nationals, and in Delhi, poor Myanmar nationals were allegedly paid to donate kidneys.
- Earlier, after the case involving Myanmar nationals came to light, the Union health secretary had urged the foreign secretary to sensitize the embassies as they are required to issue a certificate to their respective citizens, stating that the donor and recipient are related to each other for undergoing transplant in India.
- The **NOTTO registry data** shows that there has been an increase in the number of transplants in foreign nationals.
- Recently Issued Directions by the Centre:
- **ID-Generation:** The directions are given to ensure that a NOTTO ID is generated for the donor and recipient for living-donor as well as deceased-donor transplants.
- **Mandatory Quick Identification: NOTTO-ID** being mandatory for considering allocation of organs in case of deceased-donor transplant, this ID in case of a

living-donor transplant shall also be generated at the earliest, maximum within 48 hours after the transplant surgery is done.

- **Investigation & Inspection:** The Union Health ministry has directed state authorities to investigate cases of commercial trading of organs and take appropriate action for violations, if any.
- State governments to devise a system for **regular inspection** of all transplant and **retrieval centres**.
- **Combat Arising Commercial Trading Issue:** Organs of the deceased donor are anonymously allocated to people waiting for a transplant, while an organ can be donated by a living person only if donor and recipient are close relatives or share a close bond and want to donate altruistically.
- Commercial trading of organs is **not allowed** under Indian laws.
- **In Accordance with Law:** To ensure that foreigners come to India to get a transplant by following the laws of the land.
- While it is encouraging to see an increasing number of foreign nationals choosing India as their destination for getting a transplant as India offers world class transplantation at a fraction of the cost as compared to several Western countries. It must be held in accordance with the law.
- National Organ and Tissue Transplant Organization (NOTTO):
- It is a national level organisation set up under the **Directorate General of Health Services**, Ministry of Health and Family Welfare.
- It functions as the apex centre for all India activities of coordination and networking for procurement and distribution of organs and tissues and registry of organs and tissues donation and transplantation in the country.
- It has following two divisions:
 - **National Human Organ and Tissue Removal and Storage Network**
 - **National Biomaterial Centre**
- *Mandate:*

- To establish a network for organ procurement and distribution.
- To maintain a national registry on organ donation and transplantation.

Supreme Court Rejects Plea For 100% EVM-VVPAT Verification

Supreme Court's directions:

- The **Symbol Loading Units (SLUs)** used in VVPATs must be sealed, secured, and stored for **45 days** following the election results.
- The SLUs are to be stored alongside the EVMs and undergo examination akin to the EVMs.
- Candidates can request verification of **5% of the EVMs**, including ballot units, control units, and VVPATs, in any given constituency by engineers of the manufacturers.
- This request must be made in writing **within seven days** of the declaration of the election results.
- Electronic Voting Machine(EVM):
- An EVM is a portable instrument for the purpose of conducting elections to the parliament, legislature and local bodies like panchayats and municipalities.
- In **1989**, the Election Commission (EC) developed India's indigenous EVMs in alliance with two central government undertakings - the **Electronics Corporation of India (ECIL)** and **Bharat Electronics Limited (BEL)**.
- It is a microcontroller-based instrument designed to modernise the election procedure and there is no scope for invalid votes and total secrecy of voting data is maintained and it also facilitates quick and accurate counting.
- The voting data recorded in EVMs **can be retained for years** and can be extracted if necessary.

- It was first time used in the general election in **Kerala in 1982**.
- Working Module of EVM:
- An EVM consists of a **control unit** and a **balloting unit**.
- The control unit belongs to a polling officer while the balloting unit is kept in a compartment to cast votes.
- The balloting unit presents the voter with **blue buttons horizontally** labelled with corresponding party symbols and candidate names.
- The Control Unit, on the contrary, provides the officer-in-charge with a '**Ballot marked**' button to proceed to the next voter, instead of issuing a ballot paper to them.
- EVMs can even be used in areas with **no electricity**, as they can be operated on alkaline batteries.
- Voter Verifiable Paper Audit Trail (VVPAT):
- Initially introduced during the 2014 Lok Sabha elections in India, the VVPAT is essentially a system for verifying votes without traditional paper ballots, directly linked with the EVM.
- VVPAT generates a **paper slip post-vote**, displayed for seven seconds, showing the party's name and symbol chosen by the voter.
- Voters can see the slip through a transparent window on the EVM to verify their selection.
- After viewing, the slip drops into a secure compartment within the EVM, which can be accessed in case of any disputes.
- In 2019, the Supreme Court of India required cross-verification of VVPAT slips with EVM results for 5 machines per assembly segment in each parliamentary constituency.
- Ensures voter confidence and transparency by providing a physical proof of electronically cast votes.

DEFENCE AND SPACE

NASA Tracks Massive 170-Foot Asteroid Moving Towards Earth At 13798 KMPH

About Asteroid:

- Asteroids, sometimes **called minor planets**, are **rocky remnants** left over from the early formation of our solar system about 4.6 billion years ago.
- Most of this ancient space rubble can be **found orbiting the Sun** between **Mars and Jupiter** within the main asteroid belt.
- Asteroids orbit the sun in highly flattened or "**elliptical**" **circles**, often rotating erratically, tumbling and falling through space.
- The total mass of all the asteroids combined is less than that of Earth's Moon. **Many large asteroids have** one or more small **companion moons**. An example of this is Didymos, a half-mile (780 meters) wide asteroid that is orbited by the moonlet Dimorphos, which measures just 525 feet (160 m) across.

Team led by PRL Ahmedabad finds ozone on Jupiter's moon Callisto

About Ozone:

- It is a gas composed of **three atoms of oxygen**. It is both a **natural and a man-made product** that occurs in the Earth's upper atmosphere (Stratospheric ozone) and lower atmosphere (the troposphere).
- Stratospheric ozone is formed naturally through the interaction of solar ultraviolet (UV) radiation with molecular oxygen (O₂).
- The "ozone layer," approximately **6 to 30 miles** above the Earth's surface, reduces the amount of harmful UV radiation reaching the Earth's surface.

- **Key facts about Callisto:**

- It is one of **Jupiter's largest moons** and the third-largest moon in the Solar System after Ganymede and Titan.
- **Composition:** It is primarily composed of **water ice, rocky materials, sulphur dioxide**, and some organic compounds. These substances make the moon a potential candidate for supporting life in the Solar System beyond the earth.
- Its surface is heavily cratered, indicating a long history of being struck by asteroids and comets. It also lacks the extensive seismic activity seen on some of Jupiter's other moons, such as Io and Europa.

Mother of Dragons comet visible in the skies. All you need to know.

About Mother of Dragons comet:

- It is officially known as **Comet 12P/Pons-Brooks**. It is a **'Halley-type' comet** with an orbital period of roughly **71 years** and a nucleus approximately 30 km wide.
- **Composition:** It is composed of **ice, dust and rocky material**. When it approaches the Sun, heat causes the ice inside the comet to turn from solid to gas.
- It is classified as a **Jupiter-family comet**, meaning its orbit is influenced by Jupiter's gravitational pull.
- It typically reaches perihelion (closest approach to the Sun) around the orbit of Mars and can become visible to observers on Earth during its close approach. Its closest approach to Earth will occur in June 2024.

- **Key facts about Comets:**

- Comets are ancient cosmic icebergs. They are **roughly 4.6 billion years old** and formed at the same time as the Sun, Earth and the other planets.
- They are made of **dust and ice**, which partly goes from solid to gas when the comet is warmed by the Sun.

First tidally locked super-Earth exoplanet confirmed

About Tidally locked Planet:

- A tidally-locked planet in its orbit around a star keeps the same face towards the star. This happens when the **rotation period** of the planet around its own axis becomes **equal** to its **revolution period around the star**.
- On a tidally locked planet, **one side is always facing a star** while the other is cloaked in perpetual darkness. The dark side could be so cold that water and would-be atmospheric components (e.g., carbon dioxide, nitrogen, or methane) are frozen, certainly an inhospitable environment for life.
- Examples of Tidal Locking:
 - The **Moon** is tidally locked to the Earth because it rotates in exactly the same time as it takes to orbit the Earth. That is why we only see one side of the Moon.
 - **Pluto-Charon system:** Here both bodies are of comparable size and are close together, both bodies can be tidally locked to each other
- Tidal locking does influence how a planet moves, because tidal locking slows down its spin.
- This phenomenon of tidal locking can happen with other bodies in space too, as astronomers often say that binary stars or star systems that have two stars at their center, are most likely tidally locked to each other.

India's PRATUSH among telescopes astronomers want to put on, around the moon

About PRATUSH Telescope:

- **Probing ReionizATIion of the Universe using Signal from Hydrogen** (PRATUSH) is a radio telescope to be sited on the **moon's far side**.

- It is being built by the **Raman Research Institute** (RRI) in Bengaluru with active collaboration from the **Indian Space Research Organisation** (ISRO).
- Initially, ISRO will place PRATUSH into orbit around the earth. After some fine-tuning, the space agency will launch it moonwards.
- **Main roles:** It will be to **detect signals** from the **first stars and galaxies**, reveal the cosmic dawn of the universe, answering the question when the first stars formed, the nature of the first stars and what was the light from the first stars.
- It will carry a **wideband frequency-independent antenna**, a self-calibrating analog receiver and a **digital correlator** to catch radio noise in the all-important signal from the Dark Ages.
- The target instrument sensitivity is at the level of a few millikelvin without being limited by any systematic features.

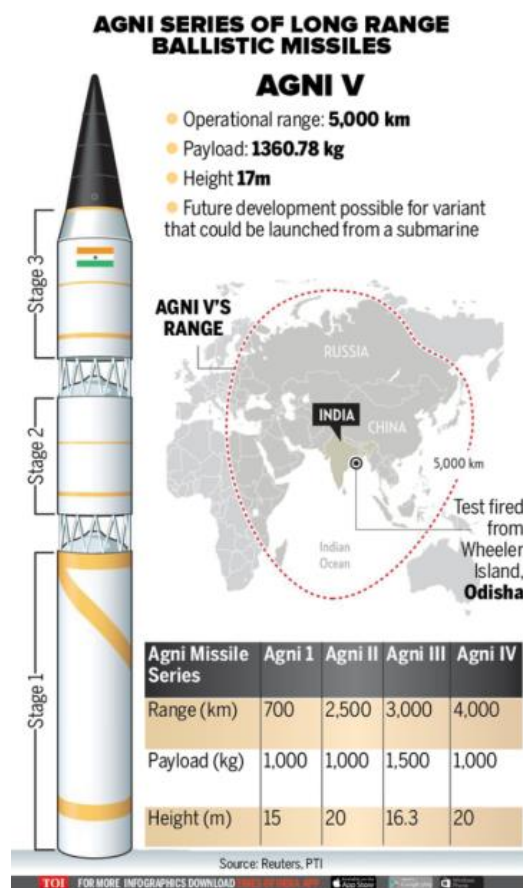
India successfully carried out the launch of the new-generation nuclear-capable ballistic missile "Agni Prime" (Agni-P)

Agni-Prime's flight test:

- Agni-Prime's flight-test was conducted by the Strategic Forces Command (SFC) along with the Defence Research and Development Organisation (DRDO).
- SFC:
- SFC, sometimes called **Strategic Nuclear Command**, forms part of India's Nuclear Command Authority (NCA).
- Established in 2003, It is responsible for the management and administration of the country's tactical and strategic nuclear weapons stockpile.

- Agni-P:

- Agni-P is a nuclear-capable new-generation advanced variant of the Agni class of missiles with a maximum range of 1,000 to 2,000 km.
- It is a **two-stage canisterised solid propellant ballistic missile** with dual redundant navigation and guidance system
- It is lighter than previous Agni series missiles, the new version will feature guidance by advanced ring-laser gyroscopes-based inertial navigation systems (INS).
- Since the missile is **canisterised**, it can be transported by road and rail and stored for longer periods, significantly reducing the time required for preparation and launch.
- It is first of a new generation of missiles introduced following the conclusion of the **Integrated Guided Missile Development Program (IGMDP)**.
- According to reports, the missile uses a cold launch mechanism and can be fired in salvo mode.



Integrated Guided Missile Development Program (IGMDP):

- The IGMDP was a program that India began in **1983 to develop a range of missiles** and gain self-reliance in missile technology.
- The program was conceived by Dr. APJ Abdul Kalam, who was the Director of Defence Research & Development Laboratory (DRDL).
- The missiles developed under the programme were:
- Short-range surface-to-surface ballistic missile **Prithvi**.
- Intermediate-range surface-to-surface ballistic missile **Agni**.
- Short-range low-level surface-to-air missile **Trishul**.

World Economic Forum and McKinsey & Co report: 'Space: The \$1.8 Trillion Opportunity for Global Economic Growth'

About Space Economy:

- The Space Economy is defined by the OECD as the **full range of activities** and the **use of resources that create value and benefits** for human beings in the course of **exploring, researching, understanding, managing, and utilizing space**.
- **The term 'space economy' covers the goods and services produced in space for use in space.**
- Current Trends in the Space Economy:
- **Economic Growth in Space Sector: The Space Report 2022 estimates that the space economy was worth \$469 billion in 2021 – a 9% increase from a year earlier.**
- Global space market is **projected to reach \$1 trillion by 2040.**
- **Rise in State-Backed Investment:** According to the Space Foundation report, there has been an increase in state-backed investment in space projects around the world.
- There was a **19% jump in overall government** spending on military and civilian space programmes in 2021.
- Drivers of Space Economy:
- **Decrease in Launch Cost:** Rapid and large drop in launch costs of satellites and rockets, which has fallen **10-fold over the past 20 years.**
- **Price of Data and Connectivity:** It is also expected to **drop by at least 10 percent** as demand **increases by 60 percent by 2035.**
- **Commercial Innovations:** Example, **improvement in resolution of Earth-observation technology**, which in turn drives down the price to access the said technologies.
- **Diversification of Technologies:** There is a **rapid diversification of space-based technologies** and activities such as **space tourism.**

- **Cultural Awareness:** Cultural awareness and general enthusiasm for space in recent days is also a major driver of interest in space for future generations.
- **Catalysts of Expansion:**
- Various industries are both **drivers and beneficiaries of growth and diversification** by improving three key aspects of space technology:
 - **Harmonisation**
 - **Increasing ease of usability and accessibility, and**
 - **Education and awareness of growing technology.**
- **New Space Entrepreneurship** has emerged in India with many start-ups which seek value in exploring end-to-end services in the Business-to-Business and Business-to-Consumer segments using New Space.
- Space Economy in India:
- **Share in Global Space Economy:** At current, the space sector in India accounts for around **two percent of the global space economy.**
- India's space economy has the **potential to reach \$44 billion by 2033** with about **8 per cent of the global share.**
- **Size of the Indian Space Economy:** It is estimated around 8.4 Billion USD. Of this, the **downstream services market**, primarily of **communication and data applications**, accounts for close to **80% of the total space economy**, wherein the private sector is a major contributor.
- The **upstream market. satellite and launch operations**, is primarily contributed by the Government, with the private sector in a vendor oriented role towards manufacturing and delivering subsystems/components.
- **Compound Annual Growth Rate (CAGR):** As per the various market surveys, the space economy has grown with an average CAGR of 8%.
- **Rise in Number of Space Start-Ups:** As per DPIIT Start-Up India Portal, the number of Space Start-Ups have increased from just **1 in 2014 to 189 in 2023.**
- The investment in Indian Space Start-Ups has increased to **\$ 124.7 Million in 2023.**

- **Increasing Role of Private Sector:** Private companies are exploring satellite-based communication solutions, Satellite integration and testing facilities.
- The local manufacturing of the satellite subsystems and Ground systems are being taken up by the private sector.
- Ex- SpaceX, Virgin Galactic, Blue Origin and Arianespace offer launch services and space tourism.
- **Rise in Satellite Launches:** There is an increase in the number of launches accomplished by the ISRO. Out of the 424 foreign satellites launched by Isro since 1990s, 389 (more than 90%) were launched in the last nine years.
- India earned **\$174 million from launching of foreign satellites.**
- Space Legislation in India:
- **Satcom Policy:** It aimed to develop a healthy and thriving communications satellite and ground equipment industry as well as satellite communications service industry in India.
- **Remote Sensing Data Policy (RSDP) 2011:** It governs the acquisition and distribution of satellite remote sensing data by non-government users, which may be acquired either through an Indian satellite or a foreign satellite.

Tata Advanced Systems Limited (TASL) has deployed its sub-metre resolution optical satellite, TSAT-1A

TSAT-1A:

- It is **SpaceX's first dedicated rideshare mission** launched into a mid-inclination orbit.
- **Other Mission:** Alongside TSAT-1A, the **Bandwagon-1 mission** had 11 other spacecraft.
- These are **Korea's 425Sat, HawkEye 360's Clusters 8 & 9, Tyvak International's CENTAURI-6, iQPS's QPS-SAR-7 TSUKUYOMI-II, and Capella Space's Capella-14.**
- TSAT-1A is a **sub-metre resolution** optical satellite.

- Developed by **Tata Advanced Systems Limited (TASL)** in collaboration with Satellogic.
- It has been successfully deployed into space by **SpaceX's Falcon 9** rocket as part of the Bandwagon-1 mission.
- It was launched from **Kennedy Space centre, Florida.**
- It was assembled at TASL's Assembly, Integration, and Testing plant located at its Vemagal facility in Karnataka, India.
- Features
- **High-Resolution Optical Images**
- **Sub-meter resolution** for capturing detailed imagery of Earth's surface.
- Enhanced collection capacity for gathering more data.
- Wider dynamic range for capturing details in **both bright and dark areas.**
- **Low-latency delivery** for faster access to captured images.
- **TSAT-1A** has multispectral and hyperspectral capabilities.
- It is helpful in enhancing its earth observation functionalities.
- Its remote sensing offers information about **minerals or vegetation of the surfaces** on the Earth.
- TSAT-1A Specifications:
- **Weight and Orbit:** It weighs **less than 50 kg** and is positioned in a **low-earth orbit.**
- **Inclined Orbit Benefits:** Its inclined orbit configuration enables more frequent revisits to specific areas compared to the **Sun Synchronous Polar Orbit (SSPO).**

Defence Research & Development Organisation (DRDO) & Indian Army conducted successful trials of indigenous Man Portable Anti-tank Guided Missile Weapon System (MPATGM).

Man Portable Anti-tank Guided Missile (MPATGM) Weapon System:

- **Indigenously Developed:** MPATGM Weapon System is indigenously designed and developed by Defence Research & Development Organisation (DRDO).
- **Comprises:** The system consisted of the MPATGM, Launcher, Target Acquisition System, and the Fire Control Unit.
- **Strike Range:** 2.5 km
- **Significance:** Penetration trials of the Tandem Warhead System of MPATGM have been successfully completed.
- It is found capable of defeating modern armour protected Main Battle Tank.
- The ATGM system is well-equipped with day/night and top attack capability.
- Dual mode seeker functionality is a great value addition to the missile capability for tank warfare.
- It is an important step towards achieving self-reliance in advanced technology-based defence system development.
- Defence Research & Development Organisation:
- Establishment: It is the **R&D wing** of the Ministry of Defence, formed in **1958** from the amalgamation of the **Technical Development Establishment (TDEs)** of the Indian Army and the **Directorate of Technical Development & Production (DTDP)** with the **Defence Science Organisation (DSO)**.
- Vision: To empower India with cutting-edge defence technologies.
- Mission: To achieve self-reliance in critical defence technologies and systems.
- Equipping armed forces with state-of-the-art weapon systems and equipment in accordance with requirements laid down by the three Services.
- Anti-Tank Guided Missiles (ATGMs):
- ATGMs are primarily designed to hit and destroy heavily armored military vehicles.

- The missiles can be transported by a **single soldier**, to larger tripod-mounted weapons, which require a squad or team to transport and fire, to vehicle and aircraft mounted missile systems.
- These are **'fire-and-forget'** missiles where the operator can retreat right after firing as there is no more guidance required.
- Man Portable Anti-tank Guided Missile (MPATGM):
- It is an indigenously developed low weight, fire and forgets missile.
- It is **'Soft' launched** from a canister using an Ejection Motor. It uses a state-of-the-art **Imaging Infra-Red (IIR) Seeker** system for homing on to the target.
- IIR Seeker systems have been successfully flight tested in Anti-Tank Guided Missiles **Nag, HELINA** and **MPATGM**. IIR Seekers have also been successfully demonstrated in the Exo-Atmospheric Interceptor PDV and **Anti Satellite Test (ASAT), Mission Shakti**.
- It uses the infrared light emission from a target to track and follow it.
- Missiles that use infrared seeking are known as **"heat-seekers"** since infrared is radiated strongly by hot bodies.
- This missile is for infantry and Parachute (Special Forces) of the Indian Army.

Siachen: 40 years of Operation Meghdoot.

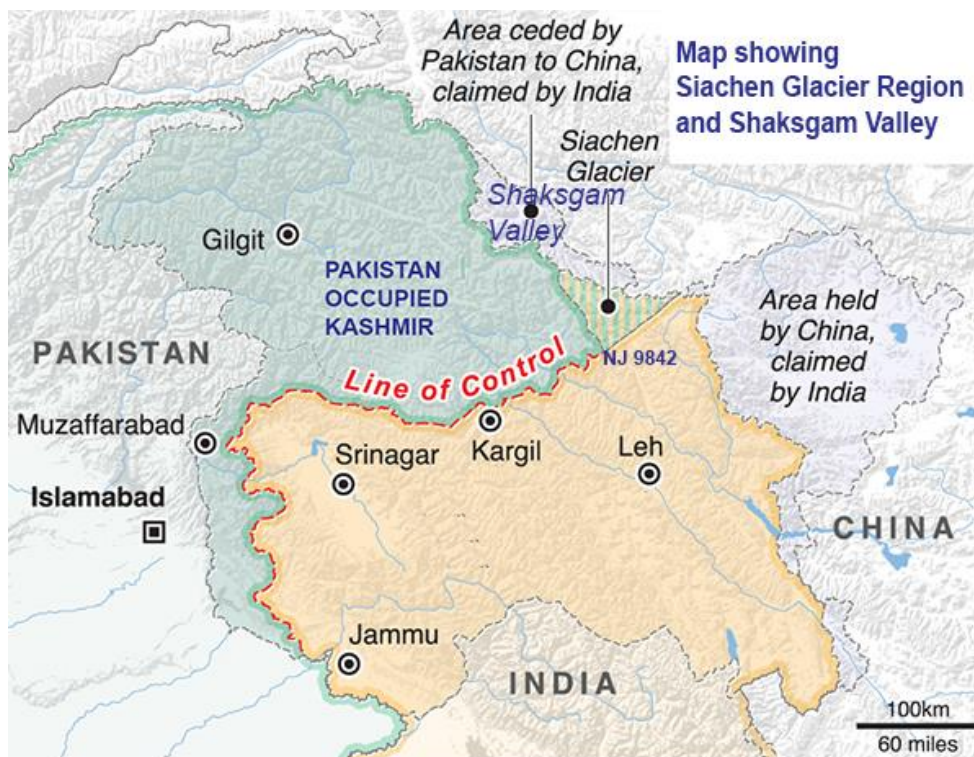
Operation Meghdoot:

- **Background:** By **1984**, Pakistan's cartographic aggression in the uncharted territory of Ladakh, allowing foreign mountaineering expeditions in Siachen, was becoming a cause of concern.
- To prevent an impending Pakistani military action in the area, India decided to thwart Pakistan's efforts to legitimize its claim on Siachen.

- **Operation Meghdoot:** It was launched by the Indian Army to secure strategic heights on Siachen with the deployment of troops.
- The operation involved the airlifting of Indian Army soldiers by the IAF and dropping them on the glacial peaks.
- Although the operation began in 1984, IAF helicopters were already operating in the **Siachen Glacier since 1978**, flying the Chetak helicopters which was the **first IAF helicopter to land in the Glacier** in October 1978.
- Positioning of Troops: About 300-odd troops were positioned on the strategically important peaks and passes of the glacier.
- By the time the Pakistan army reacted by advancing its own troops, the Indian Army occupied strategically crucial mountain peaks and passes, thereby gaining a tactical advantage.
- IAF's Role and Evolution in Operation Meghdoot: The IAF played a crucial role in supporting Operation Meghdoot, initially focusing on transport and helicopter aircraft for troop and material transport.
- Gradually, the IAF expanded its role, deploying fighter aircraft like the **Hunter, MiG-23s, and MiG-29s**, operating from high-altitude airfields at Leh and Thoise.
- This expanded role included fighter sweeps and simulated strikes over the glacier, boosting morale and deterring adversaries.
- In 2009, the IAF inducted **Cheetal** helicopters, re-engineered for high-altitude operations, and in 2013, showcased its capabilities by landing a Lockheed Martin C-130J Super Hercules at Daulat Beg Oldie.
- **Daulat Beg Oldie is the world's highest airstrip** near the line of actual control in Ladakh.
- Significance of Operation Meghdoot:

- Technological Progress and Infrastructure Development: Over the last four decades, significant efforts have been made to enhance infrastructure and habitat on the Siachen Glacier.
- Example-Introduction of **VSAT (Very Small Aperture Terminal)** technology has revolutionized communication on the glacier providing troops with crucial data and internet connectivity.
- **Enhanced Supply Chain and Logistics:** The introduction of heavy-lift helicopters and logistic drones significantly improved the supply of essential resources to personnel stationed at isolated posts, especially during harsh winter conditions.
- This includes ensuring the availability of clothing, mountaineering equipment, and rations.
- **Improved Living Conditions and Connectivity:** Recent initiatives have focused on improving connectivity, leading to advancements in the supply chain.
- **State-of-the-Art Medical Infrastructure:** The Siachen Glacier now has state-of-the-art medical infrastructure, including telemedicine nodes established by ISRO.
- These facilities provide critical medical support not only to troops but also to the local populace and tourists in the **Nubra Valley**.
- Siachen Glacier:
- Siachen Glacier is located in the **eastern Karakoram range** in the Himalayas just northeast of the point **NJ9842** where the **Line of Control** between India and Pakistan ends.

- The **75 km long Siachen Glacier** in the north of Nubra valley has the distinction of being the **largest glacier outside the polar and the subpolar regions**.
- It is also the **world's highest battlefield**.



Gopi Thotakura to be the first Indian space tourist: What is space tourism?

Space tourism:

- Space tourism is human space travel for recreational purposes.
- There are several different types of space tourism, including **orbital, suborbital and lunar space tourism**.

- The global space tourism market was worth **USD 851.4 million in 2023** and is projected to grow at a **CAGR of 44.8%** from 2024 to 2030.
- Growth factors of space tourism industry:
- Growing interest of adventure travelers and high net worth individuals in spaceflight.
- Increasing affordability of space travel and advancements in technology.
- Rising government initiatives and investments globally.
- Advanced propulsion, materials, and manufacturing methods are creating safer, more efficient spacecraft.
- Concerns:
- **Space debris**, affordability limited to wealthy, liability in accidents, health risks from microgravity and radiation.
- Legal Framework:
- **Outer Space Treaty (1967), Convention on International Liability for Damage Caused by Space Objects**, etc.
- Who is Gopi Thotakura?
- Gopichand Thotakura, described by Blue Origin as an entrepreneur, is a pilot and aviator who learned to fly before he could drive.
- He is also the co-founder of Preserve Life Corp, a wellness and applied health center based in Georgia.
- The **Blue Origin NS-25** mission will be the first crewed flight for the fully-reusable **New Shepard rocket** since NS-22 in 2022.
- Besides Thotakura and Ed Dwight, the mission will include four other astronauts: Mason Angel, Sylvain Chiron, Kenneth L. Hess, and Carol Schaller.

The Indian Army contingent departed recently for the 5th edition of India-Uzbekistan joint military Exercise DUSTLIK.

Exercise Dustlik:

- It is an **annual** joint military exercise between the Indian Army and the **Uzbekistan** Army.
- It is conducted alternately in India and Uzbekistan.
- The first edition of the exercise was held in Uzbekistan in **November 2019**.
- The last edition was conducted in **Pithoragarh** in February 2023.
- Dustlik-2024:
- It is the **fifth** edition of the joint exercise.
- The exercise will be conducted at Termez in Uzbekistan.
- The Indian Armed Forces contingent, comprising 60 personnel, is being represented by 45 personnel from the Indian Army, primarily from a battalion of the JAT Regiment, and 15 personnel from the Indian Air Force.
- The Uzbekistan contingent, comprising approximately 100 personnel, from the Uzbekistan Army and Air Force, will be represented by personnel from Southern Operational Command, part of the South-West Military District.
- The aim of Exercise DUSTLIK is to foster military cooperation and enhance combined capabilities to execute joint operations in mountainous as well as semi urban terrain.
- It would focus on a high degree of physical fitness, joint planning, joint tactical drills, and the basics of special arms skills.
- The complexity of this edition of Exercise DUSTLIK has been enhanced with the conduct of multi domain operations, as the contingent comprises personnel from combat support arms and services besides infantry.

India delivers first batch of BrahMos to Philippines.

India's Expanding Defence Export Markets:

- India exported **two Dornier 228 aircraft to Guyana**, marking its first major defence export to a **Caribbean nation**.
- India now exports military hardware to **85 countries**, showing a wide global reach.
- Record Growth in Defence Exports:
- Defence exports in FY 2023-24 hit a record **Rs. 21,083 crore (approx. US\$ 2.63 billion)**. This reflects a **32.5% increase** from the previous fiscal year.
- India's defence exports have surged **31 times over the last decade**, a remarkable growth from FY 2013-14.
- **Export authorisations** increased from 1,414 in FY 2022-23 to 1,507 in FY 2023-24, indicating an expanding approval process for defence exports.
- Contributions from Both Public and Private Sectors:
- About **60% of defence exports** come from **the private sector**, while the public sector contributes around **40%**.
- The export products include missiles, artillery guns, rockets, and armoured vehicles.

DRDO To Test Indigenous Laser Weapon DURGA-2.

DURGA-2 (Directionally Unrestricted Ray Gun Array):

- DURGA-2 is a directed **energy weapon** developed by **DRDO**.
- It uses **high-energy lasers, microwaves, and particle beams**.
- The system is designed to be deployed on land, sea, and air-based platforms.
- Operational Advantages:
- DURGA-2 can deliver lethal force at the speed of light, approximately 300,000 km/s.
- This allows for rapid response in combat situations.

- The beam's performance is stable, as it is **not influenced by gravity or atmospheric drag**.
- The intensity of energy can be varied to customize the impact on targets.
- *Strategic Importance:*
- DURGA-2 represents the future of **anti-missile, anti-drone, and anti-aircraft** technologies.
- This system aids in the development of advanced military hardware critical for modern warfare.
- Similar technologies are being developed by other countries, including **Russia, France, Germany, the UK, Israel, and China**.
- Impact on Defense Tactics
- DURGA-2 offers highly precise targeting with adjustable effects, providing significant tactical flexibility in combat.

NASA's Juno captures closest views of erupting volcanoes on Jupiter's moon Io.

Juno Mission:

- **Juno** is a **NASA** space probe orbiting the planet **Jupiter**.
- Built by **Lockheed Martin**, it is operated by NASA's Jet Propulsion Laboratory.
- It was launched **in 2011** as part of the **New Frontiers program**.
- NASA's New Frontiers program is a series of space exploration missions that began in 2003 and aim to improve understanding of the solar system.
- It is the **second** spacecraft to orbit Jupiter, following the **nuclear-powered Galileo orbiter**, which orbited the planet from **1995 to 2003**.

- In **2016**, Juno entered a polar orbit around Jupiter to initiate a scientific investigation of the planet.
- Upon completing its mission, Juno will be *intentionally deorbited into Jupiter's atmosphere*.
- Objectives:
- Juno's mission is to measure Jupiter's composition, gravitational field, magnetic field, and polar magnetosphere.
- It also aims to uncover insights into how the planet formed, including whether it possesses a rocky core, the extent of water within its deep atmosphere, mass distribution, and the characteristics of its deep winds, which can reach speeds of up to **620 km/h (390 mph)**.
- Features:
- Juno, powered by the largest solar panel wings (**Juno solar array**) deployed on a planetary probe at launch, relies on them for both stability and generating power.
- It carries scientific instruments including Magnetometers, Gravity Science, Microwave radiometer, etc.
- Jupiter's moon Io:
- Jupiter's moon Io is the "**most volcanically active world in the solar system**," with hundreds of volcanoes, some erupting lava fountains dozens of miles high.
- Io is caught in a gravitational **tug-of-war between Jupiter's immense gravity** and the smaller yet precisely timed pulls from two neighboring moons, **Europa and Ganymede, which orbit farther from Jupiter**.
- Slightly **larger than Earth's moon**, Io is the **fourth-largest moon** in the Solar System.
- It is also the **third largest of Jupiter's moons**.

- It has the highest density and strongest surface gravity among moons and contains the least amount of water by atomic ratio of any known astronomical object in the Solar System.
- Discovered in **1610 by Galileo Galilei**, Io was named after the mythological character ***Io, a priestess of Hera who became one of Zeus's lovers.***

Indian Navy recently conducted Exercise Poorvi Lehar on the East Coast.

Exercise Poorvi Lehar (XPOL):

- It is a maritime exercise conducted by the **Indian Navy** along the East Coast, under the operational direction of the **Flag Officer Commanding-in-Chief, Eastern Naval Command.**
- The exercise aimed at validation of procedures towards assessment of Indian Navy's preparedness to meet **Maritime Security challenges** in the region.
- The exercise witnessed participation of Ships, Submarines, Aircrafts and Special Forces.
- XPOL was conducted in multiple phases including combat training in a realistic scenario during the Tactical Phase and successful conduct of various firings during the Weapon Phase towards reaffirming Indian Navy's capability to deliver ordnance on target.
- With operation of aircraft from diverse locations, a near continuous Maritime Domain Awareness was maintained throughout the Area of operations.
- In addition to the participation of assets from Eastern Naval Command, the exercise also witnessed participation of assets **from IAF, Andaman & Nicobar Command** and **Coast Guard** indicating a very high degree of interoperability amongst the Services.

- The Exercise offered valuable lessons to participating forces operating under realistic conditions, thereby enhancing their readiness to respond effectively to maritime challenges in the region.

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NASA greenlights the 2028 launch for its Dragonfly Rotorcraft Mission to Saturn's organic-rich moon Titan.

Dragonfly Mission:

- It is Scheduled to be launched in **July 2028 by NASA.**
- Dragonfly marks the first time NASA will fly a vehicle for science on another planetary body.
- The car-sized “dual-quadcopter” Dragonfly rotorcraft, which is being built by the Johns Hopkins Applied Physics Laboratory (APL) in Laurel, Maryland, will reach **Titan in 2034.**
- The rotorcraft has eight rotors and flies like a large drone.
- It will cover tens of kilometers on Titan in under an hour, which is a massive distance as far as currently available extra-planetary rotorcraft are concerned.
- It will fly to dozens of promising locations on Titan, looking for **prebiotic chemical** processes common on both Titan and the early Earth before life developed.
- It will spend most of its time on the Titan's surface making science measurements.
- It will use a **radioisotope power system** (Because the hazy atmosphere on Titan will make it difficult to use solar power) like the **Curiosity rover** on Mars.
- About Titan (Moon of Saturn):
- It is an icy world whose surface is completely obscured by a golden hazy atmosphere.
- Titan is the **second largest moon** in our solar system & **Saturn's largest moon.**

- It is the only moon in the solar system with a dense atmosphere, and the only place besides Earth that has standing bodies of liquid, including rivers, lakes and seas, on its surface.
- Like Earth, Titan's atmosphere is primarily nitrogen, plus a small amount of methane.
- It is the sole other place in the solar system known to have an **earthlike cycle of liquids raining from clouds, flowing across its surface, filling lakes and seas, and evaporating back into the sky (akin to Earth's water cycle)**.
- Titan is also thought to have a subsurface ocean of water.
- *Ideal Place for Exploration:*
- Titan's dense and calm atmosphere coupled with its low gravity makes flying an ideal way to travel to its different parts.
- Titan is an ideal place to study the conditions necessary for habitability in an extraterrestrial environment.
- Even if we don't find signs of life there, there is a chance we could observe the kind of chemical interactions that happened before life developed on Earth.

IAF successfully tests air-launched ballistic missile in Andamans, significantly boosts stand-off capabilities.

- Recently, under the aegis of Strategic Forces Command a new version of Medium-Range Ballistic Missile successfully launched in the Andaman and Nicobar Islands.
- *Crystal Maze 2:*
- It is an extended stand-off range **air-to-surface ballistic missile** of **Israeli origin**, also known as **ROCKS**.
- *Features:*

- This missile has the ability to strike targets located at distances **exceeding 250 kilometers**.
- It is designed for precision strikes on high-value targets.
- It is capable of engaging heavily fortified positions from long distances, ensuring minimal collateral damage.
- It is renowned for its accuracy and reliability in combat scenarios, making it a preferred choice for missions requiring surgical precision.
- The missile's integration into various platforms enhances its operational flexibility and effectiveness in diverse combat environments.
- It operates effectively in **GPS-denied areas** like the one India faced during the Kargil War.
- It can breach regions secured by air defense systems.
- This system allows for the choice between penetration or **blast fragmentation warheads**, making it suitable for targeting both surface and heavily fortified underground facilities.
- *Ballistic Missile and Why is it Named So?*
- A Ballistic missile follows a ballistic flight path which comprises **three phases of flight**:
 - **First phase or the Boost Phase:** The **solid-fuel rocket engine** propels the missile upward, requiring it to swiftly attain velocity and altitude as it penetrates through the dense layers of Earth's atmosphere.
 - **Second and unpowered phase of flight:** It happens in the upper reaches of the earth's atmosphere or in space, where the missile travels along its pre-determined path, but without the power of its engines.
 - It is known as the **coast phase or mid-course phase** and during this time, it travels along a **horizontal path**.

- During the coasting, the missile is either in space or the upper atmosphere, where it faces minimal resistance or drag.
- **Third and final phase or the terminal phase:** The missile descends and gets back into the earth's atmosphere and flies towards its target, while being guided by its on-board systems.
- **Significance for India:** The Indian Air Force (IAF) has successfully conducted tests on this missile and aims to procure it in large numbers under the **Make in India** initiative. This move highlights India's dedication to achieving self-sufficiency in defense manufacturing.
- Other similar missiles:
- **Popeye Missile :** The Israeli-built Popeye is a **medium-range** conventional missile which can be fired from a **stand-off distance** of around 90 km, i.e., **the aircraft doesn't need to be vertically above the target to hit it.**
- **SPICE: SPICE (Smart Precise Impact and Cost Effective guidance kit)-2000** is mounted on a standard **2000-pound Mk 84 unguided bomb**. This converts it into smart guided **air-to-surface munition** that can be dropped from a stand-off distance of up to 60 km.
- It is a **"fire and forget" weapon** that automatically goes to its target once launched relying only on its navigation/seeker system.
- The missile, launched from a **Su-30 fighter** jet by the IAF.
- This missile inherits many technologies **from Popeye and SPICE** which was used in the **Balakot strike**.
- Strategic Forces Command (SFC):
- It is also sometimes known as **Strategic Nuclear Command**, forms part of India's **Nuclear Command Authority (NCA**, which is responsible for command and control decisions regarding India's nuclear weapons programme).
- The SFC is incharge of handling the country's nuclear arsenal, while the DRDO is responsible for developing weapons systems and related military technologies.
- It was created **on 4th of January, 2003**.

- It comprises personnel from the Indian Army, Navy and Air Force.
- **The Commander-in-Chief (CinC)**, a 3-star General, is appointed on a rotational basis from the three services.

INTERNATIONAL RELATIONS

India-EU Trade & Technology Council

India-EU Trade & Technology Council (TTC)

- **India-EU-TTC** is strategic coordination and engagement on trade and technology between India and Europe
- **First Trade and Technological Council:** The EU-India Trade and Technology Council is the EU's second bilateral forum and India's first created with any partner. In June 2021, the European Union and the United States began a TTC.
- **Aim:** To establish a high-level coordination platform for solving critical issues at the convergence of trade, trusted technology, and security.
- **Meetings of the Council:** Ministerial meetings under the TTC are held annually to ensure regular high-level contact between India and the EU.
- These meetings are held to foster balanced participation and strengthen bilateral collaboration.
- Working Groups
- The TTC is made up of three Working Groups (WGs) that report on roadmaps for future collaboration.
- **The Working Group on Strategic Technologies, Digital Governance, and Digital Connectivity:** It will collaborate on topics of mutual interest, including **digital connectivity, AI, 5G/6G, high performance and quantum computing, semiconductors, cloud systems, cybersecurity, digital** skills, and digital platforms.

- **The Working Group on Green and Clean Energy Technologies:** It will prioritize green technologies, including investment and standards, with a focus on research and innovation.
- **WG for Trade, Investment, and Resilient Value Chains:** It will aim to strengthen supply chains and improve access to vital components, energy, and raw materials.
- It will also aim to overcome recognised trade impediments and global trade difficulties by encouraging cooperation in multilateral settings.

Zaporizhzhia Nuclear Plant's Nuclear Security

Zaporizhzhia Nuclear Plant

- Located in southeast Ukraine, along the banks of the **Dnipro River**, which flows into the **Black Sea**.
- It is the **largest nuclear plant** in Europe.
- The plant is currently under the control of Russian forces.



- Nuclear Security
- Nuclear security is about the **prevention, detection, and response** to unauthorized activities with nuclear materials.
- The IAEA has set seven key principles for nuclear safety and security.
- Seven Pillars of Nuclear Safety and Security
- **Physical Integrity:** Ensuring that reactors, fuel ponds, and waste storage are secure and intact.
- **System and Equipment Functionality:** Keeping all safety and security systems operational.
- **Operational Staff Capacity:** Ensuring staff are capable and under no excessive pressure to maintain safety and security.
- **Secure Off-site Power:** Maintaining a reliable external power source for all nuclear facilities.

- **Logistical Supply Chains:** Ensuring uninterrupted supplies and transport to and from the sites.
- **Radiation Monitoring and Emergency Response:** Having effective radiation monitoring and emergency plans both on-site and off-site.
- **Reliable Communication:** Ensuring ongoing, dependable communication with regulatory bodies and relevant entities.
- Key International Regulations
- **1979 Convention on the Physical Protection of Nuclear Material and Facilities (CPPNM)**
- **United Nations Security Council Resolution 1540 (2004)**
- **2005 International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT)**

Gulf Cooperation Council (GCC) and its 'Vision for Regional Security'

About Gulf Cooperation Council:

- It is a **regional, intergovernmental, political, and economic union** established on 25 May 1981, with formal signing of the Charter of the GCC.
- **Member states:** It comprise of **6 national monarchies of the Gulf region ie. The Kingdoms of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates.**
- **Headquarters: Riyadh**, the capital of Saudi Arabia
- **Military arm: The Peninsula Shield Force** is the military arm of the GCC, formed in 1984.
- **Objectives:** To effect coordination, integration and inter-connection between member states in all fields in order to achieve unity between them.



Vision Statement for 'Regional Security'

- **Principles:**
- The vision statement operates on the principles of **shared destiny and indivisible and collective security of the member states.**
 - It outlines the principles of **respecting sovereignty and non-interference** in the internal affairs of the States
- **Objective:**

- To preserve regional security and stability, tackle the challenges facing them and settle the disputes through peaceful means.
- To build regional and international partnerships to deal with the regional threats.
- **Commitments:**
- **Resolution of conflict:** The GCC states need **joint actions to prioritize dialogue and negotiation** to resolve their differences and conflicts and to avoid the use of force.
- **Terrorism and extremism:** It urges the member states to combat terrorism and extremism by stopping the flow of money to the hands of the terrorists and to combat money laundering.
- **Maritime security:** A call for **regional and international coordination** to ensure maritime security and ensure safety of trade and energy supply routes.
 - GCC countries are the key suppliers of energy and any disruption in the sea lines of communication will directly affect their national economies. **Example: The Red Sea Crisis.**
- **Nuclear non proliferation Regime:** The GCC has asked to make the **region a Weapons of Mass Destruction Free Zone (WMDFZ)** with Iran and Israel possessing nuclear programmes.
 - It calls for a Nuclear non proliferation Regime in West Asia, but also supports the right of the States to use nuclear energy for peaceful purposes.
- **Cybersecurity:** The vision document urges the member states to take effective steps to combat cyber security challenges with growing digitisation.
- **Shared challenges:** Effective collaboration in addressing the new age challenges of climate change, water and food security, Sustainable Development Goals (SDGs), energy security, defending economic resources and creating investment opportunities.

C-Dome Defence System of Israel

C-Dome:

- It is the **naval version** of **Israel's Iron Dome missile defence system**, designed to counter aerial threats.
- It was first deployed to respond to a hostile aircraft **near Eilat**.
- Key Features of C-Dome:
- Operates similarly to the Iron Dome, using **radar to detect and neutralize threats with missiles**.
- Unlike Iron Dome, which is land-based, **C-Dome is mounted on ships**, specifically on **Sa'ar 6-class corvettes**, enhancing maritime security.
- Provides 360-degree protection against maritime and coastal threats.
- Uses **TAMIR interceptors** and a **modular Vertical-Launch Unit (VLU)** for threat interception.
- Integrated with the ship's radar system for detecting and tracking threats.
- Development and Operational Status:
- Unveiled in **2014** and declared operational in November 2022.
- Tested on **German-made Sa'ar 6-class** corvettes used by the Israeli Navy.
- Shares technology with the Iron Dome, which has been operational since 2011 with a 90% effectiveness rate.
- Strategic Importance
- Ensures high kill probability against modern maritime and coastal threats.
- C-Dome enhances the defensive capabilities of Israel's naval forces, providing a robust shield against aerial attacks.

South Korea launches its 2nd military spy satellite amid animosities with North Korea.

- The satellite was deployed using a **SpaceX Falcon 9** rocket and is equipped with **synthetic aperture radar (SAR)**, enabling it to capture images regardless of weather conditions.
- Military spy satellites:
- Military spy satellites, also known as **reconnaissance satellites** or **intelligence satellites**, are artificial satellites used for military surveillance and reconnaissance.
- They are either Earth observation satellites or communications satellites deployed for military or intelligence applications.
- They provide information on enemy forces and their capabilities, and are used for military observation missions.
- They are capable of **intercepting and recording radio** and **radar transmissions** as it passes over a country.
- The most common missions for military satellites are: Intelligence gathering, Navigation, and Military communications.
- Countries such as the **US** (with **the Keyhole series**, known as KH), China (with the **Yaogan series**), and **Russia** (with the **Persona series**) have deployed numerous reconnaissance satellites.
- Types:
- **Optical imaging satellites:** Use light sensors to detect missile launches and "see" enemy weapons on the ground.
- **Radar-imaging satellites:** Use radar technology to observe the Earth through cloud cover.
- **Signals-intelligence or ferret satellites:** Use radio receivers to capture radio and **microwave transmissions** from any country on Earth.

- **Missile early warning:** Detects ballistic missile launches.
- **Nuclear explosion detection:** Detects nuclear detonations from space.
- **Electronic reconnaissance:** Intercepts stray radio waves.
- Concerns:
- **Militarization of Space:** The deployment of military assets in space raises the **risk of weaponization** and conflict escalation beyond Earth's atmosphere.
- **Promotion of Mistrust:** Military satellite deployments can exacerbate tensions between nations, as seen in the case of North and South Korea, heightening suspicion and leading to potential arms races.
- **Dual-Use Technology:** Satellite technology, while serving civilian purposes like communication and navigation, can also be repurposed for military applications, including orbital weapons capable of **targeting ground installations**.
- **Intelligence Gathering:** Advanced reconnaissance satellites, such as those developed by China, have the capability to gather sensitive military intelligence, potentially posing security risks for other nations like India.
- Indian reconnaissance satellites:
- **RISAT-2:** India's first dedicated reconnaissance satellite, designed for border surveillance, counter-terrorism, and anti-infiltration operations.
- The satellite was decommissioned in October 2022.
- **RISAT-2B:** The third satellite in the series, launched in May 2019, with an **X-Band radar** that takes high-resolution spot images.
- **EMISAT:** India's first Electromagnetic Intelligence Gathering Satellite, launched in April 2019 that provides information and locations of enemy radars.
- **GSAT:** India has two dedicated military satellites, the **GSAT-7 (Rukmini)** for the Navy and the **GSAT-7A (Angry Bird)** for the Air Force.
- **Domestic private sector satellite:** Manufactured by **Tata Advanced Systems (TASL)**, this satellite has **sub-meter resolution** imagery capabilities and is expected to launch in 2024.

- The satellite will be controlled from a ground station in India, which will keep the coordinates monitored by the armed forces secret.

The NASA welcomed Sweden as the 38th country to sign the Artemis Accords.

Artemis Accords:

- The Artemis Accords are a **non-binding** set of principles established in **2020** by the **US State Department and NASA**, with Australia, Canada, Italy, Japan, Luxembourg, the United Arab Emirates, the United Kingdom and the United States.
- This US-led alliance seeks to facilitate international collaboration in planetary exploration and research.
- It relates to activities in orbit, on the surface, and in the subsurface of the moon, Mars, comets, and asteroids.
- It also covers the stable orbital points known as the **Lagrangian points** for the Earth-moon system).
- Artemis Accords Members:
- The Accords have been signed by **39 countries** till now.
- On **June 21,2023 India became the 27th country** to sign the Artemis Accords.
- **China and Russia are not** part of this initiative.
- They are grounded in the **Outer Space Treaty (OST) of 1967**, which is a multilateral pact under the United Nations serving as the foundation for international space law.
- The OST emphasizes that space is a shared resource for humanity, prohibits national appropriation, and encourages the peaceful use of space.
- The Outer Space Treaty:

- It was adopted by the **United Nations** in 1967.
- It primarily addresses the
- Peaceful use of outer space and prohibits the placement of nuclear weapons in space.
- Provisions related to space debris and the return of space objects to Earth.
- Damage caused by space objects to other space assets.
- It also applies to damage caused by falling objects on earth.
- **Rescue and Return Agreement 1968**
- Earlier known as '**Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space**'(ARRA).
- It outlines the responsibilities of the states to assist & rescue astronauts in distress and promptly return them to the launching State.
- Also, for the Recovering of space objects.
- **The Liability Convention, 1972:** (Convention on International Liability for Damage Caused by Space Objects)
- Most space-faring countries are signatories to this Convention.
- This convention is one of the several international agreements that complement the Outer Space Treaty, the overarching framework guiding the behavior of countries in space.
- **Registration Convention, 1975** (Convention on Registration of Objects Launched into Outer Space)
- To provide means and procedures to assist in the identification of objects launched into outer space(space objects) and to make provisions for their registration
- Commitments under the Accords:

- **Peaceful Purposes:** The signatories commit to conduct space activities for peaceful purposes and in accordance with international law.
- **Broad Dissemination:** There is a commitment to broadly disseminate national space policies and scientific information resulting from activities.
- **Common Infrastructure:** They recognize the importance of developing interoperable and common exploration infrastructure, such as communication systems and landing structures, to enhance scientific discovery and commercial utilization.
- **Registration and Data Sharing:** Signatories agree that space objects should be **registered** and that scientific data is to be openly shared on time. Private sectors are exempt unless they act on behalf of a signatory.
- **Preservation of Heritage:** There is a commitment to preserve outer space heritage, including historic landing sites and evidence of activity on celestial bodies.
- **Utilization of Space Resources:** The utilization of space resources must support safe and sustainable activities and must not interfere with the activities of other signatories. **Information on location and nature of resources must be shared to prevent interference.**
- **Mitigation of Debris:** Signatories plan for the safe and timely disposal of spacecraft and commit to limiting the generation of harmful debris.

Indian nationals can now apply for multiple-entry Schengen visa with longer validity.

Schengen Visa:

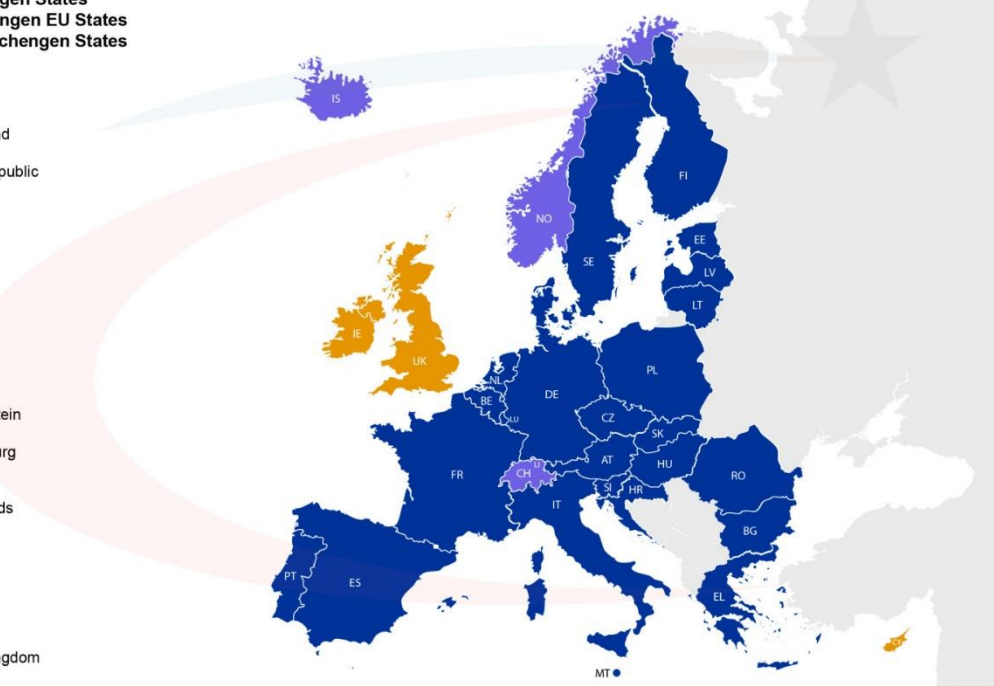
- It is an **official document** mandatory for some non-Europeans to travel to all **the 27 countries** which are part of the **Schengen area**.
- Once granted, this visa allows the traveller to cross the borders of the other member-states without going through identity checks at the border.

- The Schengen visas allow visitors to travel freely in the Schengen area for short stays of a maximum of 90 days in any **180-day period**.
- The visas **do not give** the right to work.
- What is the Schengen Area?
- It is a group of 27 European nations that have abolished their internal borders, for the free and unrestricted movement of people.
- Members of this area include 23 of the 27 EU member states (except for **Bulgaria, Cyprus, Ireland and Romania**) and all members of the **European Free Trade Association (Iceland, Liechtenstein, Norway and Switzerland)**.
- **Switzerland, Iceland, and Norway** are **not in the EU** but are inside of the Schengen Area.
- Being part of this area means that countries:
- Do not carry out checks at their internal borders, except in cases of specific threats;
- Carry out harmonized controls at their external borders, based on clearly defined criteria.

The Schengen Area

- EU Schengen States
- Non-Schengen EU States
- Non-EU Schengen States

AT Austria
BE Belgium
BG Bulgaria
CH Switzerland
CY Cyprus
CZ Czech Republic
DE Germany
DK Denmark
EE Estonia
EL Greece
ES Spain
FI Finland
FR France
HR Croatia
HU Hungary
IE Ireland
IS Iceland
IT Italy
LI Liechtenstein
LT Lithuania
LU Luxembourg
LV Latvia
MT Malta
NL Netherlands
NO Norway
PL Poland
PT Portugal
RO Romania
SE Sweden
SI Slovenia
SK Slovakia
UK United Kingdom



The prime minister of India addressed the 6th edition of the International Conference on Disaster Resilient Infrastructure 2024.

- During **India's G20 Presidency**, a **Disaster Risk Reduction Working Group** was established.
- The focus of this group was on financing disaster risk reduction efforts.
- These efforts, combined with the growth of CDRI, will pave the way for a more resilient future.
- International Conference on Disaster Resilient Infrastructure:
- ICDRI is the flagship annual conference of the **Coalition for Disaster Resilient Infrastructure (CDRI)**.

- *Objective:* Its primary aim is to enhance global dialogue and collaboration on disaster and climate resilient infrastructure.
- *Highlights of ICDRI 2024:*
- *Theme of 2024: ‘Investing today for a more resilient tomorrow.’*
- He said that Disasters and their effects do not recognize borders and in today’s interconnected world, disasters and disruptions have far-reaching consequences.
- He highlighted the significance of Investing in resilient infrastructure for a better future.
- *Coalition for Disaster Resilient Infrastructure:*
- **CDRI** is an independent international organization
- It is a Platform for Collaboration where countries can share knowledge and resources.
- *Objective:* To enhance the resilience of infrastructure systems against the impact of disasters.
- *Establishment Date:* CDRI was established in **2019** during the **United Nations Climate Action Summit in New York.**
- It is India’s second major global initiative after the **International Solar Alliance (ISA)** in **2015 Paris climate change conference.**
- *Members:* **39 countries** and 7 organizations.
- CDRI’s programs fund projects in vulnerable regions, including resilient housing and enhanced early warning systems.



Significance for India:

- **India on the World Stage** : CDRI offers India an opportunity to establish itself as a leader in global climate action and disaster resilience efforts.
- It enhances India's soft power on the international stage.
- **Greater Significance:** The initiative holds significance beyond economic considerations as
- It aligns with broader goals such as disaster risk reduction, Sustainable Development Goals (SDGs), and climate agreements.
- This alignment promotes sustainable and inclusive growth for all.

- Reason for Investment in Resilient Infrastructure:
- **Sustainable Development:** Investing in resilient infrastructure contributes to achieving the UN's Sustainable Development Goals (SDGs) by promoting long-term economic, social, and environmental well-being.
- **Increased frequency and severity of natural disasters:** Disasters cause immense damage to infrastructure, displacing people, **disrupting essential services**, and **jeopardizing health and safety**.
- Thus, there is a need to invest in resilient infrastructure to reduce the severity of natural disasters.
- **Long-term impact beyond economic losses:** Disasters have a devastating human cost, destroying homes, livelihoods, and disrupting communities.
- Rebuilding infrastructure with resilience in mind can minimize this long-term suffering.
- **Global interconnectedness:** Disasters in one region can have cascading effects worldwide
- Therefore, there is a need for collective efforts as a collective effort towards resilient infrastructure globally strengthens everyone's preparedness.
- **Protecting the most vulnerable:** Developing nations and small island states often face a higher risk of disasters.
- Investing in resilient infrastructure in these regions safeguards their vulnerable communities.

India's External Affairs Minister joined the 1st 'ASEAN Future Forum' virtually.

ASEAN Future Forum:

- Proposed at the **43rd ASEAN Summit** in **2023**, which was held at **Jakarta, Indonesia**.

- *Objective:* To serve as a platform for member states and partners to exchange ideas and policy suggestions.
- *Goal:* To influence ASEAN's developmental trajectory positively & formulate its Strategic Plans with focus on **ASEAN Community Vision 2045**.
- Initiated and hosted in: **Hanoi, Vietnam**.
- *Theme:* **“Toward fast and sustainable growth of a people-centered ASEAN Community.”**
- *EAM emphasized the Significance of India with ASEAN:*
- **Key Pillar of India's Indo-Pacific Vision:** ASEAN holds a central position in India's **Act East Policy**.
- India supports ASEAN unity and centrality, viewing a strong and unified ASEAN as vital in shaping the regional Indo-Pacific architecture.
- Synergy between **'India's Indo-Pacific Oceans Initiative' (IIPOI)** and the **ASEAN Outlook on Indo-Pacific (AOIP)** provides a strong framework of cooperation, including and addressing challenges to comprehensive security.
- **Support for ASEAN Centrality:** The Quad initiative complements ASEAN-led mechanisms, offering people-centric benefits such as infrastructure and scholarships while recognizing ASEAN's central role in regional prosperity.
- *Commitment to Regional Stability:*
- India's accession to the **Treaty of Amity and Cooperation in Southeast Asia** underscores its commitment to maintaining peace, prosperity, and stability in the region.
- Initiatives like the **ASEAN-India Maritime Exercise** and **India's Security and Growth for All in the Region (SAGAR)** highlight India's role as a net security provider.

- **Upholding International Laws:** Both India and ASEAN emphasize the importance of upholding the **UN Convention on the Law of the Seas (UNCLOS)** and collaborate on addressing global challenges such as climate change, transnational crimes, and health and food security.
- **Promoting Diverse and Resilient Supply Chains:** Recognizing the vulnerabilities exposed during the Covid19 pandemic, India and ASEAN advocate for diverse, secure, transparent, and resilient supply chains.
- **Multifaceted Cooperation:** India and ASEAN collaborate through various sub-regional mechanisms, including the **Mekong-Ganga Cooperation** and **BIMSTEC**, enhancing economic and cultural ties.
- **Advocating for Global South Perspective:** India, as G20 President, emphasized the importance of the **Global South's perspective** in international affairs which helps to foster cooperation and coordination between India and ASEAN in navigating the multipolar world order.

The Shanghai Cooperation Organisation (SCO) Defence Ministers' meeting took place in Astana, Kazakhstan.

- **Agreements and Declarations:** During the meeting, a protocol was signed by the Defence Ministers of all SCO Member States.
- A Joint Communique was issued after the meeting, in which the SCO Defence Ministers agreed to develop the idea of '**One Earth, One Family, One Future**', which is rooted in the ancient Indian philosophy of '**Vasudhaiva Kutumbakam**'.
- **India's Commitment to Peace and Counterterrorism:** The Defence Secretary of India reiterated India's commitment towards maintaining peace, stability and security in the SCO region.
- He emphasized the need to adopt a zero-tolerance approach towards terrorism in all its forms for prosperity and development of the SCO Member States.

- He mentioned India's long-standing proposal of **Comprehensive Convention on International Terrorism at the United Nations.**
- *Shanghai Cooperation Organization (SCO):*
- The SCO is an **eight-member** multilateral organization, established on 15 June 2001 in **Shanghai, China** by the leaders of **China, Kazakhstan, Kyrgyzstan, Russia, Tajikistan and Uzbekistan.**
- Origin: Prior to the creation of SCO in 2001, Kazakhstan, China, Kyrgyzstan, Russia and Tajikistan were members of the **Shanghai Five.**
- **Shanghai Five (1996)** emerged from a series of border demarcation and demilitarization talks which the four former Soviet republics held with China to ensure stability along the borders.
- Following the accession of Uzbekistan to the organization in 2001, the Shanghai Five was renamed the SCO.
- Official Languages: **Russian and Chinese**
- Member states: **Kazakhstan, China, Kyrgyzstan, Russia, Tajikistan, Uzbekistan, India, Pakistan and Iran.**
- Observer States: **Afghanistan, Belarus, Mongolia**
- Coverage: The SCO's geographic scope covers 60 percent of Eurasia and represents 40 percent of the world's population, with a combined GDP accounting for 20 percent of the global economy.
- Chairmanship: The Chairmanship of SCO is by rotation for a year by Member States.



Objectives:

- To strengthen mutual trust, friendly relations and cooperation among young people of SCO member States.
- It seeks to counter western influence in Eurasia.
- India and SCO:
- India was granted Observer status at the **July 2005 Astana Summit**, and subsequently participated in all SCO forums open to Observers.
- India and Pakistan became members at the Astana Summit, in 2017.
- Organizational Structure:
- **Heads of State Council:** The supreme SCO body which decides its internal functioning and its interaction with other States & international organizations, and considers international issues.

- **Heads of Government Council:** Approves the budget, considers and decides upon issues related to economic spheres of interaction within SCO.
- **Council of Ministers of Foreign Affairs:** Considers issues related to day-to-day activities.
- **Regional Anti-Terrorist Structure (RATS):** Established to combat terrorism, separatism and extremism.
- **Secretariat:** The Secretariat of the SCO serves to implement organizational decisions and decrees, documents (such as declarations and agendas).

India-Bangladesh Bilateral Talks On Civil Service Capacity Building

- Secretary of **Department of Administrative Reforms and Public Grievances (DARPG)** visiting Bangladesh for bilateral discussions regarding renewal of MOU between National Centre for Good Governance (NCGG) India and Bangladesh Ministry of Public Administration for the period 2024-2029.
- National Centre for Good Governance:
- It is an autonomous institute under the aegis of **Department of Administrative Reforms and Public Grievances**, Government of India.
- The NCGG has been set up to assist in bringing about governance reforms through studies, training, knowledge sharing and promotion of good ideas.
- It seeks to carry out policy relevant research and prepare case studies; curate training courses for civil servants from India and other developing countries.
- Background:
- It traces its origin to the **National Institute of Administrative Research (NIAR)**. NIAR was set up in **1995** by the **Lal Bahadur Shastri National Academy of Administration (LBSNAA)** the Government of India's apex training Institute for higher civil services.
- NIAR was subsequently renamed with an expanded mandate, as National Centre for Good Governance, which was inaugurated on February 24th, 2014.

- Objectives
- To function as a national repository on information on best practices, initiatives and methodologies that promote **Good Governance, e-Governance etc.**
- To advise on key issues in governance and develop synergy across various Ministries/ Departments of GoI, and State Governments.
- Governing Body:
- The affairs of the NCGG are managed under the overall superintendence and direction of the Governing Body, which is headed by the Cabinet Secretary.
- It has Secretaries of 9 ministries/ departments and 5 eminent persons viz. academicians, eminent administrators, specialists, eminent innovators, heads of reputed institutions as members.
- The Director General, who is the Chief Executive of NCGG acts as the **Member-Secretary** of the Governing Body.
- Head office: Its head office is at New Delhi and the branch office at **Mussoorie**.

China heightened the deployment of its ships and aimed water cannons at Filipino boats during supply missions to the Sierra Madre.

- According to recent analysis by the Washington Post, Chinese coast guard and militia ships have frequently surrounded and collided with Philippine resupply vessels.
- Sierra Madre:
- **Landing Ship:** It was constructed in the US for **World War II (1939-45)**, commissioned in 1944 as a landing ship and sent to Vietnam during the US participation in the **Vietnam War (1954-75)**.

- In 1976, it was transferred to the Philippines, an ally of the US. In 1999, it was left on the **Second Thomas Shoal**, part of the mostly uninhabited **Spratly islands**.
- **Philippines' Strategic Moves:** The Philippines, then brought this ship to the Second Thomas Shoal, a **submerged reef** located in the **South China Sea** to further its territorial claims.
- Since then, the Philippines has sent smaller boats to the ship for repairs, and sending supplies to the crew onboard.
- **Mischief Reef Dispute:** China laid claims on the nearby **Mischief Reef** and has since demanded the ship's removal which the Philippines has rejected.
- **Challenge for Philippines:** Today, the ship is largely dilapidated and rusting. However, for the Philippines, its removal would risk weakening its claims over the islands and Chinese presence being established.



Claims over Spratly Islands:

- Overlapping Claims in the **South China Sea**: Countries in the region have extended overlapping claims on the South China Sea, claiming ownership over its islands such as the **Spratly Islands** and the **Paracel Islands**.
- Along with issues over sovereignty, the rich oil and gas reserves in the region and its rich fishing waters have also encouraged countries to lay their claims.
- China claims nearly **90%** of the South China Sea.
- **The Hague Tribunal's Ruling**: In 2016, an international tribunal in the Hague ruled in favour of the Philippines citing China's actions in the dispute.
- The Tribunal declared that certain sea areas are within the EEZ of the Philippines because any possible entitlement of China does not overlap those areas". The tribunal highlighted:
 - China's construction of **artificial islands** equipped with helipads caused irreversible damage to the marine environment
 - establishing a significant artificial island within the Philippines' EEZ
 - It had eliminated evidence of the natural state of features in the South China Sea that were part of the dispute between the parties.
- China rejected the ruling.



Exclusive Economic Zone (EEZ):

- An EEZ is an area of the ocean extending **200 nautical miles (370 km)** beyond a nation's **territorial sea (12 nautical miles or 12 miles from the coast)**.

- Within this area, a coastal nation has jurisdiction over both **living and nonliving resources**, according to the US National Oceanic and Atmospheric Administration (NOAA).
- US Response:
- **U.S. Support for the Philippines:** US voiced its support to the Philippines which is an important strategic ally.
- **U.S.-Philippines Mutual Defense Treaty, 1951:** As per this, an armed attack in the Pacific Area on either of the Parties would be dangerous to its own peace and safety.
- Moreover, each party agrees that it will act to meet the common dangers in accordance with its constitutional processes.
- In May 2023, the two countries agreed on new guidelines under the treaty.
- US stated that the guidelines reconfirm that a military assault in the Pacific, encompassing the SCS would trigger mutual defense obligations **under Articles IV and V of the 1951 U.S.-Philippines Mutual Defense Treaty.**”

ECONOMY

What RBI's norms on penal charges mean for borrowers

About RBI Guidelines on Penal Charges on Loan Accounts:

- The norms **prohibit commercial banks** and finance companies **from charging** borrowers' **penal rates on loan defaults** or any other non-compliance event.
- Under the new rules, **penalty, if charged**, for non-compliance of the material terms and conditions of the loan contract by the borrower should **be treated as 'penal charges.**

- It **cannot be levied in the form of 'penal interest'** that is added to the rate of interest charged on the advances.
- There should be **no capitalisation of penal charges**; that is **no further interest computed** on such charges.
- The **material terms and conditions** will be defined as per the credit policy of the bank, and they may vary from one category of loan to another, and from bank to bank based on their own assessment.
- There is **no upper limit** or cap **for penal charges**. However, the guidelines stipulated that the quantum of penal charges would be reasonable and commensurate with the non-compliance without being discriminatory within a particular loan category.
- The guidelines had also mentioned that the **penal charges in the case of loans sanctioned to individual borrowers** for purposes other than business will not be higher than the penal charges applicable to non-individual borrowers for similar non-compliance.
- Also, in order to prevent banks from imposing arbitrary rates of interest, they are meant to follow a board approved policy on penal charges on similar charges on loans.
- These guidelines will **not apply to credit cards**, which are covered under product specific directions.
- The key rationale of the guidelines was that the intent of levying penal charges is meant to **inculcate a sense of credit discipline** and such charges are not meant to be used as a revenue enhancement tool over and above the contracted rate of interest.

SEBI unveils SCORES 2.0 to strengthen investor redressal

What is SCORES?

- It is a **web-based** centralized **grievance redress system of SEBI** launched in 2011. It enables investors to lodge and follow up on their complaints and track the status of redressal of such complaints online from anywhere.
- It enables **market intermediaries and listed companies** to **receive complaints** online from investors, redress such complaints, and report redressal online.
- **An investor** who is not familiar with SCORES or does not have access to SCORES **can lodge complaints in physical form** at any of the offices of SEBI.
 - Such complaints would be scanned and also uploaded in SCORES for processing.
- **What types of complaints can be registered in the SCORE portal?**
 - Complaints can be lodged on SCORES for any issues covered under the **SEBI Act, Securities Contract Regulation Act, Depositories Act**, and rules and regulations and provisions of the **Companies Act, 2013**.
- **Entities against which complaints are handled by SEBI include:**
 - Listed companies / registrar & transfer agents
 - Brokers / stock exchanges
 - Depository participants / depository
 - Mutual funds
 - Portfolio Managers
 - Other entities (KYC Collective investment scheme, Merchant banker, Credit rating, Foreign institutional investor etc)
- **Key Features of SCORES 2.0:**
- It will feature reduced and **uniform timelines for redressal** of investor complaints, which is 21 calendar days from the date of receipt of the complaint.

- An **auto-routing of complaints** to the concerned regulated entity will be facilitated to eliminate time lapses, if any, in the flow of complaints.
- Designated bodies will have to **monitor the timely redressal** of investors' complaints.
- There will be **two levels of review**. The **first review** will be **by the 'designated body'** if the investor is dissatisfied with the resolution provided by the concerned regulated entity. The **second review** will be **by SEBI** if the investor is still dissatisfied after the first review.
- If there is **non-adherence to** the prescribed **timelines** by the regulated entity, then there would be **auto-escalation of the complaint to the next level**.
- SCORES 2.0 will be **integrated with the KYC Registration Agency database** for easy registration of the investor on SCORES.

RBI mulls to set up Digital India Trust Agency to check illegal lending apps

Digital India Trust Agency:

- It will be responsible for **stopping illegal lending apps** from popping up. It will enable the verification of these digital lending apps and will **maintain a public register** of these verified applications.
- Any app which will not carry the **"verified" tag of DIGITA**, will be considered **unauthorised**.
- **Significance:** This will create an important and much-needed checkpoint in the fight against online financial fraud.
- **What is digital lending?**
- It is a **remote and automated lending process**, largely by use of seamless digital technologies. It generally involves **three parties** – a lender, a lending service provider (including a digital lending platform) and a borrower.
- It involves lending through **web platforms or mobile apps**, utilising technology in customer acquisition, credit assessment, loan approval, disbursement, recovery and associated customer service.

- It includes products like Buy Now, Pay Later (BNPL), which is a financing option (or simply a short-term loan product). It allows one to buy a product or avail a service without having to worry about paying for it immediately.

RBI defers exchange-traded currency derivatives rules

What are Derivatives?

- The term derivative refers to a type of **financial contract** whose value is dependent on an underlying asset, group of assets, or benchmark. These contracts can be used to trade any number of assets and carry their own risks.
- Common derivatives include **futures** contracts, **forwards**, **options**, and **swaps**. Prices for derivatives derive from fluctuations in the underlying asset.
- The most common underlying assets for derivatives **are stocks, bonds, commodities, currencies**, interest rates and market indexes.
- They are used for various purposes, including speculation, hedging and getting access to additional assets or markets.
- The basic principle behind entering into derivative contracts is to **earn profits by speculating** on the value of the underlying asset in the future.
- There are mainly **two types** of derivatives: one that is subject to standardized terms and conditions, and thus being **traded on stock exchanges**, and the **other being traded between private counter-parties** in the absence of a formal intermediary.
- While the first type is known as **exchange-traded derivatives**, the other is **over-the-counter derivatives**.
- **What are Exchange Traded Currency Derivatives (ETCDs)?**
- They are financial contracts that allow traders and investors to **speculate on the future price movements** of various currency pairs.
- These derivatives are **traded on exchanges**, and their value is based on the underlying currency exchange rate.

- **Common Derivatives:**
- **Futures Contracts:** It is an agreement between two parties to buy or sell an asset at a predetermined price on a specific future date. The underlying asset can be commodities, financial instruments, or indices.
- **Options Contracts:** It gives the holder the right, but not the obligation, to buy (call option) or sell (put option) an underlying asset at a specified price (strike price) on or before a predetermined expiration date.
- **Swaps:** They are agreements between two parties to exchange cash flows based on specific financial variables. Common types of swaps include interest rate swaps, currency swaps, and commodity swaps. Swaps are often used to manage interest rate risks, currency risks, or to change the nature of a debt obligation.
- **Forwards:** They are similar to futures contracts but are not standardized or traded on exchanges. They are customized agreements between two parties to buy or sell an asset at a specified price on a future date.

RBI turned down the request from small finance banks (SFB) to drop the “small finance” tag.

Small Finance Banks (SFBs)

- **Background: Dr. Raghuram Rajan’s Committee on Financial Sector Reforms** recommended the notion of **Small Finance Banks in its 2009 report titled ‘A Hundred Small Steps’.**
- **Small Finance Banks (SFBs)** are specialized banks in India that focus on the financial needs of **underserved and unserved population segments**, such as **small business units, micro and small businesses, and unorganized sector** entities.
- Objectives of Small Finance Banks (SFBs)
- **Financial Inclusion:** SFBs seek to promote financial inclusion by meeting the needs of small businesses, small and marginal farmers, **micro and small enterprises, and unorganized sectors.**

- **Not Exclusive:** Although its primary focus is financial inclusion, **SFBs are open to more than just these sectors.**
- Promoters and Structure of SFBs
- **Promoters of Small Finance Banks:** Individuals, corporations, trusts, or societies can promote small finance banks.
- **Legal Structure:** They are formed as public limited companies in the private sector, licenced under the **Banking Regulation Act of 1949**, and supervised by the **RBI Act of 1934**.
- Area of Operations of SFBs
- **No Restrictions:** Unlike regional rural banks (RRBs) and local area banks, **SFBs can operate without restriction in terms of location.**
- **Capital Requirement:** The minimum capital requirement for SFBs is **100 crores.**
- Regulatory Framework For SFBs
- **Compliance:** SFBs are subject to all RBI prudential rules and regulations that apply to **existing commercial banks**, including maintaining **the CRR &SLR.**
- **Priority Sector Lending (PSL):** **SFBs must extend 75% of the credit to sectors** classified as priority sector lending by the Reserve Bank.
- SFBs: Branches and Rural Presence
- **Branches:** At least 25% of SFB branches should be in unbanked rural areas.
- **Loan Portfolio:** A minimum of **50% of the loan portfolio** should consist of loans and advances of up to **25 lakhs.**
- Non-Risk Sharing Financial Services
- **Allowed operations:** SFBs may engage in **non-risk-sharing financial services operations** that do not involve a commitment of funds. These include distributing **mutual fund units**, insurance policies, **pension plans, etc.**
- **Foreign Exchange:** SFBs can establish dealerships in the foreign exchange market.
- Conversion and Licensing

- **Conversion:** Existing NBFCs, microfinance institutions, and local **banks can choose to convert into Small Finance Banks.**
- **On-Tap Licencing:** In 2019, the RBI implemented a **'on-tap' licensing process**, which allows it to accept applications and **award licenses to SFBs throughout the year.**

RBI proposed to make CBDC-R accessible to a broader population by allowing non-bank payment system operators to offer CBDC wallets.

Central Bank Digital Currency:

- **Definition: Central Bank Digital Currencies (CBDCs)** are a **digital currency issued by a country's central bank.** They are similar to cryptocurrencies, except that the central bank fixes their value **and is equivalent to the country's fiat currency.**
- **Digital Rupee:** The RBI's CBDC, also known as the Digital Rupee or **e-Rupee**, **is equivalent to a sovereign currency** and may be exchanged one-for-one with fiat currency.
- **CBDC's Legality:** The **Finance Act 2022 amends the RBI Act**, allowing it to launch **Central Bank Digital Currency.** The definition of a banknote was changed to allow the RBI to **issue physical and digital currency** by changing **Section 2 of the RBI Act, of 1934.**
- Types of CBDC – Retail Digital Rupee and Wholesale Digital Rupee
- **Retail Digital Rupee:** CBDC that people can use for everyday transactions.
- **Wholesale CBDC:** It is a CBDC that can only be **used by financial institutions** such as banks and NBFCs.
- CBDC – Retail Digital Rupee (e₹-R):
- **Coverage:** Retail Digital Rupee would cover **specific areas in closed user groups** that include **participating customers and businesses.**

- **Issuance:** e₹-R is a **digital token** used as legal tender. It would be **produced in the same denominations as traditional paper** cash and coins.
- **Distribution through Intermediaries:** Users can transact with e₹-R through a **digital wallet issued by partner banks** and stored on mobile phones/devices. Transactions can be made between **individuals or between merchants**.
- **Payment through QR Codes:** Payments to merchants can be made using QR codes **displayed at their locations**.
- **Convertibility:** Retail Digital Rupee, like cash, **does not earn interest** and can be **converted into other forms of money**, such as bank deposits.
- **Features:** The e₹-R offers **trust, safety, and settlement finality**, similar to actual cash.
- **Non-bank payment system operators (PSOs)**
- Non-bank payment system operators (PSOs) include entities regulated by the Reserve Bank, such as **Payment System Providers (PSPs) and Non-Banking Financial Companies (NBFCs)**, as well as **entities governed by other financial sector authorities** such as PFRDA, IRDAI, SEBI, and others

Hurun Global Unicorn Index 2024

Unicorn Company:

- A unicorn company is a privately held startup company that has a valuation of **over \$1 billion** and is **not listed** on the stock market.
- The term was first popularized by **venture capitalist Aileen Lee** in 2013, who chose the mythical animal to represent the statistical rarity of such successful ventures.
- Key findings of the Index:
- India in **2023 had 67 unicorns**, which is one less than 68 such startups in 2022, yet it retains its status as the **world's third-largest hub for unicorns**.

- The US led the list with 703 unicorns, up 37 from 2022, and China ranked second with 340 unicorns.
- UK and EU ranked No 4 and No 5 in the list, respectively.
- The total value of **the world's unicorns have reached US\$5 trillion**, equivalent to year 2022's GDP of Japan.
- The global count of unicorns surged by 171 over the past year, reaching a total of 1,453, marking a 7% increase and setting a new world record.
- The United States alone added **70 new unicorns**, while China added **56**.
- However, both countries also experienced the highest number of dropouts, with 21 and 11 companies respectively ceasing to be unicorns.
- Declining trends:
- Indian founders are establishing more unicorns abroad than at home.
- The country produced more offshore unicorns than any other country, co-founding 109 unicorns outside of India compared to 67 in India.
- Slowdown of India's startup ecosystem, which is mainly attributed to a lack of investment in startups.
- Failure to take prudent measures to ensure business sustainability has resulted in uncontrolled growth, marked by rapid depletion of cash reserves.
- Initiatives taken by India to promote start-ups:
- **Atal Innovation Mission (AIM):** The scheme, launched by the government in 2016, aims to foster innovation by introducing new programs and policies to support startup development across various economic sectors.
- **Multiplier Grant Scheme (MGS):** The Department of Electronics and Information Technology initiated the Multiplier Grant Scheme (MGS) to

empower collaborative research and development among industries for the growth of goods and services.

- **Startup India:** A program that provides venture capital funds to startups, credit guarantees for loans, and **an AI-based matchmaking platform** to connect startups with investors.
- **SIDBI Fund of Funds:** A fund that provides **capital to startups** and encourages private investments.
- **Tax incentives:** Tax exemption on capital gains invested in the Fund of Funds, and a **100% deduction of profits and gains** from eligible businesses for **three consecutive assessment years**.
- **Startup India Seed Fund Scheme:** The Government of India introduced this scheme in January 2021 to support early-stage startups.
- **National Start-up Award:** It aims to recognize, promote, and provide exclusive handholding support to a diverse range of startups.
- India's startup ecosystem:
- As of 2023, India has the third largest startup ecosystem in the world, with over 1,12,718 startups recognized by **DPIIT across 763 districts**.
- The startup ecosystem has experienced exponential growth over the past decade, with a **15% year-on-year** growth rate in 2018.
- In 2020, over 16,000 new tech companies were added, and in 2023, investment firms provided a total of \$8.4 billion in funding.
- The startup ecosystem has witnessed a **15-fold increase** in total funding, a nine-fold increase in the number of investors, and a seven-fold increase in the number of incubators.

Rs 5-trillion domestic fast-moving consumer goods (FMCG) market still faces hurdles on its path to complete recovery from the current slowdown

Fast-moving consumer goods (FMCG):

- FMCG, or Consumer Packaged Goods (CPG), are **products sold quickly** and at a relatively **low cost**.
- The FMCG industry is characterized by **high-volume sales, quick inventory turnover**, and various products catering to consumer needs.
- These goods **include essential everyday items** such as food and beverages, toiletries, cleaning supplies, and other low-cost household items.
- FMCGs have a **short shelf life** because of **high consumer demand** (e.g., soft drinks and confections) **or because they are perishable** (e.g., meat, dairy products, and baked goods).
- **FMCG Industry in India:**
 - The FMCG sector is the **fourth-largest sector** in the Indian economy.
 - In 2022, the **urban sector accounted for 65%** of the overall annual FMCG sales, while rural India contributed over 35%.
 - **Household and personal care products** make up **50% of the industry's sales**, healthcare claims 31-32%, and food and beverage products account for the remaining 18-19%.
 - It provides employment to around 3 million people, accounting for approximately **5% of the total factory employment** in India.

Indian government has introduced a new platform called CDP-SURAKSHA for disbursing subsidies to horticulture farmers under the Cluster Development Programme (CDP)

CDP-SURAKSHA:

- **A Digital Platform:** The CDP-SURAKSHA is essentially a digital platform that will allow **an instant disbursement of subsidies to farmers** in their bank account by **utilizing the e-RUPI voucher** from the **National Payments Corporation of India (NPCI)**.

- **Access Allowed:** It allows access to farmers, vendors, implementing agencies (IA), and cluster development agencies (CDAs), and officials of the National Horticulture Board (NHB).
- **Characteristic Features:** The CDP-SURAKSHA has features such as **database integration with PM-KISAN**, cloud-based server space from NIC, UIDAI validation, eRUPI integration, local government directory (LGD), content management system, geotagging, and geo-fencing.
- **Aim:** To push the **growth of India's horticulture sector**, which contributes nearly one-third to the agriculture gross value addition (GVA).
- The total production of horticulture crops has also spiked in recent years. While in 2010-11, it stood at 240.53 million tonnes, the number rose to **334.60 million tonnes in 2020-21**.
- Significance of the Platform:
- **Upfront Subsidies:** The CDP-SURAKSHA platform will provide subsidies to **farmers upfront**, at the time of purchasing the planting material. Vendors, who will supply planting materials to farmers, will receive their payment only after farmers verify the delivery of their orders.
- In the old system, a farmer had to buy planting materials on their own. They would then have to approach the officials concerned for the release of the subsidy.
- **The e-RUPI Voucher:** The voucher is a **one-time payment mechanism** that can be redeemed **without a card, digital payments app or internet banking access**, at the merchants accepting e-RUPI.
- According to the NPCI, the e-RUPI can be shared with the beneficiaries for a specific purpose or activity by organisations or government via SMS or QR code.
- About Cluster Development Program (CDP):
- **Launched by:** The CDP is a **component of the central sector scheme** of National Horticulture Board (NHB) that was launched by the **Ministry of Agriculture and Farmers Welfare (MoA&FW) in 2021**.

- **Aim:** It is aimed at **leveraging “the geographical specialization of horticulture clusters and promoting integrated and market-led development** of pre-production, production, post-harvest, logistics, branding, and marketing activities.”
- So far, 55 horticulture clusters have been identified, out of which 12 have been selected for the pilot. **Each cluster will have an implementing agency and a cluster development agency (CDA).**

World Trade Organisation (WTO) has published the latest Global Trade Outlook and Statistics Report

Global Trade Outlook and Statistics Report:

- **World Merchandise Trade volume:**
- It is projected to grow **2.6% in 2024 and 3.3% in 2025**, following a larger-than-expected decline of -1.2% in 2023.
- By the end of 2023, merchandise trade volume was up **6.3% compared to 2019**. Commercial services also increased, with annual US\$ values up 21% between 2019 and 2023.
- India's share of global goods exports was **1.8% in 2023 and imports was 2.8%**.
- **World Real GDP Growth at market exchange rates :**
- It is slowed from **3.1% in 2022 to 2.7% in 2023** but is expected to remain mostly stable over the next two years at 2.6% in 2024 and 2.7% in 2025.
- linked to inflationary pressuresThe contrast between the steady growth of GDP and the slowdown in merchandise trade volume is linked to inflationary pressures, which had a downward effect on consumption of trade-intensive goods.
- **US Dollar Value of Merchandise Counterbalanced by Commercial Services Trade :**

- The US dollar value of global **merchandise trade dropped by 5% to US\$ 24.01 trillion**. However, this decline was largely counterbalanced by a **robust 9% increase in commercial services trade, reaching US\$ 7.54 trillion**.
- In global commercial services, India's share in exports is seen **4.4% in 2023 at \$344 billion**, up 11% on-year whereas imports is seen as 3.4% at flat at \$247 billion.
- **Reasons Behind the Shift** : The decrease in merchandise exports can be attributed in part to the declining prices of commodities like oil and gas. Conversely, the upsurge in commercial services trade was fueled by the resurgence of international travel and the booming market for digitally delivered services.
- **Digitally Delivered Services** :
- India is now **4th largest exporter of Digitally Delivered Services** (India's share rose to 6% in 2023 from 4.4% in 2019)and reached \$257 billion in 2023 in the World, marking a 17% increase compared to the previous year.
- This growth outpaced that of Germany and China, which saw 4% growth each.
- **Future Outlook** : In 2024 and 2025, inflation is expected to gradually abate, allowing real incomes to grow again in advanced economies, boosting consumption of manufactured goods.
- A recovery of demand for tradable goods in 2024 is already evident. This is related to an increase in household consumption linked to improved income prospects.
- Challenges in Global Trade:
- The report highlights concerns about trade fragmentation, noting a **6% decline** in the trade of intermediate goods, though non-intermediate goods trade has remained stable.
- Geographical challenges also pose significant issues:

- The **Panama Canal** is currently operating at partial capacity due to freshwater shortages, impacting **6% of the global trade volume**.
- The **Suez Canal**, responsible for about **12% of global trade**, faces complications in its operations due to attacks on vessels.
- Trade route diversions, particularly the necessity to use the **Cape of Good Hope route**, have added around **ten days** to the travel time for journeys between Asia and Europe.

Global Financial Stability Report highlights the doubling of cyberattacks since the pandemic began.

Rising Cyber Risks in the Financial Sector:

- The **IMF's** April 2024 **Global Financial Stability Report** highlights the **doubling of cyberattacks** since the pandemic began.
- The potential losses from cyber incidents have quadrupled since 2017, now exceeding \$2.5 billion.
- Impact on Financial Institutions:
- Financial institutions, holding extensive **sensitive data** and handling monetary transactions, are prime targets.
- They account for nearly **20% of targets**, with banks bearing the brunt of this exposure.
- Cyberattacks not only threaten individual firms but also risk **destabilizing the entire financial ecosystem**.
- Why rising cyber incidents in financial sector?
- The reliance on **third-party IT service providers** and **emerging technologies** increases vulnerabilities.
- While these external providers can enhance operational resilience, they also expose the financial industry to systemwide shocks.

- Insider threats, which involve authorized users misusing their privileges, either intentionally or unintentionally, for monetary gain.
- The **cybersecurity skills gap** leaves financial firms vulnerable to cyber threats.
- Geopolitical tensions, such as the surge in cyber-attacks following Russia's invasion of Ukraine, pose significant cybersecurity challenges.
- Impact of Cyber Attacks on financial Stability:
- Erosion of confidence in the financial system, disruption of critical services, and a domino effect affecting adjacent institutions could occur.
- For example, a severe incident at a financial institution could undermine trust and, in extreme cases, lead to market selloffs or runs on banks.
- Cyber incidents that disrupt critical services like payment networks could also severely affect economic activity.
- Cyber-attacks propagate rapidly within a network of financial systems through financial linkages, thus impacting market stability.
- Mitigating Cyber Risks:
- The IMF emphasizes the importance of comprehensive national cybersecurity strategies, enhanced regulatory and supervisory frameworks, and increased international cooperation to tackle the borderless nature of cyber threats.
- To strengthen resilience in the financial sector, authorities should develop an adequate national cybersecurity strategy accompanied by effective regulation and supervisory capacity.
- This should encompass:
- Periodically assessing the cybersecurity landscape and identifying potential systemic risks from interconnectedness and concentrations, including from third-party service providers.

- Encouraging **cyber "maturity"** among financial sector firms, including board-level access to cybersecurity expertise, as supported by the chapter's analysis suggesting that better cyber-related governance may reduce cyber risk.
- Improving cyber hygiene of firms, including their online security and system health (such as **antimalware** and multifactor authentication), and providing training and awareness.
- Prioritizing data reporting and collection of cyber incidents, and sharing information among financial sector participants to enhance their collective preparedness.
- World CyberCrime Index:
- It has been developed as a joint partnership between the **University of Oxford** and **UNSW Canberra**.
- The data for the Index was collected through a survey of top cybercrime experts worldwide.
- They were asked to assess five major categories of cybercrime and nominate the countries they considered to be the most significant sources of each of these types of crime.
- The five categories were:
- Technical products/services (such as malware)
- Attacks and extortion
- Data/identity theft (such as hacking or phishing)
- Scams (such as business email compromise or online auction fraud)
- Cashing out/money laundering (such as credit card fraud)
- The survey further requested participants to rank each nominated country based on the impact, professionalism, and technical skill of its offenders.

- Findings:
- Six countries (**China, Russia, Ukraine, the US, Romania, and Nigeria**) appeared in the top ten of each category of cybercrime.
- **Russia** was ranked number one overall, with **Russian cybercriminals** considered to be the most professional and technically skilled in the world, with their crimes having the most impact.
- Russia was followed by Ukraine and China in the rankings.
- India captured the **number 10** spot on the rankings, getting a score of 7.90 for impact, 6.60 for professionalism of cybercriminals, and 6.65 for technical skills.
- In comparison, China got 8.22, 7.70, and 7.81, while the United States got 7.99, 7.21, and 7.21, respectively.
- Overall, India got a score of 7.05 while China and the United States got 7.91 and 7.47, respectively, putting them in the third and fourth places.

CBDT signs record number of 125 Advance Pricing Agreements in FY24.

Advance Pricing Agreements by CBDT:

- In the fiscal year 2022-23, the CBDT signed **95 APAs**, consisting of 63 unilateral and 32 bilateral agreements. This includes partnerships with countries such as Finland, the UK, the US, Denmark, Singapore, and Japan.
- For the fiscal year **2023-24**, the **numbers increased to 125 APAs**, with 86 unilateral and 39 bilateral, marking the highest count since the program began in 2012.
- Advance Pricing Agreements (APAs):
- APAs are designed to establish transfer pricing methodologies for a taxpayer's international transactions.

- This initiative was launched in India in 2012 as part of the **Finance Act**. It is regulated under **Sections 92CC and 92CD of the Income-tax Act, 1961**.
- The agreements help confirm **the arm's length price** or the method for determining it for transactions between independently acting parties.
- Types of Advance Pricing Agreements
- **Unilateral APA**: This agreement involves just the taxpayer and the tax authority from the taxpayer's own country.
- **Bilateral APA (BAPA)**: This type involves the taxpayer, an associated enterprise in a foreign country, and both their respective tax authorities.
- **Multilateral APA (MAPA)**: This agreement includes the taxpayer, two or more associated enterprises in different countries, and multiple tax authorities.
- Benefits of APAs
- **Ease of Doing Business**: APAs simplify and stabilize tax regulations for **cross-border transactions**.
- **Resolving Transfer Pricing Disputes**: These agreements complement **Double Taxation Avoidance Agreements** to reduce conflicts over transfer pricing.
- **Predictable Tax Obligations**: APAs provide certainty in tax liabilities for up to nine years, minimizing risks related to audits and disputes.

Bitcoin Halving 2024: How mega crypto event impacted BTC price, investors.

- Bitcoin has completed its fourth halving. This historic moment, which occurred on April 19, 2024, saw the block reward for Bitcoin miners reduced by half, from 6.25 BTC to 3.125 BTC.
- The halving refers to an **alteration** in the foundational blockchain technology of Bitcoin, aimed at **decreasing the pace of generating new bitcoins**.
- Since its creation by the pseudonymous figure **Satoshi Nakamoto**, Bitcoin has been structured to possess a finite supply of **21 million tokens**.

- The process of halving will persist until 2041, by which time all Bitcoins will have been mined.
- Bitcoin Halving:
- The Bitcoin Halving refers to **the 50% reduction in the reward paid** to Bitcoin miners who successfully process other people's cryptocurrency transactions so that they can be added to the public digital ledger known as the blockchain.
- The halving policy was integrated into Bitcoin's mining algorithm to **mitigate inflation** by preserving scarcity.
- In order to "grow" Bitcoin's blockchain and keep the ecosystem running, Bitcoin miners rely on advanced computer equipment to solve a complex mathematical puzzle through a process known as '**Proof of work.**'
- *Why does the Bitcoin Halving matter to crypto investors?*
- Bitcoin mining increases the supply of **BTC** in circulation while the Bitcoin Halving reduces the rate at which these coins are released, making the asset more scarce.
- *Scarcity is seen as pushing up prices, as is the case with gold.*
- While there can only ever be **21 million BTC** in the world, over **19 million have already been "mined" or released.**
- This sounds like the end of the story, but the Bitcoin Halving means it will take far more time for the remaining coins to be mined.
- In theory, the decrease in the rate of Bitcoin issuance suggests that the price could rise if demand remains constant.
- A halving takes place after 2,10,000 blocks are mined, and has happened so far in 2012, 2016, and 2020 - every four years.
- In 2009, a successful Bitcoin miner could claim a prize of 50 BTC.

- After this 2024's halving, they will only get **3.125 BTC**.
- Impact the Crypto market:
- Experts say that the halving event might impact Bitcoin's price as its heightened scarcity could result in upward pressure on prices and attract a wave of new investors to the cryptocurrency market.

Net direct tax collections surge 17.7% YoY to Rs 19.58 trillion in FY24.

Direct Tax Collections in FY23-24:

- While gross **direct tax collections** (provisional) for the **FY 2023-24** rose **18.48% to ₹23.37 lakh crore**, **net proceeds** (after accounting for refunds) surged **17.7% to ₹19.58 lakh crore**, reflecting **buoyancy in the economy** and rise in income levels of individuals and corporates. This surpassed the initial budget estimate by **₹1.35 trillion** and the revised estimate (RE) mentioned in the interim budget by **₹13,000 crore**.
- Refunds of **Rs 3.79 trillion** were issued during 2023-24, showing an increase of **22.7 per cent over Rs 3.09 trillion** issued the previous year.
- **Rise in Personal Income Tax Collection:** In FY24, the actual growth in personal income tax collection exceeded expectations, reaching **25.3% compared to the 22.7%** projected in the Revised Estimates (RE) over the FY23 collection.
- Net income tax collections surged by 25.2%.
- This is significant for two reasons:
- The higher tax payments suggest increased earnings, indicating prosperity among taxpayers.
- It may indicate an **expansion of the tax base**.

- **Lower than Anticipated Corporation Tax Growth:** The growth in corporation tax was lower than anticipated, standing at **10.3% instead of the 11.7%** forecasted in the RE.
- The government reduced the corporation tax rate to **22% (25.17% including cess and surcharge)** from the previous **30% starting from FY20** for companies that do not utilize any exemptions or incentives.
- The tax rate was lowered to **15%** for **newly established** domestic companies incorporated on or after October 1, 2019, engaged in fresh investments in manufacturing until March 31, 2023.
- This deadline was subsequently extended until March 31, 2024.
- **Trend in Indirect Tax Collection:** As indirect tax collection exceeded the RE for FY24, it is anticipated that the total tax revenue will surpass the RE.
- The indirect tax collection for FY24 surpassed the RE of Rs 14.84 trillion by a considerable margin, primarily due to record GST collection.
- Direct Tax:
- **About:** It is a type of tax that is levied directly on the **income, wealth, or property** of individuals or organizations.
- Unlike indirect taxes, which are levied on goods and services and are **paid indirectly by consumers** (such as sales tax or VAT), direct taxes are **paid directly to the government by the taxpayer.**
- **Significance:** The tax rate increases as income or wealth increases which promotes a sense of *fair distribution of the tax burden* based on ability to pay.
- **Income Tax:** Imposed on individual, liable to pay the tax directly to the Government and bear the burden of the tax himself.
- **Corporation Tax:** Levied on the profit of corporations and companies.



Government Initiatives to Improve Direct Taxes:

- **Faceless E-assessment Scheme (2019) & Faceless Appeals(2020):** It removes direct interaction between taxpayers and assessing officers/ appellate authorities fostering transparency and reducing bias.
- **Document Identification Number (DIN):** A unique DIN is assigned to every communication related to tax matters, facilitating easy tracking and verification.
- **Advance Pricing Agreements (APAs):** It allows taxpayers and tax authorities to **pre-agree** on how to price international transactions, minimizing future disputes and fostering certainty.
- **Direct Tax Vivad se Vishwas Act, 2020:** It provides a window for settling pending direct tax disputes, offering reduced penalties and fees for timely resolution.

- Indirect Tax:
- It is the tax levied on the consumption of goods and services. It is not directly levied on the income of a person.
- Indirect tax is generally imposed on suppliers or manufacturers who pass it on to the final consumer.

International Monetary Fund (IMF) has raised concerns about the rapidly expanding private credit market in its recent report on global financial stability.

Private Credit (PC):

- Private credit or **private debt investments** are debt-like, non-publicly traded instruments provided by **non-bank entities**, such as private credit funds or **business development companies (BDCs)**, to fund private businesses.
- It typically involves the bilateral negotiation of terms and conditions to meet the specific needs and objectives of the individual borrower and lender, without the need to comply with traditional regulatory requirements.
- It excludes bank loans and funding from publicly traded assets like corporate bonds.
- It is tailored to the borrower's specific needs and is often illiquid.
- Significance of Private credit:
- Private credit offers significant benefits by providing long-term financing to firms too large or risky for banks and too small for public bond markets.
- Tailored lending terms offer flexibility during challenging times.
- Overview of Private Credit:
- **Market Size and Role:** Private credit has expanded to a substantial **\$1.7 trillion** sector that plays a critical role in the debt markets.

- **Primary Beneficiaries:** The sector primarily serves small to mid-size borrowers with high leverage, indicating heightened risk.
- **Performance in Economic Slumps:** Historically, private credit has not been tested in severe economic downturns, raising concerns about its resilience in such scenarios.
- *Risks Identified by the IMF:*
- **Liquidity Demands:** There are concerns about the ability of funds to maintain liquidity, especially during financial stress.
- **Lack of information and transparency:** This makes it difficult to ascertain risks fully.
- **Quality of Borrowers:** The underlying borrowers often have higher leverage, which may increase the risk of default, especially in stagflation scenarios.
- **Regulatory Gaps:** Current regulations for insurers and pension funds do not adequately consider the credit performance of underlying loans.
- **Increased Use of Risky Structures:** The use of payment-in-kind structures, which allow borrowers to defer interest payments, is on the rise, potentially increasing long-term financial strains.
- **Interconnectedness:** The PC value chain involves **leveraged players**, from borrowers to funds to end investors, increasing the risk of spillovers.
- *Concerns Over Market Stability:*
- **Competitive Pressures:** Increased competition among lenders could lead to the issuance of loans with weaker protections.
- **Potential Market Deterioration:** The competitive landscape may lead to deteriorated credit quality and increased financial vulnerabilities.
- **Liquidity Risks for Retail-Oriented Funds:** Popularity in retail-oriented funds could heighten liquidity risks, especially under market stress conditions similar to those seen in 2020.
- *Interconnections and Valuation Issues:*
- **Market Connections:** Extensive links exist between private-credit funds, private equity, and institutional investors, which could amplify systemic risks.

- **Valuation Challenges:** The private and illiquid nature of the market complicates accurate valuations, potentially delaying the recognition of losses and exacerbating defaults in adverse scenarios.
- Regulatory Recommendations:
- The IMF urges more robust disclosure requirements for market participants to better analyze risks.
- Strengthening cross-sectoral and international regulatory cooperation to address challenges effectively.
- Enhanced reporting standards are proposed to ensure better transparency and risk assessment.

New IUCN report titled “Toward a Regenerative Blue Economy” shows way toward Regenerative Blue Economy

- The primer report is the result of a joint effort between IUCN Commissions, Secretariat and partners under the France-IUCN Partnership (2021-2024).
- The report was developed in the context of the **Sustainable Blue Economy project**, led by experts from the **Ecosystem-based Aquaculture Specialist Group (E-bAG)** of the **IUCN Commission on Ecosystem Management (CEM)**.
- The new IUCN report proposes a clear definition and founding principles for a **“Regenerative” Blue Economy**. It defines different sustainability levels within the overall umbrella and sets ambitions for nature and society alike.
- Blue Economy:
- *Definition:* It is the sustainable use of ocean resources to benefit economies, livelihoods and ocean ecosystem health.
- The Blue Economy is a sector, expected to be worth some **\$1.5 trillion a year, as per the World Bank**.
- **Activities of Blue Economy:** It include maritime shipping, fishing and **aquaculture**, coastal tourism, **renewable energy**, water

desalination, **undersea cabling**, seabed extractive industries and deep sea mining, **marine genetic resources**, and biotechnology.

- Types of Blue Economy:
- IUCN has defined three types of Blue Economy-
- **Brown Blue Economy or Ocean Economy:** This is a type of Blue Economy rooted in the **maritime sector** and includes traditional activities of the maritime sector. It is anthropocentric and based on a conventional economic model.
- Blue Economy is here associated with traditional accounting consisting of micro- and macroeconomic profitability and social (including employment) indicators:
- **The Sustainable Blue Economy:** At the **United Nations Conference on Sustainable Development (UNCSD) Rio+20 Summit, 2012** the **“Blue Economy”** was recognised as encompassing all economic activities in the marine sector, provided that these were consistent with sustainable development.
- *Focus:* The focus is to protect, repair, and restore marine and coastal ecosystems and ecosystem services are integrated along with the traditional focus on driving marine Economy.
- *Accounting:* Success is measured in the form of environmental assessments, and key performance indicators (**KPIs**), has been added to traditional conventional accounting for the Blue Economy.
- **The Regenerative Blue Economy:** It is an inclusive framework which advocates for **‘blue justice’**, and is based on the broad principles of the ecosystem approach
- *Definition:* It is an economic model that combines rigorous and effective regeneration and protection of the ocean and marine and coastal ecosystems, with sustainable sea-linked and low-carbon economic activities, and fair prosperity for people and the planet, today and tomorrow.

- *Economic activities:* Activities such as **oil extraction or deep-seabed mining (DSM) are excluded** from the regenerative economy scope. Other sectors such as fishing, aquaculture, and tourism will also need to adapt their practices.
- *Success indicator:* New indicators like the '**Ocean Impact Navigator**', have been proposed as a way to evaluate the positive impact of the Regenerative Blue Economy on ocean and coastal socio-ecological systems.



Government Initiatives to promote blue economy:

- **National Policy for India's Blue Economy-2021:** It aims to enhance contribution of the blue economy to India's GDP, improve lives of coastal communities, preserve marine biodiversity, and maintain the national security of marine areas and resources.
- **Fisheries and Aquaculture:** The government is promoting the holistic development of the sector through initiatives like the **Fisheries and Aquaculture Infrastructure Development Fund**, and creation of a dedicated **Ministry for Fisheries, Animal Husbandry and Dairying in 2019**.
- **Pradhan Mantri Matsya Sampada Yojana (PMMSY):** It aims to bring about **Blue Revolution** through plugging critical gaps in infrastructure—right from production, technology use to post-harvest management

- **Sagarmala scheme:** It lays ground for port-led development in the country with its focus on port modernisation and extended connectivity by providing states financial assistance
- **Tourism: National Maritime Heritage Complex** is being established in Lothal. **MV Ganga Vilas** today is the **world's longest river cruise service**. An International Cruise terminal is coming up in Mumbai
- **Samudrayaan project:** It is under the Deep Ocean Mission. **MATSYA 6000**, a manned deep submersible vehicle, will be utilised for deep sea exploration of rare sea minerals, **polymetallic manganese nodule resources**, and study deep-sea biodiversity.
- **Maritime India Vision 2030:** Under the vision for this decade, the government has planned over 150 initiatives across various maritime sub-sectors like ports, shipping and waterways

Inheritance tax in India?

How to tax wealth?

- There are three approaches of wealth taxation, based on
- **Returns with a capital income tax:** There can be a *capital levy on income* from wealth or ownership of assets resulting in capital gains
- **Stocks with a wealth tax:** It is linked to the value of owned assets as a one-time levy
- **Transfers of wealth:** In the form of wealth tax, inheritance tax, estate tax, or gift tax at the time of transfer of wealth or assets.
- Inheritance/ Estate Tax:
- *Definition:* It is a tax levied on the total value of money and property of a deceased person before it is distributed to their legal heirs.
- The tax is typically calculated based on the value of the assets left behind after any exemptions or deductions

- The duty had a threshold of Rs 1 lakh, and progressive rates from 5% to 40% on the principal value of the estate exceeding Rs 20 lakh.
- Purpose: Inheritance tax is levied as a tool for redistribution of wealth to address income inequality.
- *Does India have an inheritance tax?*
- In **1953**, India's Parliament had passed the **Estate Duty 'Death Tax' Act**, which was later abolished in **1985 by the Rajiv Gandhi government**.
- As per the Act, tax/duty was imposed on the **principal value of movable and immovable property**, including agricultural land, passed on to any person after the death of the owner of such property. The Act was applicable only if the property-owning person died as an adult (i.e. completed 18 years of age).
- Estate duty was applicable only on inherited properties with a value above the exclusion limit set by the Act, and the tax rate was calculated as per the market value at the time of death.
- The properties on which this duty was applied included immovable and movable property owned by the deceased in India and outside, which were passed on to a successor – if the person died when domiciled in India. If not, estate duty was levied only on immovable property in India and all movable properties; **immovable properties outside India were not taxed**. The **Act was amended in 1960 to exclude properties in Odisha, West Bengal, and Jammu & Kashmir**, and further in 1968, 1982, and 1984 to include amendments made by other Finance laws.
- After implementation, the death duty imposed peaked up to **85%**, making it highly unpopular. **In 1985, the then Finance Minister V.P. Singh abolished** it as the income generated for the Centre via such taxes was much less than the cost incurred due to the administrative process in executing it.
- As of date, there is no tax imposed on property inherited, whether through a will or by intestate succession.

- Methods of inheritance tax:
- **Will of succession:** It is a document in which the deceased person has pre-declared the lawful owner of his/her assets.
- **Inheritance by nomination:** A person can declare a person of his/her choice as the nominee. The nominee then becomes the lawful owner of an asset and the benefit it generates.
- **Inheritance by joint ownership:** If any asset lies under the joint ownership of two or more people, the survivor(s) get to manage the asset post death of the other owner(s).
- India also had a wealth tax and a gift tax, which were abolished in 2015 and 1998 respectively.
- Reason for abolishing Estate Duty/ wealth Tax and Gift Tax:
- **Procedural harassment:** Taxpayers were being unduly harassed with the existence of two separate taxes on property i.e. **wealth tax (before death) and estate duty (after death)**
- **Unmet objectives:** There was no reduction in the unequal distribution of wealth whereas, the tax did not assist states in financing their development schemes significantly either.
- **Economies of scale:** While the yield from estate duty is only about Rs 20 crore in 1985, whereas its cost of administration and collection was relatively high.
- **Tax Evasion:** High rates of taxation often results in flight of capital and investment to tax havens or tax jurisdictions with favorable tax rates.
- Comeback:
- **Wealth Tax:** Wealth tax was replaced with an additional **surcharge of 2%** on the super rich with a taxable income of over **Rs 1 crore**.
- **Gift Tax:** It was reintroduced in **2004** with gifts from unrelated persons above the threshold of **Rs 25,000 (later raised to Rs 50,000)** only being taxable as income. Gifts from blood relations, lineal ascendants and descendants, and gifts on occasions like marriage are exempt.

- Global Scenario:
- Inheritance Tax across the globe: **Japan** has the highest inheritance tax rate with **55 per cent in the world** followed by **South Korea** with a rate of 50 per cent.
- This is in stark contrast to several other countries. According to leading financial firm **Pricewaterhouse Coopers (PwC)**, most European, American and even African nations levy inheritance tax. In Europe, the top nations levying tax on inherited properties are — **France (60%), Germany (50%)**, United Kingdom (40%), Spain (33%) and Hungary (18%). Other countries with high inheritance taxes are Japan (55%), South Korea (50%), Ecuador (37%), Chile (25%), South Africa (25%) and Taiwan (20%)
- Inheritance tax plays a significant role in shaping economic policies and social welfare systems, influencing decisions on wealth transfer and **intergenerational equity**.
- Case of Global Minimum Corporate Tax Rate:
- **140 countries plus** have agreed to implement a new global tax agreement proposed by the Organisation for Economic Co-operation and Development (**OECD**), which imposes a minimum effective rate of **15%** on corporate profits.
- The deal intends to remove the incentive for nations that operate as tax havens for corporate giants with the OECD estimating the **Global Minimum Tax (GMT)** policy to reduce under-taxed profits by around 80%.
- **Calls to tax billionaires:** A proposal in the US to levy a **minimum 25% tax** on taxpayers with wealth **over \$100 million**. France and Brazil have pushed for a *G20 declaration on taxing the super rich by July*.

Ban on MDH, Everest products: Spices Board mulls mandatory testing of consignments to Singapore, Hong Kong.

- Certain spices of Indian brands facing ban in Singapore and Hong Kong due to quality concerns, the **Spices Board** said it will start mandatory testing of such consignments destined to these two countries.
- The ministry has sought details from the two firms — MDH and Everest — whose products have been banned for allegedly containing **pesticide 'ethylene oxide' beyond permissible limits.**
- Spices Board India:
- It is the **statutory organization** constituted on **26th February 1987**, under the **Spices Board Act 1986.**
- It was formed with the merger of the **erstwhile Cardamom Board and Spices Export Promotion Council.**
- The Board functions as an international link between the Indian exporters and the importers abroad and it has been involved in various activities which touch upon every segment of the spices sector.
- Main functions:
- The Spices Board is responsible for the overall development of cardamom (small and large) in terms of improving production, productivity and quality.
- The Board is also implementing post-harvest improvement programmes for improving quality of the 52 scheduled spices for export.
- The various development programmes and post-harvest quality improvement programmes of the Board are included under the head '**Export Oriented Production**'.
- Promotion of organic production, processing and certification of spices
- Development of spices in the North East
- Provision of quality evaluation services
- *Nodal Ministry:* **Ministry of Commerce & Industry, Government of India.**

PayU receives RBI's in-principle approval for payment aggregator role.

Payment Aggregator (PA):

- Payment aggregator is a **financial technology** company that enables businesses to accept various payment methods, including debit cards, credit cards, UPI, and bank transfers.
- They act as intermediaries between merchants and financial institutions.
- PAs are incorporated under **the Companies Act, either 1956 or 2013**.
- Authorization and Regulation:
- **Non-bank payment aggregators** must obtain authorization from the RBI under the **Payment and Settlement Systems Act, 2007**.
- Types of Payment Aggregators in India:
- **Third-party payment aggregators:** Independent companies that offer a wide range of payment options through partnerships with multiple payment providers.
- **Bank payment aggregators:** Owned and operated by banks, offering a more limited range of payment options but potentially higher security and reliability.
- Features and Functions:
- Payment aggregators assist businesses in setting up sub-merchant accounts, which are essential for processing transactions.
- Operational Process:
- To accept payments, businesses first create an account with a PA, which then provides them with merchant accounts.
- At the checkout page, customers choose their preferred payment method. The acquiring bank receives the transaction details, and the card company conducts a fraud check.

- After approval, the issuer sends funds to the acquiring bank, which then transfers them to the merchant's account.
- Security and Efficiency:
- Payment aggregators prioritize security measures to prevent fraud and protect customer data.
- The onboarding process for merchants is streamlined to be efficient, often completed within a few days.

RBI issues Master Direction for Asset Reconstruction Companies.

Asset Reconstruction Companies (ARC):

- ARCs are financial institutions that buy the **Non Performing Assets (NPA)** or **bad assets** from banks and financial institutions so that the latter can clean up their balance sheets.
- In the Union Budget 2021-22, Finance Minister announced the setting up of ARCs in India to take care of Non-Performing Assets (NPAs) of stressed banks.
- They are *registered under the RBI* and **regulated under the Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interest (SARFAESI) Act, 2002.**
- RBI's New Master Direction for ARCs:
- The Master Direction for ARCs has been issued under the authority granted by the **SARFAESI Act, 2002.**
- *Objective:* To ensure ARCs operate prudently and efficiently, protecting investor interests and maintaining financial stability.
- **Minimum Net Owned Funds (NOF):** ARCs must maintain a minimum **NOF of Rs 300 crore** to commence business in securitization or asset reconstruction.
- **Registration Requirement:** ARCs need to apply for and obtain a **Certificate of Registration (CoR)** from the RBI before starting their operations.

- **Investment Restrictions:** ARCs are not allowed to invest in land or buildings, except for their own use, which should **not exceed 10%** of their owned funds.
- **Prohibition on Deposits:** ARCs cannot raise funds through deposits.
- **Capital Adequacy:** A capital adequacy ratio of **at least 15% of total risk-weighted assets** must be maintained.
- **Leadership Age and Tenure Limits:** The maximum age for **MD/CEO** or Whole-time Director (WTD) is capped at **70 years**, with a tenure limit of **five years at a time** and a maximum continuous tenure of **fifteen years**.
- **Reporting Malpractices:** ARCs must report serious professional misconduct by chartered accountants, advocates, and valuers to the **Indian Banks Association (IBA)** for inclusion in a fraud database.
- Significance of ARCs:
- Encourage prompt resolution of stressed assets, facilitating better value realization.
- Inject liquidity into the economy by addressing distressed assets.
- Enhance bank valuation and strengthen their capacity to raise market capital.

World Trade Organization (WTO) is celebrating 30 years of the Marrakesh Agreement.

Marrakesh Agreement:

- The **Marrakesh Agreement** is the foundational treaty of the **World Trade Organization (WTO)**, which was signed by 123 countries in Marrakesh, Morocco, in **1994**.
- This agreement succeeded the **General Agreement on Tariffs and Trade (GATT)**. It significantly changed how international trade rules and organizations were managed.
- Objectives of Marrakesh Agreement:

- One key objective is to reduce trade barriers to boost economic growth.
- It aims to promote **fair competition** on an international scale.
- The agreement seeks to ensure full employment and increase effective demand across the globe.
- Another goal is to expand the production and trade of goods and services.
- It focuses on **optimizing** the use of world resources to foster sustainable growth.
- Key Features of Marrakesh Agreement:
- The agreement established the World Trade Organization (WTO) as the global authority on trade rules.
- It expanded trade regulations to include not just goods but also services and intellectual property, under the **General Agreement on Trade in Services (GATS)** and the Agreement on **Trade-Related Aspects of Intellectual Property Rights (TRIPS)**.
- The **Dispute Settlement Understanding (DSU)** was instituted to resolve trade disputes legally.
- The **Trade Policy Review Mechanism** was introduced to enhance transparency and ensure compliance in trade policies.
- The WTO was structured with governance bodies like the Ministerial Conference and the General Council to oversee these regulations.

UNCTAD marks 60th anniversary with rebranded as UN Trade and Development.

UNCTAD (United Nations Conference on Trade and Development):

- The UNCTAD, short for **United Nations Conference on Trade and Development**, was established in **1964**. It was set up as a permanent intergovernmental body by the United Nations General Assembly.

- Its main goal is to assist developing countries, especially those that are least developed or transitioning, to effectively integrate into the global economy.
- Membership:
- **UNCTAD has 195 member nations**, including **India**.
- Headquarters:
- The headquarters of UNCTAD are in Geneva, Switzerland.
- **Missions of UNCTAD:**
- UNCTAD helps countries explore options to tackle large-scale development challenges.
- It supports efforts to diversify economies and reduce reliance on commodities.
- The organization aims to limit exposure to financial volatility.
- UNCTAD promotes a global partnership for development and seeks to improve coherence in global economic policymaking.
- It ensures that all countries reap the benefits of development gains linked to trade.
- **Objectives of UNCTAD:**
- Diversify economic activities to minimize dependence on commodities.
- Promote global partnerships and coherence in economic policy-making.
- Ensure that all countries benefit from trade-related development gains.
- **Structure of UNCTAD:**
- The highest policy-making body of UNCTAD is the Conference, which meets **every four years** to establish policies and create work programs.
- **Functions of UNCTAD:**

- The **Trade and Development Board** acts as the executive body, managing operations when the Conference is not in session.
- The UNCTAD Secretariat, a part of the UN Secretariat, carries out policy analysis, monitors and implements decisions, and facilitates technical cooperation and information exchanges.
- Key Activities of UNCTAD:
- UNCTAD conducts economic and trade analysis and facilitates consensus-building.
- It offers technical assistance to make use of trade, investment, finance, and technology for inclusive and sustainable development.
- Reports of UNCTAD:
- The organization publishes important reports such as the **Trade and Development Report**, the **World Investment Report**, and the **Least Developed Countries Report**.

Indian Renewable Energy Development Agency (IREDA) was granted 'Navratna' status by the Department of Public Enterprises.

- Comparing year-on-year figures, IREDA witnessed a 32% rise in net profit, while it remained consistent quarter-on-quarter at ₹337 crore.
- Criteria for Classification of Navratna Status:
- To qualify for Navratna status, a company must first attain the **Miniratna category-I** designation and be included in **Schedule A** of **Central Public Sector Enterprises (CPSEs)**.
- For a company to achieve Navratna status, it must report a net profit of more than **Rs 5,000 crore** for three consecutive years, and maintain an average

annual turnover of **Rs 25,000 crore for three years**, or have an **annual average net worth** of over Rs 15,000 crore for three years.

- CPSEs must have achieved an 'excellent' or 'very good' rating in the Memorandum of Understanding (MOU) for three out of the last five years.
- Also, eligible CPSEs must attain a composite score of 60 or above in six selected performance indicators.
- Benefits Avail:
- The Indian government granted Navratna status to premier public sector undertakings (PSUs), empowering them to execute significant investments of up to ₹1,000 crore without requiring approval from the central authority.
- These firms are permitted to allocate up to **30%** of their net worth annually, provided it remains under ₹1,000 crore.
- They have the option to participate in joint ventures, forge partnerships, and set up overseas subsidiaries.
- The status gives the **Board of Directors** of these CPSEs the power to allow mergers and acquisitions in India and abroad.
- However, they need approval from the **Cabinet Committee on Economic Affairs (CCEA)** to make investments abroad.
- Indian Renewable Energy Development Agency (IREDA):
- Under the Aegis of: IREDA is a **non-banking financial institution** under the **Ministry of New and Renewable Energy, established in 1987.**
- Evolution:
- **1987:** It was established and later to be classified under the "**Public Financial Institution**" under **section 4 'A' of the Companies Act, 1956**, and is officially registered as a **Non-Banking Financial Company (NBFC)** with the Reserve Bank of India (RBI).

- 2015: The Ministry of New and Renewable Energy (MNRE) acknowledged IREDA's contributions by conferring upon it the status of **Mini Ratna (Category-I)**.
- 2023: The MNRE, has upgraded IREDA from Schedule B to Schedule A category Central Public Sector Enterprises. This paved the way for IREDA to attain Navratna status, granting it greater financial autonomy.
- 2024: The **Department of Public Enterprises granted 'Navratna' status to IREDA.**
- **Mandate:** IREDA is engaged in promoting, developing and extending financial assistance for setting up projects related to new and renewable sources of energy.
- It offers financial assistance to projects that produce electricity using fresh and sustainable sources. The government holds a **75%** ownership stake in the company.
- Some Remarkable Projects of IREDA:
- **Green Rooftops Scheme**, World's First Floating Solar PV Project, **Financing Battery Energy Storage Systems (BESS).**

Reserve Bank of India (RBI) recently issued the draft regulatory framework for loan products aggregated by lending service providers to ensure transparency for borrowers.

Lending Service Providers (LSPs):

- LSPs are engaged by the **Regulated Entities (REs)** (banks or NBFCs) to carry out some functions of RE in connection with lenders' functions on digital platforms.
- The LSPs generally, under an **outsourcing arrangement**, offer their services to REs for a fee or commission.

- RBI defines an **LSP as an agent** of an RE that carries out one or more functions of the lender, including customer acquisition, underwriting support, pricing support, disbursement, servicing, monitoring, collection, and loan recovery on behalf of the RE.
- In simple terms, LSPs are **loan aggregators** which provide loans from their partner REs.
- In some cases, a RE can also act as an LSP.
- They are technology-centric entities which have the client reach and are thus capable of offering a marketplace for both lenders and borrowers.
- LSPs entail aggregation of loan offers from multiple lenders on an electronic platform, which enables the borrowers to compare and choose the best available option to avail a loan from one of the available lenders.

FIU unveils alert indicators on anti-money laundering.

New Alert Indicators:

- Aims to enhance the scrutiny of suspicious transactions as part of anti-money laundering (AML) and counter-terrorism (CFT) financing efforts.
- Issued under the provisions of the **Prevention of Money Laundering Act (PMLA), 2002** during the 2022-23 financial year.
- Financial institutions and intermediaries are required to share **suspicious transaction reports (STRs)** with the FIU, which then analyzes and forwards them to investigative and intelligence agencies for appropriate action.
- Sector-Specific Alert Indicators:
- **Capital Markets:**
- The "alert indicators" aim to tackle "emerging risks" within **market infrastructure institutions (MIIs)** such as stock **exchanges** and **depositories**.

- These risks include synchronized and manipulative trading practices, **order spoofing**, misuse of client funds by stockbrokers, suspicious off-market transactions, etc.
- New guidelines lead to strategic enhancements in how transaction information is received.
- **Insurance Companies:**
- Guidelines emphasize generating alerts for insurance frauds and analyzing them from AML/CFT perspectives.
- Insurance firms are encouraged to identify and report suspicious activities promptly.
- **Insurance Regulatory and Development Authority of India (IRDAI)** plays a key role in ensuring compliance.
- **Cryptocurrency Service Providers:**
- The agency issued alert indicators for cryptocurrency service providers, including **instructions to register** with the FIU, conduct enhanced due diligence, and implement the travel rule.
- The travel rule, extended to crypto companies in 2019 by FATF, *requires cryptocurrency service providers to share sender and recipient data with each other during transactions.*
- **Online Payment Gateways:**
- Examination of business models by a working group including RBI and NPCI due to the rapid transaction speeds and lack of transparency in some cases.
- Focus on addressing AML/CFT risks in the rapidly evolving digital payment landscape.
- **Credit Rating Agencies and Debenture Trustees:**

- The new guidelines ensure CRAs report STRs promptly to the FIU, identifying early-stage corporate frauds with AML/CFT implications.
- This enables swift action by law enforcement, preventing fund misappropriation by fraudulent issuers.
- Debenture trustees are required to monitor and report any breaches in trust deeds or laws.
- Money laundering:
- Money laundering is the process of converting illegally obtained money or assets into legitimate funds.
- Money laundering, under the PMLA of 2002, involves any activity related to the proceeds of crime, including concealing, possessing, acquiring, or using them, as well as presenting them as legitimate property.
- The PMLA defines proceeds of crime as any assets or property that have been acquired or derived, either directly or indirectly, from illegal or criminal activities.
- **Financial Intelligence Unit-India (FIU-IND):**
- FIU-IND was established in **2004** as the central national agency responsible for receiving, processing, analyzing and disseminating information relating to suspect financial transactions.
- It is also responsible for coordinating and strengthening efforts of national and international intelligence, investigation and enforcement agencies in pursuing the global efforts against money laundering and financing of terrorism.
- It is an **independent body** reporting directly to the **Economic Intelligence Council (EIC) headed by the Finance Minister.**
- It is a part of the **Department of Revenue, Ministry of Finance.**
- Other measure to combat Money Laundering:

- **Specialized Agencies:** Entities like the Enforcement Directorate (ED), Central Bureau of Investigation (CBI), among others, are tasked with enforcement and investigation.
- **International Cooperation:** India collaborates with global bodies such as the Financial Action Task Force (FATF) and the **Eurasian Group on Combating Money Laundering and Financing of Terrorism** to strengthen international efforts against these crimes.

ENVIRONMENT

Protect India's scrublands to save the caracal

About Caracal:

- It is an elusive, primarily **nocturnal animal** which has traditionally been valued for its litheness and extraordinary ability to catch birds in flight. In India, it is called **siya gosh**, a Persian name that translates as 'black Ear'.
- They typically use abandoned porcupine burrows and rock crevices for maternal dens, but can be found with their young in dense vegetation.
- **Distribution:**
 - The most suitable habitat for caracals in Rajasthan, Gujarat and Madhya Pradesh is located in Kutch, the Malwa Plateau, the Aravalli hill range and the Bundelkhand region,
 - It is found in several dozen countries across **Africa, the Middle East, Central and South Asia.**
- **Habitat:** They live in woodlands, savannahs and in scrub forests.
- **Threats:** Large-scale hunting, illegal trading and loss of natural habitats are considered significant threats to the species.

- **Conservation status:**
 - **The Wild Life (Protection) Act, 1972:** Schedule I

Clean Energy Transitions Programme 2023

About Clean Energy Transitions Programme:

- It is the **IEA's flagship initiative** launched in 2017 for accelerating progress toward a global net zero energy system.
- It leverages the insights and influence of the world's leading energy authority to accelerate **clean energy transitions**, particularly in emerging and developing economies
- Its goals are in line with the objectives of the 2015 Paris Agreement and the Sustainable Development Goals established by the United Nations.
- **Key facts about IEA:**
- It is an autonomous **inter-governmental organisation** within the OECD framework. It works with governments and industry to shape a **secure and sustainable energy future** for all.
- It was founded in 1974 to ensure the security of oil supplies. It was created in response to the 1973-1974 oil crisis.
- It consists of **31 member countries** and eleven association countries. A candidate country to the IEA must be a member country of the Organisation for Economic Co-operation and Development (OECD).

Is natural gas actually cleaner than coal? Growing evidence says maybe not

About Bridge Fuel:

- Bridge fuel is a commonly-used term for a fuel that will power society with the **least environmental cost** while we deploy non-polluting, renewable energy.

- The goal of using a bridge fuel is **to replace** the bulk of today's **fossil-fuel-dependent energy sources** as we transition to a cleaner and more renewable energy economy that is free of greenhouse gas emissions.
- Many people consider **natural gas a bridge fuel** because it produces less greenhouse gas during the combustion process.
- However, additional considerations for a bridge fuel include whether it increases national energy independence while reducing pollution-related costs.
- **Key Facts about Natural Gas:**
- Natural gas is a **fossil fuel** and a **nonrenewable resource**. It is a mixture of gases which are **rich in hydrocarbons**.
- It is a **colorless and odorless gas** composed of **70-90% methane** (CH₄). Its other ingredients include ethane (C₂ H₆) and propane (C₃ H₈).
 - Possible **impurities include carbon dioxide** (CO₂), **hydrogen sulfide** (H₂S) and nitrogen (N).
- **How did natural gas form?**
 - Millions to hundreds of millions of years ago, the **remains of plants and animals** (such as diatoms) built up in thick **layers on the earth's surface and ocean floors**, sometimes mixed with sand, silt, and calcium carbonate. Over time, these layers were buried under sand, silt, and rock.
 - **Pressure and heat changed** some of this carbon- and hydrogen-rich material **into coal**, some into **oil** (petroleum) and some into **natural gas**.
 - Natural gas **reserves are deep** inside the earth, near other solid and liquid hydrocarbon beds like coal and crude oil.
- **Uses:**
 - It is **not used in its pure form**; it is processed and converted into cleaner fuel for consumption.
 - Many **by-products** are extracted while processing natural gas, like **propane, ethane, butane, carbon dioxide, nitrogen**, etc, which can be further used.

- It is mainly used as a **fuel for generating electricity** and heat. Natural gas in compressed form is used as fuel for vehicles, which is known as **CNG**.
- It is used as fuel **for boilers and air conditioners** It is also used for **making fertilizers** also, mainly **ammonia**.
- Hailed as a cleaner energy source than other fossil fuels, especially coal, natural gas has a lesser climate impact than coal because it **emits 50 percent less CO2 into the atmosphere**.

During the upcoming hot weather season (April to June), above Normal maximum Temperatures are likely over most parts of country, says IMD

About India Meteorological Department:

- It was established in 1875. It is the National Meteorological Service of the country and the principal government agency in all matters relating to **meteorology and allied subjects**. The **Director General of Meteorology** is the Head of this organization.
- There are 6 Regional Meteorological Centres, each under a Deputy Director General with headquarters at Mumbai, Chennai, New Delhi, Calcutta, Nagpur and Guwahati.
- **Mandate:**
 - To take meteorological observations and to provide current and **forecast meteorological information** for optimum operation of weather-sensitive activities like agriculture, irrigation, shipping, aviation, offshore oil explorations, etc.
 - To warn against **severe weather phenomena** like tropical cyclones, norwesters, duststorms, heavy rains and snow, cold and heat waves, etc., which cause destruction of life and property.

- To provide **meteorological statistics** required for agriculture, water resource management, industries, oil exploration and other nation-building activities.
- To conduct and **promote research** in meteorology and allied disciplines.
- **Nodal ministry:** Ministry of Earth Sciences (MoES)
- **Headquarter:** New Delhi.

India plans to make carbon fibre in response to EU carbon tax

About Carbon fibre:

- It is a material consisting of **thin, strong crystalline filaments of carbon**, essentially carbon atoms bonded together in long chains.
- **Properties:**
 - It has high stiffness and stiffness-to-weight ratio.
 - It has high tensile strength and strength-to-weight ratio.
 - It has high-temperature tolerance with special resins.
 - It consists of low thermal expansion.
 - It also has high chemical resistance.
- The fibers are extremely stiff, strong and light, and are used in many processes to create excellent structural materials.
- Currently, India does not produce any carbon fibre, relying entirely on imports from countries such as the US, France, Japan and Germany.
- **Applications**

- It is essential for various applications such as fighter planes' noses, civilian airplanes, drone frames, car chassis and fire-resistant building material.
- It is a critical material in **technical textiles** and is known for its **high strength and lightweight** properties.

Andhra forest officials hack into tree, water gushes out

About Indian laurel tree:

- **Scientific name:** Terminalia elliptica (syn. T. tomentosa)
- **Other names:** Asna; saj or saaj; Indian laurel; **marutham** (Tamil); **matti** (Kannada); ain (Marathi); taukkyan (Burma); asana (Sri Lanka); and casually **crocodile bark** because of the characteristic bark pattern.
- **Habitat:** It is mainly found in both **dry and moist deciduous forests** in southern India up to 1000 m.
- **Distribution:** It is principally native to southern and Southeast Asia in India, Nepal, Bangladesh, Myanmar, Thailand, Laos, Cambodia and Vietnam.
- **Application:**
 - The wood of this tree is **used for furniture**, cabinetwork, joinery, paneling, specialty items, boat-building, railroad cross-ties (treated), decorative veneers and for musical instruments (e.g. for guitar fretboard).
 - Its leaves are used as **food by Antheraea paphia** (silkworms) which produce the tussar silk (Tussah), a form of commercially important wild silk.
 - The bark is used medicinally against diarrhoea. Oxalic acid can be extracted from it.
 - The bark and especially the fruit yield **pyrogallol and catechol** to dye and tan leather.

Venomous jellyfish blooms spotted along Visakhapatnam coast in Andhra Pradesh

Purple-striped jellyfish:

- **Appearance:** It usually appears a blue purple (mauve) colour with a globe shaped umbrella covered in orangey brown warts.
- **Habitat:** It is primarily pelagic or in the open ocean. However, this species can survive in benthic and temperate coastal habitats.
- **Distribution:** It is found worldwide in **tropical and warm-temperature seas**. It is mainly found in the Indo-Pacific, Atlantic Ocean and the Mediterranean Sea.
- **Unique feature:** Unlike other jellyfish species, it has stingers not just on the tentacles, but on the bell too. These are **bioluminescent**, having an ability to produce light in the dark.
- It is venomous and causes **varying degrees of illness** such as diarrhoea, extreme pain, vomiting and anaphylactic shock.
- **A jellyfish bloom** is when the **population** of the species **increases** dramatically within a short period of time, usually due to a higher reproduction rate.
 - According to marine biologists, jellyfish blooms are reported frequently as a **result of rising ocean temperatures**, one of the main causes of substantial population growth.

How Odisha is promoting climate-resilient agriculture through rice fallow initiative

About Paira cropping system:

- The utera/paira is a type of cropping which is commonly practiced in Bihar, Eastern Uttar Pradesh, West Bengal Chhattisgarh and Odisha.

- It is a kind of **relay method** of sowing in which lentil/ lathyrus/ urdbean/ mungbean seeds are broadcast in the standing crop of rice about 2 weeks before its harvest.
- This system does not allow agronomic intervention such as **tillage, weeding, irrigation and fertilizer** However, rice variety decides the productivity of pulses in this system.
- **Advantages:**
 - This practice enables us to use **better soil moisture** available at the time of harvesting of rice crops, which could otherwise be lost quickly.
 - Experimental evidence showed that paira cropping produced **more yield** of lentil than planting with tillage after harvesting of the rice crop.
 - This is an efficient way of **utilising resources for sustainable** crop intensification and boosting land productivity.
- **What is the Relay cropping method?**
- It is a method of multiple cropping where **one crop is seeded** into **standing second crop** well before harvesting of second crop.
- It can solve a number of conflicts such as inefficient use of available resources, controversies in sowing time, fertilizer application and soil degradation.

Union Environment Ministry announced the rules for its Green Credit Programme (GCP)

Green Credits:

- It is an innovative **market-based mechanism** whereby voluntary environmental actions will be incentivized by participation from various stakeholders like individuals, communities, private sector industries, and companies.
- The Green Credits are Categorised into **Eight** key Areas:

- Tree plantation; Water management; Sustainable agriculture; Waste management; **Air pollution reduction; Mangrove conservation** and restoration; **Eco-mark labelling; Sustainable building** and architecture
- *The Green Credit Programme (GCP):*
- Green Credit Programme Launched by the Ministry of Environment, Forest and Climate Change in line with the **Lifestyle for Environment (LiFe)** movement at the recent **COP28 in Dubai**.
- Administered by the Indian Council of Forestry Research and Education (**ICFRE**).
- Aim: To Generate **Green Credits** through plantation on degraded wasteland with its initial phase focusing on water conservation and afforestation.
- *Green Credit Programme Features:*
- Creation of a **land bank**: Registered and approved entities (individuals, groups, public and private sector units) can pay to finance afforestation projects in specific tracts of degraded forest and wasteland.
- State forest departments will carry out the actual afforestation.
- Each planted tree would be worth **one 'green credit' after two years of planting** and an evaluation by the International Council of Forestry Research and Education (ICFRE).
- Offsetting mechanism: Companies can then use these green credits to offset some of their obligations under India's compensatory afforestation laws.
- **A Market-based Approach**: The Green Credit Programme creates a market-based incentive for environment-positive actions like water conservation or soil improvements, apart from just carbon emission reductions.
- *Concerns:*
- **Increased Risk of more forest land diversion**: The Green Credit Programme facilitates the creation of land banks by linking them to **compensatory afforestation** activities, which could enable more diversion of forest land to commercial entities.

- **No economies of scale:** The Indian market being undeveloped with a restricted number of participants could lead to inefficient transactions due to an **unbalance in the number of buyers and sellers.**
- **Market volatility:** Green Credit Programme would cause the value of green credits to fluctuate in value and result in businesses facing uncertainties related to their environmental investments.
- It would slow down the programme's efficiency, with delays in receiving credit and receiving revenues from trades, and affect its success.
- **Risk of Greenwashing:** For efficient administration of the scheme, stronger regulations are needed to guarantee ongoing monitoring and validation of claims, which would otherwise risk mere greenwashing.
- **No standard unit of measurement:** The green credit system does not yet have a **standard unit of measurement**, unlike the **carbon market (prices a standard unit per tonne of carbon emitted)**, as it is complicated to determine as they are accrued from various activities and across different sectors.
- Compensatory Afforestation Law:
- Administered under **The Forest (Conservation) Act, 1980**, based on the **Polluter's Pay Principle.**
- Purpose: The law obliges any industry or institution that has razed forest for non-forestry purposes, to provide an equivalent amount of non-forest land to forest authorities and pay for its afforestation.
- Provisions:
- The compensatory land needs to be as near as possible to the forest tracts which have been razed.
- In case of unavailability, twice the amount of 'degraded' forest land (usually land with very low tree density but officially marked as forest) may also be made available for compensatory afforestation.

- **Net Present Value Rule:** Companies also need to compensate for the value of the forest ecosystem, called the '**net present value**', which is lost due to the diversion of the forest land.

IMD raises alert for extreme heat wave weather.

Climate Change and Heatwaves:

- The warning from IMD aligns with the findings of the Intergovernmental Panel on Climate Change (**IPCC**) report in 2023.
- The IPCC's 2023 report highlights the urgent need for action against climate change.
- Current carbon emission rates indicate a limited time frame of 10 years to offset emissions equivalent to a decade's worth.
- Scientists warn that without immediate and strong measures, the world could face dire consequences, including heatwaves, droughts, food insecurity, and the spread of infectious diseases.
- The damage caused by global warming, even at just **one degree above pre-industrial temperatures**, has been more severe than anticipated, leading to disruptions in ecosystems and communities.
- IMD's Criteria for Heatwaves:
- IMD declares a **heatwave** when temperatures **exceed 40°C in plains, 37°C in coastal areas**, and **30°C in hills**.
- Heatwaves are categorized based on departures from normal temperatures and actual maximum temperatures, with severe heatwaves occurring at higher thresholds.
- **Heat Wave: 4.5°C to 6.4°C** above normal temperature.
- **Severe Heat Wave:** Above **6.4°C** above normal temperature.
- Heat Wave (Plains): **Temperature ≥ 40°C**.

- Severe Heat Wave (Plains): **Temperature $\geq 45^{\circ}\text{C}$.**
- If these conditions **persist for two consecutive days, a heat wave** is declared.
- Favorable conditions include:
- Transportation of hot, dry air across the region.
- Lack of moisture in the upper atmosphere.
- Clear skies, allowing maximum insulation.
- Presence of large amplitude anti-cyclonic flow over the area.
- Impact and Mitigation:
- Heatwaves pose significant health hazards, including heat strokes, and strain water and energy resources.
- Agriculture also suffers, with potential effects on crop yield and food security due to wilting and early ripening.

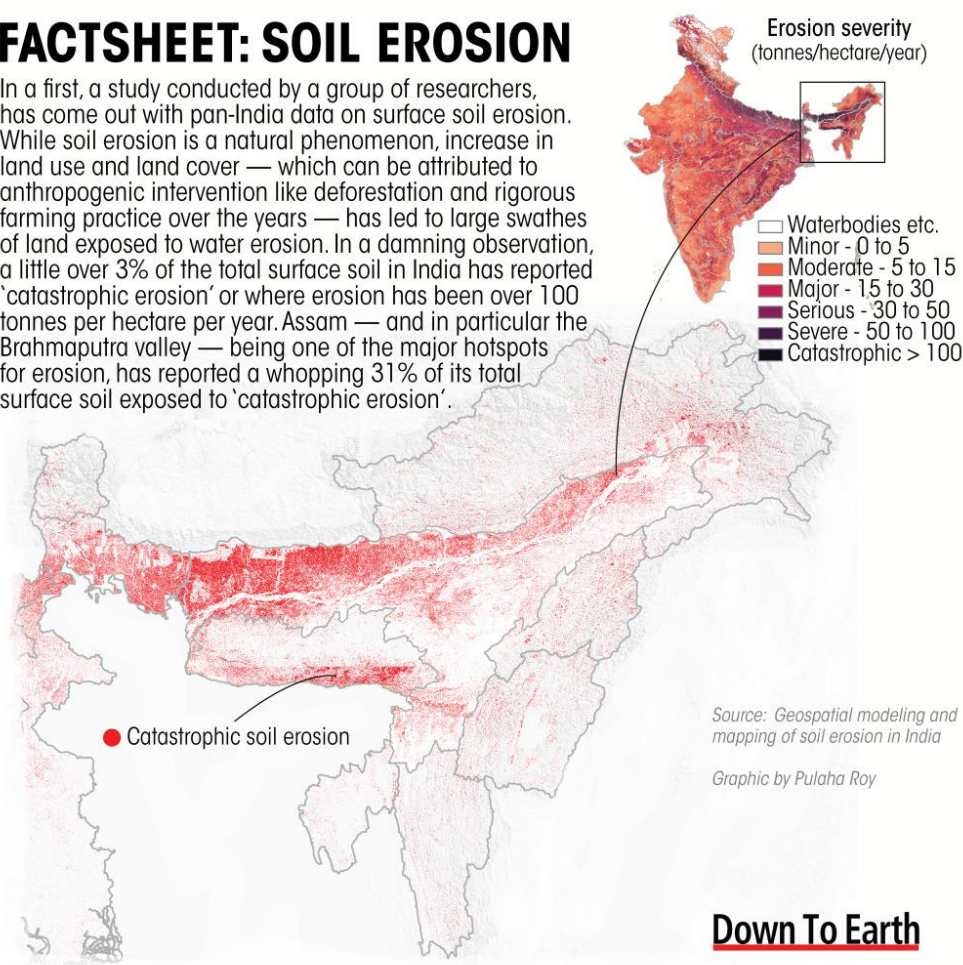
First comprehensive national-scale assessment of soil erosion and sediment yield mapping across India

- The study **titled “Geospatial Modeling and Mapping of Soil Erosion in India,”** conducted by **IIT-Delhi**, offers a comprehensive national-scale assessment of soil erosion and sediment yield mapping to facilitate the planning and implementation of soil conservation strategies.
- Key highlights of the study:
- Soil erosion, described as the **gradual removal of the topmost soil** layer by water, wind, and mass movement, leads to long-term soil deterioration and is **exacerbated by unsustainable** human activities.
- It results in reduced agricultural productivity, sedimentation of water bodies, flooding, landslides, and desertification.

- The study's key findings include an annual potential **soil loss of 21 tonnes/ha/yr in India**, with rainfall intensity and topographic factors being the primary contributors to this erosion.
- Over **78 million hectares** of farmland suffer from a loss of productivity by an average of 8% annually.
- Approximately **5% of India's geographical area** falls into the catastrophic erosion category, threatening infrastructure like roads and buildings with deep gullies, especially in parts of **Assam, Meghalaya, and Himachal Pradesh**.
- The Brahmaputra basin faces the maximum potential soil erosion, followed by the Mahanadi and Ganga basins.

FACTSHEET: SOIL EROSION

In a first, a study conducted by a group of researchers, has come out with pan-India data on surface soil erosion. While soil erosion is a natural phenomenon, increase in land use and land cover — which can be attributed to anthropogenic intervention like deforestation and rigorous farming practice over the years — has led to large swathes of land exposed to water erosion. In a damning observation, a little over 3% of the total surface soil in India has reported 'catastrophic erosion' or where erosion has been over 100 tonnes per hectare per year. Assam — and in particular the Brahmaputra valley — being one of the major hotspots for erosion, has reported a whopping 31% of its total surface soil exposed to 'catastrophic erosion'.



Down To Earth

- Initiatives in India to address soil erosion:
- **Integrated Watershed Management Programme (IWMP)** aimed at restoring ecological balance by conserving and developing degraded natural resources.
- **The Integrated Wasteland Development Programme (IWDP)** for improving productivity of waste and degraded lands.
- Participation in the **Bonn Challenge under UNCCD**, committing to restore 26 million hectares of degraded and deforested land by 2030.

The forest department is monitoring an outbreak of mange among a pack of Asiatic wild dogs in the Mudumalai Tiger Reserve (MTR) in the Nilgiris

Mange Disease:

- It is a **skin disease** of animals caused by mite infestations, characterized by inflammation, itching, thickening of the skin, and hair loss.
- The most severe form of mange is caused by varieties of the mite **Sarcoptes scabiei**, which also causes human scabies.
- Some form of mange is known in all domestic animals, although many varieties of mange mites infest only one species.
- **Transmission:** They are transmitted between animals by direct contact and by objects that have been in contact with infected animals. Most forms of mange are treatable.
- Key facts about Asiatic wild dogs:
- It is a wild canid found in the forests of central, south, and southeast Asia.
- Other Names: **Indian wild dog**, whistling dog, red wolf, red dog and mountain wolf.
- Distribution:

- They are found throughout **Eastern and Southeastern Asia**.
- They can be seen as far north as **Siberia**, as far south as some Malaysian islands, and as far west as the Indian peninsula.
- They are found in three clusters across India, namely the **Western and Eastern Ghats**, the central Indian landscape and North East India. The Western and Eastern Ghats is a stronghold region for dholes.
- **Habitat:** Dholes are animals that inhabit dense jungles, steppes, mountains, scrub forests, and pine forests.
- Conservation status:
- **IUCN Red List:** Endangered
- **The Wildlife Protection Act 1972:** Schedule II
- **CITES:** Appendix II

Plastic Overshoot Day Report 2024 by Swiss-based research consultancy 'Earth Action (EA)'.

Plastic Overshoot Day:

- Plastic Overshoot Day marks the date when the global generation of plastic waste surpasses the world's capacity to manage it.
- For 2024, this day will fall on **5th September** globally and on **23rd April** for India, calculated based on each country's MWI.
- Based on the country's **Mismanaged Waste Index (MWI)** i.e., **the ratio of the mismanaged waste and the total waste**.
- Key Highlights of the Report:
- The Global plastic waste generation has risen by **7.11 per cent** since 2021.
- The world is estimated to have generated **220 million tons** of plastic waste this year, 70 million tons of which will end up polluting the environment.

- Twelve countries are responsible for **60 per cent** of the world's mismanaged plastic waste: China, India, Russia, Brazil, Mexico, Vietnam, Iran, Indonesia, Egypt, Pakistan, the United States and Turkey.
- People living in **Belgium**, with a yearly waste production of 147.7 kg per person.
- In terms of Mismanaged plastic waste:
- Oman tops the list of countries, with a projected 111 kg of mismanaged plastic per person in 2024.
- Findings related to India:
- India will reach its **Plastic Overshoot Day on April 23**.
- India is among the 12 countries responsible for 60% of the world's mismanaged plastic waste.
- Despite the report classifying India as a **“low-waste-producing”** polluter due to its low per capita plastic waste production (8 kg per capita per year), India is projected to have a high level of Mismanaged waste by 2024.
- Categorized as **‘The Waste Sponges’** referring to a low consumption yet a high level of plastic pollution.
- India expected mismanaged waste in 2024 will be 7.4 million tons, which is “very high”.
- India's mismanaged plastic waste will be less than one-fifth of China and one-third of the US.
- India is estimated to release an average of **3,91,879 tons of microplastics** into the environment and 31,483 tons of chemical additives into waterways.
- Steps at India Level :
- **The Plastic Waste Management Rules, 2016:** This legislation introduced a series of measures aimed at curbing plastic pollution.
- It introduced the concept of **EPR** to manage plastics in India.

- **Plastic Waste Management (Amendment) Rules, 2021 & 2022:** The guidelines on EPR coupled with the prohibition of identified single use plastic items.
- The rules prohibit the manufacture, import, stocking, distribution, sale, and usage of single-use plastics.
- Thickness Standards for Plastic Carry Bags: Starting from September 30, 2021, the thickness of plastic carry bags was increased from **50 to 75 microns**. This was further augmented to **120 microns**, effective from December 31, 2022.
- To ensure effective Plastic Waste Management (PWM) in the country :
- **'Prakriti'**, a mascot initiative, was taken by the Ministry of Environment, Forest & Climate Change and Central Pollution Control Board (CPCB) to spread greater awareness among masses about small changes that can be sustainably adopted in our lifestyle for a better environment.
- *Terminologies:*
- **Plastic credits:** It is a mechanism that allows companies to offset their plastic footprint by funding or supporting projects that prevent or remove plastic waste from the environment & to increase the use of more sustainable alternatives.
- **Plastic Offsetting:** This concept revolves around the notion that both companies and consumers can offset their plastic consumption by acquiring plastic credits.
- **Plastic Neutrality:** This term is used to describe a situation where a company has procured sufficient plastic credits to balance out its entire plastic footprint over a specified period.
- *Steps at global level*
- UNEA's Resolution to "End Plastic Pollution" : 175 countries have endorsed the **UN Environment Assembly (UNEA-5) resolution in Nairobi to End Plastic Pollution** and forge an international legally binding agreement by 2024.
- The fourth session of the Intergovernmental Negotiating Committee to develop an international legally binding instrument on plastic pollution, including in the

marine environment (INC-4), is scheduled to take place from **23 to 29 April 2024 in Ottawa, Canada.**

"Early Warnings for All" initiative (EW4All)

India is helping Nepal, Maldives, Sri Lanka, Bangladesh and Mauritius develop early warning systems to reduce the loss of life and property due to extreme weather events.

- India's efforts are part of the United Nations' **(EW4All)**.
- Early Warning Systems (EWS):
- EWS are an **integrated system** of hazard monitoring, forecasting, prediction, disaster risk assessment, communication, and preparedness activities.
- They enable individuals, communities, governments, and businesses to take timely action to reduce disaster risks before hazardous events.
- A successful EWS can save lives and jobs, land and infrastructures, and support long-term sustainability.
- Early Warnings for All (EW4All):
- EW4All is a United Nations initiative that aims to protect people from hazardous weather, climate, and water events through early warning systems by 2027.
- It was formally launched in **2022 at COP27 in Sharm El-Sheikh**, Egypt, and is co-led by the **United Nations Meteorological Organization (WMO)** and **United Nations Office for Disaster Risk Reduction (UNDRR)**.
- It aligns with the priorities of the **Paris Agreement** and supports key provisions of the **Sendai Framework for Disaster Risk Reduction**, particularly **Target G** on availability and accessibility of multi-hazard early warning systems.
- It also contributes to delivering the targets of the 2030 Agenda for Sustainable Development on poverty, hunger, health, water, clean energy, climate action and sustainable cities.

- The delivery of Early Warnings for All requires scale up and coordinated investments and action across the four essential pillars of end to end, people-centred **Multi-Hazard Early Warning Systems (MHEWS)**.
- Four Pillars:
- **Disaster risk knowledge:** Ensuring all countries have access to reliable, understandable and relevant risk information, science and expertise (led by UNDRR).
- **Detection, observation, monitoring, analysis, and forecasting:** Ensuring all countries have robust forecast and monitoring systems and enabling policies to support optimization and sustainability of hazard monitoring and early warning systems (led by WMO).
- **Warning dissemination and communication:** Using a people-centered approach to ensure that early warnings are effectively and timely disseminated to reach everyone, especially those most at risk (led by ITU).
- **Preparedness and response capabilities:** Ensuring local governments, communities and individuals at risk have the knowledge and means to take pre-emptive early actions to prepare for and respond to incoming disasters upon receiving warnings (led by IFRC).
- Need for EWS:
- With human-induced climate change causing more extreme weather, early warning systems are crucial.
- The world is projected to experience 560 medium- to large-scale disasters annually.
- They're not a luxury but a cost-effective tool that saves lives, reduces economic losses, and yields nearly tenfold returns on investment.
- Between 1970 and 2021, approximately 2 million deaths and economic losses totaling USD 4.3 trillion were attributed to extreme weather events.
- They can help in preparing for and reducing the risk of disasters.

- Challenges faced by EWS:
- **Data collection and management:** It is difficult to get accurate information on all relevant parameters.
- **Monitoring:** Inadequate or poorly maintained monitoring stations can lead to inaccurate predictions.
- **Communication barriers:** Everyone needs to understand what actions they should take after receiving an alert to avoid panic or confusion.
- **Public awareness:** Lack of public awareness and public complacency can be an obstacle.
- **Lack of co-ordination:** Coordination gaps between data collection and warning dissemination centers.
- Road ahead:
- Improving data quality and ensuring global data access.
- Integrating scientific and technological advancements with local, traditional, Indigenous, and generational knowledge.

Adani Green Energy Ltd (AGEL) recently established the world's largest renewable energy park in Gujarat's Khavda region.

Khavda Renewable Energy Park

- It is the **world's largest renewable energy park.**
- It is located at **Khavda** in Gujarat's **Kutch region**, boasting an impressive **45 GW capacity** predominantly fueled by solar energy.
- The region has the second-best solar radiation in the country after **Ladakh** and wind speeds five times that of the plains.
- Situated just one kilometer from the international border with Pakistan, the energy park maintains a buffer zone manned by the **Border Security Force (BSF).**

- Originally accessed only by a modest airstrip without air traffic control, the site now gears up for a significant clean energy venture.
- It spans 538 square kilometres, approximately five times the size of Paris.
- It is being built by Adani Green Energy Ltd (AGEL), India's largest renewable energy company.
- Investment: AGEL will invest about Rs 1.5 lakh crore to generate **30 megawatts** of clean electricity. It would comprise **26 GW of solar** and **4GW of wind capacity**.
- The Khavda Park, at its peak, is projected to generate 81 billion units of electricity, a quantity capable of powering entire nations such as Belgium, Chile, and Switzerland.

Government to operationalize gas-based power plant to meet high electricity demand during summer.

Steps taken by the government:

- To ensure maximum power generation from **Gas-Based Generating Stations**, the Government has issued directions to all Gas-Based Generating Stations under **Section 11 of the Electricity Act, 2003**.
- Section 11 of the Electricity Act, 2003, allows the government to direct a generating company to operate and maintain a generating station in **extraordinary** circumstances.
- Implementation Framework:
- **GRID-INDIA** will inform Gas-Based Generating Stations in advance of the days when gas-based power is required.
- GRID-INDIA, a division of the Ministry of Power, Government of India, is responsible for the round-the-clock integrated operation of the Indian Power System.

- Stations holding **Power Purchase Agreements (PPAs)** must offer their power to PPA holders first, with any surplus offered in the power market.
- Stations without **PPAs must directly** offer their generation in the power market.
- A high-level committee led by the **Chairperson** of the Central Electricity Authority will oversee the implementation of these directives.
- Other Measures Undertaken:
- Planned maintenance of power plants will be deferred to the monsoon season.
- New capacity additions will be expedited to augment power supply.
- Partial outages of thermal power plants will be minimized.
- Surplus power from Captive Generating Stations will be utilized, and excess power will be offered for sale in the **Energy Exchange**.
- The government is promoting a **gas-based economy** for energy security.
- Gas-based economy:
- A gas-based economy is one where gas is the primary source of commercial energy, and natural gas is a major component.
- In **2016**, the Government of India (GOI) announced that India would increase the percentage of natural gas in its primary energy basket **from 6.14% to 15% by 2030**, and become a "**gas-based economy**".
- Significance:
- **International commitments:** India is moving towards a gas-based economy to meet climate action commitments, including achieving **net zero by 2070, reducing emissions intensity by 45%**, and reducing **total carbon emissions by 1 billion metric tonnes by 2030**.
- **Cost-effective:** Natural gas is more cost-effective than petrol and diesel, and has a higher energy output than other fossil fuels.
- **Reduce pollution:** Natural gas is **cleaner and safer** than coal and liquid fuels, contributing to improved air quality.

- When burned for power generation, it emits almost **50% less carbon dioxide** than other forms like coal.
- **Logistics:** Natural gas can be easily stored and delivered through pipelines or liquefied and transported by ship.
- **Backup to renewables:** Natural gas plants can quickly start up and fill the electricity grid gap when renewables aren't producing enough, serving as a backup to renewables.
- **International geopolitics:** Trading in natural gas can provide India with more flexibility in international geopolitics.
- *Challenges:*
- **Non-renewable resource:** Natural gas is a non-renewable resource that can only be obtained through costly and potentially dangerous drilling.
- **Infrastructure:** India has inadequate infrastructure to meet its growing energy needs, and the transmission and distribution networks are often ineffective.
- **Import dependency:** India **imports around 45% of its gas**, and more than **half of its natural gas-based power capacity is idle** due to a lack of domestic gas supply.
- **High subsidies:** The fertilizer sector has the largest share in the overall consumption of natural gas which is highly subsidized.
- Government initiatives to promote gas-based economy:
- **City gas distribution (CGD) infrastructure:** The GOI is developing networks to deliver **Piped Natural Gas (PNG)** to homes and businesses, and Compressed Natural Gas (CNG) for use in vehicles.
- **Unified gas pipeline tariffs:** In 2023, the GOI implemented unified gas pipeline tariffs to simplify gas pricing and encourage downstream demand.
- **National Gas Grid:** It is a long-distance pipeline network that aims to ensure equitable distribution of natural gas across India.

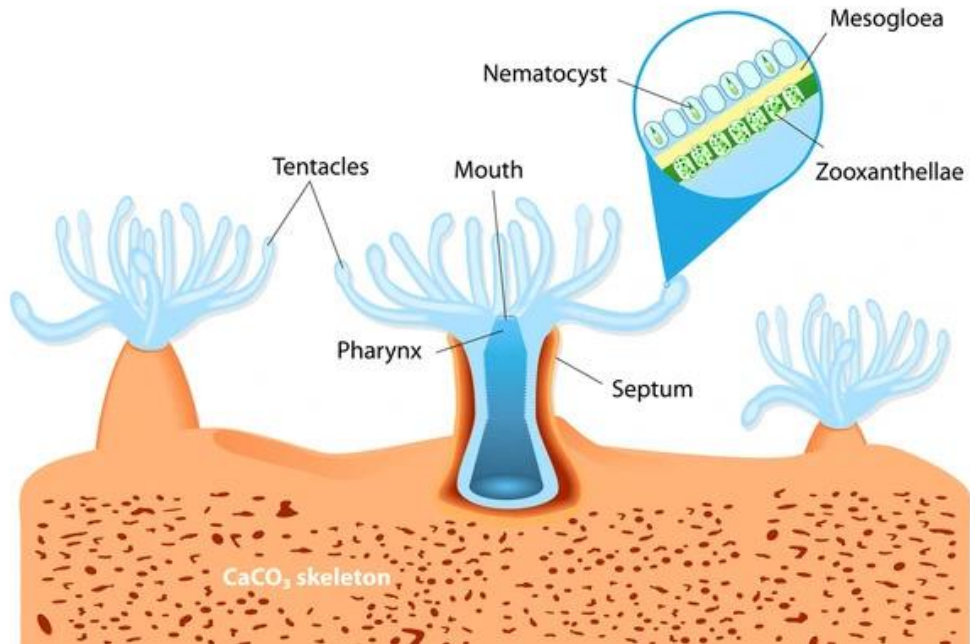
- **Sustainable Alternative Towards Affordable Transportation (SATAT):** It is an initiative by the Indian government that encourages entrepreneurs to set up **Compressed Bio Gas (CBG)** plants.

Tiny biodegradable straw forts could protect new coral from fish who snack on it 'like popcorn'

- South Florida researchers trying to prevent predatory fish from devouring laboratory-grown coral are grasping at biodegradable straws in an effort to restore what some call the rainforest of the sea.
- Marine researcher Kyle Pisano and his partner, Kirk Dotson, have developed the **Coral Fort—a biodegradable cage** crafted partly from drinking straws—to enhance the survival rate of transplanted coral.
- Predators like **parrot fish** pose a significant threat to **newly transplanted coral**, often causing survival rates to plummet below 40%.
- *Coral Fort (A biodegradable Cage):*
- The cage comprises a **limestone disc** encircled by eight vertical drinking straws made from a biodegradable material called **polyhydroxyalkanoate (a biopolymer derived from canola oil)**.
- These straws, initially designed for boba drinks, provide adequate protection for the coral before harmlessly dissolving in the ocean.
- The Coral Fort, designed to dissolve over time, eliminates the need for maintenance or removal.
- *Significance :*
- It helps in reducing the labor-intensive process of protecting and maintaining coral.

- This innovative solution not only enhances the survival of transplanted coral but also streamlines restoration efforts crucial for preserving oceanic biodiversity and coastal resilience against natural disasters like hurricanes.
- Parrot Fish relationship with Corals :
- Named for their bright colors and beak-like mouths, Parrotfish are large herbivores that **graze on the algae growing atop hard corals**.
- They digest the algae and excrete the **coral as fine sand**.
- Coral sand found on our reefs and even helps to form **reef islands**.
- It's estimated a single parrotfish could produce up to 90 kilograms of sand each year.
- In the process of feeding on coral polyps, parrotfish may actually help spread the beneficial **zooxanthellae algae that corals cultivate**.
- This sort of cross-pollination results in more genetically diverse and resilient reefs.
- An even more important benefit of all this chewing on the reef is the removal of *light-leaching algae from the surfaces of corals*.
- Corals :
- Corals are colonial marine invertebrates of the **phylum Cnidaria**.
- **Polyp:** An individual coral is known as a polyp.
- A polyp is a sac-like animal, excretes an exoskeleton near the base.
- Polyps form a symbiotic relationship with plant-like cells called zooxanthellae (**unicellular dinoflagellates**).
- **Symbiotic Relationship:** Coral Polyp can ingest tiny organisms called **plankton** & other small creatures but still majority of their energy and nutrients they get from the zooxanthellae living within their tissues which also is **responsible for giving the corals its color**. In return corals provide the zooxanthellae with shelter and protection.

CORAL ANATOMY



Coral Reefs :

- Coral reefs are formed when thousands of polyps living together in a coral colony secrete **calcium carbonate exoskeleton** beneath it. Over time, the skeletons of many coral colonies add up to build the structure of a coral reef.
- Coral reefs, often referred to as the **“rainforest of the sea,”** are crucial ecosystems supporting over **25% of marine species**. However, the decline of coral populations due to various factors, including rising ocean temperatures, has prompted urgent conservation measures.
- Significance of coral reef ecosystems:
- Coral reefs protect coastlines from harsh ocean storms and floods.
- They serve as nurseries, and breeding and feeding grounds for marine wildlife.
- They provide livelihood opportunities through tourism and fishery for coastal communities. According to the National Oceanic and Atmospheric

Administration (NOAA), about **500 million people worldwide** are dependent on coral reefs for livelihood.

NOAA's Coral Reef Watch (CRW), ICRI confirm fourth global mass coral bleaching event in 2023-2024.

Coral Bleaching:

- Coral bleaching occurs when the **coral Polyp** expels the **marine algae** ie. **zooxanthellae** from its tissue and breaks the symbiotic relation. This results in them losing their colour and source of nutrients and energy.
- **Stress Response:** The bleaching event indicates a stress response enabling them to recover, depending on the **intensity of heat stress** and its duration.
- Corals can recover back to their original health if other stressors such as marine pollution and ocean acidification are kept under check and certain adaptation measures taken.
- Global Coral Bleaching Event:
- **Extent of Bleaching:** **Coral Reef Watch (CRW)** and **International Coral Reef Initiative (ICRI)** have recorded bleaching of corals in 53 countries, territories and local economies across five different ocean/sea basins between February 2023 and April 2024.
- **Affected Region:** The Report confirms widespread bleaching across parts of the **Indian Ocean**, including **Tanzania, Mauritius**, the Seychelles, Tromelin, Mayotte, and off the **western coast of Indonesia**.
- **Frequency of Events:** The earlier **event (3rd global bleaching)** had lasted from 2014 to 2017 making the present occurrence second such event in the last 10 years.
- Previous events of global bleaching occurred first in **1998**, then in **2010**, and between 2014-2017.

- **Future Projection:** Climate models suggest that bleaching events may become an annual occurrence for most reefs somewhere around 2040-2050.
- **CRW Declaration:** The CRW declares a global mass coral bleaching event only when it records or gets inputs from all ocean basins of coral bleaching.



- Causes of Coral Bleaching:
- **Temperature:** The corals can survive only in a **specific temperature range** and **global sea surface temperature** is rising because of global warming stressing the corals.
- **Extensive Marine Heatwaves:** During a marine heatwave, temperatures in vast areas of sea and ocean surfaces increase and remain high for elongated periods of time.
- **World Meteorological Organization (WMO)'s State of the Global Climate 2023 Report** said that 2023 was the hottest on record for the atmosphere and the oceans with nearly **one-third** of the global ocean gripped by it any day.

- **Subaerial Exposure:** Low tides, sea level drops and tectonic uplift can result in sudden exposure of coral to the atmosphere. Subaerial exposure often results in bleaching and consequent coral death due to sudden changes in atmospheric conditions.
- **El Nino:** Ocean Heating and mass coral bleaching are closely tied to the occurrence of El Nino events since 1997, each of these pairs of El Nino years has also witnessed mass bleaching of corals.
- **General Ocean Warming:** Ocean warming will pose a serious threat to coral reef ecosystems around the planet, as bleaching events will increase in severity, frequency, and magnitude.
- Example- Localised coral bleaching events have also been witnessed in recent La Nina years in the **Great Barrier Reef**, off the coast of Australia, in 2020 and 2022.
- **Sedimentation:** Human Activities such as coastal construction and mining can result in high rates of erosion, increasing sediment content in water and disrupting the natural process of photosynthesis.
- **Inorganic Nutrients:** Increases in inorganic nutrients such as **ammonia** and **nitrate** cause zooxanthellae to multiply by 2-3 times which can cause secondary adverse effects such as **lower coral resistance and increased disease susceptibility**.
- National Oceanic and Atmospheric Administration's (NOAA) Coral Reef Watch (CRW):
- It offers the world's **only** global early-warning system of coral reef ecosystem environmental changes.
- Function:
- To remotely monitors conditions that can cause coral bleaching, disease, and death
- To delivers information and early warnings in near real-time

- To use operational climate forecasts to provide outlooks of stressful environmental conditions on coral reefs worldwide.
- It uses remote sensing, modeled, and in situ data to operate a decision support system.
- International Coral Reef Initiative (ICRI):
- About: It is a global partnership between Nations and organizations striving to preserve coral reefs and related ecosystems around the world.
- Founded: It was founded in **1994** by eight governments, namely **Australia, France, Japan, Jamaica, the Philippines, Sweden, the United Kingdom, and the United States of America.**
- It was announced at the First **Conference of the Parties** of the **Convention on Biological Diversity** in December 1994.
- **Membership:** ICRI now counts over 100 members including **India**
- Foundational documents: ICRI adopted a '**Call to Action**' and a '**Framework for Action**' as its foundational documents setting the four cornerstones of ICRI: *Integrated Management; Science; Capacity Building and Review.*
- Corals:
- Corals are colonial marine invertebrates of the phylum Cnidaria.
- **Polyp:** An individual coral is known as a polyp. A polyp is a sac-like animal and they **excrete an exoskeleton** near the base. Polyps form a **symbiotic relationship** with plant like cells called zooxanthellae (**unicellular dinoflagellates**).
- Symbiotic Relationship: Coral Polyp can ingest tiny organisms called plankton & other small creatures but still majority of their energy and nutrients they get from the zooxanthellae living within their tissues which also is responsible for giving the corals its color.
- In return corals provide the zooxanthellae with shelter and protection.

- Conditions for Survival:
- **Shallow Water:** Corals require sunlight and clear shallow water for their growth. They are found typically in water above **165 feet (50 meters)**.
- **Clear Water:** That lets sunlight through. They don't thrive well when the water is opaque.
- **Warm Water:** Reef-building corals require warm water conditions to survive. Different corals living in different regions can withstand water temperatures in the range of **20–32° C**.
- **Pollution-free water:** Corals are sensitive to pollution and sediments. Wastewater discharged into the ocean near the reef can contain too many nutrients that cause seaweeds to overgrow the reef
- **Salinity:** Corals need saltwater (salinity almost **27 ppt**) to survive and require a certain balance in the ratio of salt to water. **This is why corals don't live in areas where rivers drain fresh water into the ocean ie. Estuaries.**

India Achieves Record Growth in Renewable Energy Capacity: Adds 18.48 GW in 2023-24, Aims for Ambitious 500 GW Target.

Record Renewable Energy Capacity Addition:

- India added a record renewable energy capacity of **18.48 GW** in 2023-24, marking a remarkable **increase of over 21%** from the previous year.
- Solar installations accounted for the majority of the capacity addition, totaling 12.78 GW, followed by wind energy at 2.27 GW.
- Current Installed Capacity and Targets:
- Currently, India's **installed renewable energy capacity** stands at **143.64 GW**, excluding large hydropower capacity (each plant is more than 25 GW or above).
- Including large hydro projects, the **total renewable energy capacity reaches around 190 GW.**

- To achieve the target of **500 GW** of renewable energy by **2030**, India needs to add approximately 310 GW in the next six years, averaging about 50 GW annually.
- Renewable energy capacity distribution:
- India's total solar installed capacity leads with **81.81 GW**, followed by approximately **46 GW from wind energy**.
- Biomass cogeneration contributes **9.43 GW**, and small hydro projects (each with up to 25 MW capacity) add another 5 GW.
- State-wise Distribution:
- **Gujarat** and **Rajasthan** lead in renewable energy capacities with approximately **27 GW each**, followed by **Tamil Nadu (22 GW)**, **Karnataka (21 GW)**, and **Maharashtra (17 GW)**.
- States like Himachal Pradesh and Andhra Pradesh have also made significant contributions, with installed capacities of about 11 GW each.
- Renewable energy targets in India:
- India has set a target to **reduce the carbon intensity** of the nation's economy by **less than 45% by the end of the decade**, **achieve 50% cumulative electric power installed by 2030 from renewables**, and **achieve net-zero carbon emissions by 2070**.
- India aims for 500 GW of renewable energy installed capacity by 2030.
- India aims to produce **5 Mn Tonnes of green hydrogen by 2030**.
- This will be supported by **125 GW of renewable energy capacity**.
- Steps taken to promote Renewable Energy (RE):
- **National Green Hydrogen Mission:** Launched to establish India as a global hub for the production, utilization, and export of Green Hydrogen and its derivatives.
- Schemes: Includes the **Production Linked Incentive Scheme for High Efficiency Solar PV Modules**, **Pradhan Mantri Kisan Urja Suraksha evam**

Utthaan Mahabhiyan (PM-KUSUM), Solar Rooftop Phase II, and the 12000 MW CPSU Scheme Phase II.

- **Infrastructure Development:** Initiatives to set up **Ultra Mega Renewable Energy Parks**, providing land and transmission facilities to RE developers for large-scale project installations.
- **Policy Support:** Enacted **the Green Energy Open Access Rules 2022** to promote renewable energy adoption.
- **Investment Opportunities: Allows 100% Foreign Direct Investment (FDI)** under the automatic route in the renewable energy sector.
- Challenges:
- **Access to financing:** Lack of institutions to deploy financing effectively in new low-carbon growth areas.
- **Location-specific potential:** Renewable energy is concentrated in areas sometimes away from consumers or the grid.
- **Higher costs:** The transition to renewables requires massive investments, which can burden poorer countries and affect their budgets for essential services.
- **Energy storage:** Solar PV & Wind turbines relies on environmental factors such as weather, seasons, and geographical locations and hence they require backup or storage solutions to provide stable power.
- **Lack of infrastructure:** Renewable energy sources require large amounts of land, and traditional energy sources like coal and oil have existing infrastructure.
- **Installed capacity for Renewables (accounting 41.4% Of India's total energy mix):**
- Renewable energy sources have a combined installed capacity of 150+ GW.
- As of **Feb 2024**, Renewable energy sources, including large hydropower, have a combined installed capacity of **183.49 GW**.
- The following is the installed capacity for Renewables:

- **Wind power: 45.15 GW**
- **Solar Power: 75.57 GW**
- **Biomass/Co-generation: 10.2 GW**
- **Small Hydro Power: 4.99 GW**
- **Waste To Energy: 0.58 GW**
- **Large Hydro: 46.92 GW**

Three new fish species spotted using tools in the Laccadive Sea.

- Three fish species that live in the Laccadive Sea, off the southwest corner of the Indian coast, are capable of using tools.
- This discovery adds to the small list of fish, specifically 18 species worldwide, known to use tools.
- Tool-Using Fish Species:
- Most fish species do not use tools due to their physical limitations, such as lacking hands, claws, or tentacles.
- Despite these limitations, certain **wrasses** have developed specialized behaviors to manipulate objects and crack open **sea urchins** by using external tools.
- This tool usage is rare among fish and showcases their complex cognitive abilities, challenging the common perception that fishes have lower intelligence.
- Recent Discoveries in the Laccadive Sea:
- Scientists have recently identified three new fish species that utilize tools: **Jansen's wrasse** (*Thalassoma jansenii*), **checkerboard wrasse** (*Halichoeres hortulanus*), and **moon wrasse** (*Thalassoma lunare*).
- These innovative species use parts of **the coral reefs as anvils to break the hard shells** of *E. molaris* **sea urchins**, demonstrating their ability to interact with their environment in unique ways.
- Implications of These Findings

- These wrasses, belonging to the **Labridae** family, illustrate how marine creatures can adapt their behavior to overcome physical limitations.
- The observed behaviors not only reflect the adaptability and intelligence of these fish but also invite a reevaluation of the cognitive capabilities within the aquatic world.

The Arctic's Plastic Crisis.

- **Published by:** Toxic Threats to Health, Human Rights, and Indigenous Lands from the Petrochemical Industry was launched by **Alaska Community Action on Toxics (ACAT)** and **the International Pollutants Elimination Network (IPEN)** on April 15.
- **Context:** Released in anticipation of the fourth session of the **Intergovernmental Negotiating Committee on Plastic Pollution (INC-4)** in Ottawa, Canada.
- The Arctic is a '**hemispheric sink**' for chemicals & plastics accumulating in the region from local as well as global sources.
- Key Findings:
- The Arctic is a **hemispheric sink** for global pollutants, including plastics and chemicals, transported via atmospheric and oceanic currents through a process known as global distillation or the "**grasshopper effect.**"
- **Grasshopper Effect** is the **geochemical process** by which certain chemicals are transported from **warmer to colder regions** of the Earth, particularly the poles and mountain tops.
- The Arctic is warming nearly **four times faster** than the global average, exacerbated by global fossil fuel use.
- Toxic chemicals such as **polyaromatic hydrocarbons** and **bisphenols** are accumulating in the Arctic, posing serious health risks like cancer and obesity to Arctic peoples.

- The issues of plastics, toxic chemicals, and climate change in the Arctic are interconnected and stem from fossil fuel production.
- Environmental degradation is causing displacement and threatening food security for indigenous groups such as the **Aleut, Yupik, and Inuit**.
- *Recommendations:*
- **End Subsidies:** End government subsidies to the fossil fuel and petrochemical industries.
- **Support Renewables:** Advocate for support towards clean, renewable energy and a toxics-free materials economy.
- **Stop Expansion:** Recommend halting the expansion of the petrochemical industry in the Arctic.
- **Cultural Preservation:** Encourage strengthening of traditional Indigenous values and practices in **Alaskan** communities.
- **Policy Integration:** Adopt the **Louisville Charter for Safer Chemicals**, integrate Just Transition framework principles, and ensure strong implementation of the **Stockholm Convention on Persistent Organic Pollutants**.
- **Global Action:** Support the adoption of a legally binding Global Plastics Treaty.

World Earth Day is celebrated annually on April 22nd to support environmental conservation efforts.

- World Earth Day, also known as **International Mother Earth Day**, is a globally recognised event dedicated to raising awareness and promoting the sustainability of our planet.
- *World Earth Day 2024:*
- **World Earth Day 2024 Theme:** The theme for Earth Day 2024 is **“Planet vs. Plastics”** .

- This theme emphasizes the need for collective action to repair and heal the planet's ecosystems, combat climate change, and preserve biodiversity.
- **Significance:** World Earth Day holds significance as a global initiative to raise awareness about environmental issues and inspire action.
- It serves as a reminder that everyone has a shared responsibility for the health of the planet and that corporations, governments, communities, and individuals must work together to achieve this goal.
- Origin of World Earth Day:
- **Background:** The concept of World Earth Day can be traced back to the late 1960s, which saw a surge in public debate over environmental issues.
- **Rachel Carson's book Silent Spring (1962)** and the **Santa Barbara oil spill (1969)** raised awareness about environmental destruction.
- EARTHDAY.ORG:
- **About:** Growing out of the **first World Earth Day in 1970**, EARTHDAY.ORG is the world's largest recruiter to the environmental movement, working with more than 150,000 partners in over 192 countries to drive positive action for our planet.
- **Mission:** It's mission is to diversify, educate and activate the environmental movement worldwide.
- **Acceptance of Idea:** However, it was first accepted in the USA when the **UN officially acknowledged it in 1972 after peace activist John McConnell** proposed the idea of celebrating a day in honor of the Earth and peace.
- It began from **Gaylord Nelson, a US senator**, who sought to infuse the energy of student anti-war protests with an emerging public consciousness about air and water pollution" during this time.

- He recruited activist Denis Hayes to organize campus teach-ins and scale the idea to a broader public.
- The duo chose April 22 as the date — then a weekday falling between Spring Break and Final Exams to maximize student participation.
- Goals Laid for Environment Protection:
- **Reducing Plastic Production:** On this World Earth Day 2024, EARTHDAY.ORG renewed its commitment aiming for a **60% reduction** in plastic production by **2040** to safeguard both human and planetary health.
- Key Objectives towards goal:
- **Raising Awareness:** The campaign prioritizes spreading awareness about the detrimental effects of plastic on human and environmental health.
- It calls for increased research into the health implications of plastic exposure and advocates for transparency in sharing findings with the public.
- **Phasing Out Single-Use Plastics:** It aims to rapidly eliminate single-use plastics by 2030.
- It seeks to embed this commitment within the **United Nations Treaty on Plastic Pollution by 2024**, ensuring global cooperation in tackling this pressing issue.
- **Investing in Innovation:** It emphasizes the importance of investing in innovative technologies and materials to pave the way for a *plastic-free world*.
- Indian Government initiatives aligned with World Earth Day:
- **Green Credit Program:** Under this, participants can earn **Green Credits** for a wide range of activities that promote environmental sustainability.
- **Global Biofuel Alliance:** Under India's G20 presidency, the India-led initiative was launched to promote sustainable biofuel usage, offer technical assistance to

national biofuel programs worldwide, and enable the exchange of policy practices.

- **International Solar Alliance (ISA):** India established ISA with **France in 2015** to attract **\$1 Tn** of investment in **solar projects by 2030** in solar-rich countries, thereby increasing access to clean energy.
- **Lifestyle for Environment:** It promotes an eco-friendly lifestyle centered around mindful and purposeful use, rather than thoughtless and wasteful consumption.

GAIA Asia Pacific, in collaboration with other environmental organisations, ASEAN to take decisive action in response to plastic pollution.

Global Alliance for Incinerator Alternatives (GAIA):

- GAIA is a worldwide alliance of more than 1,000 grassroots groups, non-governmental organizations, and individuals in over 90 countries.
- GAIA seeks to drive a global movement toward **environmental justice** by empowering grassroots initiatives that tackle waste and pollution.
- It aims to transition from a linear, **extractive economy to a circular system** that upholds people's right to a safe and healthy environment.
- It envision a just, zero waste world built on respect for ecological limits and community rights, where people are free from the burden of toxic pollution, and resources are sustainably conserved, not burned or dumped.
- This means fighting pollution and promoting regenerative solutions in cities through local campaigns, policy changes, research, and community building efforts.
- It focuses on four main areas of action: **incineration, zero waste, plastic pollution, and climate change.**

- GAIA Asia Pacific:
- GAIA's work in Asia Pacific is focused on spotlighting and providing support for the many innovative and **on-the-ground zero waste** solutions.
- Their work also aims to address the systemic injustices of global waste trade, which exploits cheap labor and lower environmental standards in developing countries.
- They advocate for an end to waste trade and the **cessation of burn technologies**, such as **incinerators**, exported from countries in the Global North, China, and Japan.
- Incinerator:
- Incineration is a process used to **treat waste by burning** the substances it contains.
- This process takes place in a **special furnace called an "incinerator"**.
- Various types of hazardous materials, such as soil, sludge, liquids, and gases, can be treated through incineration.
- Process:
- During incineration, waste materials are converted into ash, **flue gas**, and heat through combustion.
- The ash primarily consists of the inorganic components of the waste and may appear as solid lumps or particles carried by the flue gas.
- Before releasing into the atmosphere, the flue gases must undergo cleaning to remove gaseous and particulate pollutants.
- In some cases, the heat produced during incineration can generate electricity.
- Challenges in Tackling Plastic Pollution:
- **Global Plastic Production and Consumption:**The vast amount of plastic produced and used worldwide has worsened the problem.

- Plastic is deeply integrated into daily life, from packaging to single-use items, making reducing consumption difficult.
- According to the Lawrence Berkeley National Laboratory (LBNL), if the world doesn't cut plastic production by **12-17% per year**, achieving the Paris Climate goals would not be possible.
- **Inadequate Waste Management Infrastructure:** Many regions lack efficient waste management systems.
- Improper disposal causes plastic waste to accumulate in landfills, waterways, and oceans.
- Therefore, There is a need to develop a robust infrastructure for waste collection, recycling, and disposal is crucial.
- **Marine Pollution and Ecological Impact:** Plastic debris harms marine ecosystems, endangering marine life.
- It also causes animals to ingest or become entangled in plastic, leading to injury, suffocation, and death.
- **Microplastics and nanoplastics:** Tiny plastic particles are known as microplastics and nanoplastics.
- These particles are difficult to detect and remove from permeate water bodies which it poses significant risks to the environment.

50 Years of India's Chipko (Hug the Trees) Movement.

Chipko Movement:

- The Chipko movement, also known as **Chipko Andolan**, is a **non-violent** social and ecological movement in India that began in the 1970s to protect trees from commercial logging and government-backed policies on deforestation.

- It is one of the earliest examples of a collective effort aimed at forest conservation, revolving around the practice of hugging trees to prevent them from being cut down.
- It is also renowned for mobilizing women for forest preservation and is **recognized as an eco-feminist movement**.
- This movement led to a shift in attitudes regarding women's status in society.
- Origins:
- The Chipko Movement originated in the Himalayan regions of **Uttarakhand (then part of Uttar Pradesh), in 1973**.
- The name of the movement '**chipko**' comes from the word '**embrace**', as the villagers hugged the trees and encircled them to prevent being hacked.
- The movement, led by **Sunderlal Bahuguna** in the Garhwal forests, ended in 1974.
- Leaders like **Gaura Devi, Amrita Devi Bishnoi, Medha Patkar, A. K. Banerjee**, and others strengthened it.
- The movement drew inspiration from the original Chipko Andolan initiated by **Rajasthan's Bishnoi community in the 18th century**.
- Women's role in the movement:
- The Chipko movement can be described as a women's movement.
- Women formed the nucleus of the movement, as the group most directly affected by the lack of firewood and drinking water caused by deforestation.
- The movement saw poor, rural women embracing trees to halt deforestation.
- They became the backbone of the movement and took on significant roles in afforestation efforts.
- Challenging societal norms:

- Women's involvement in the movement challenged traditional gender roles and empowered them to assert their rights and interests.
- The movement evolved into a dual purpose of conservation and challenging societal norms.
- Women aimed to protect the environment while also challenging the status quo, which favored men, demanding a voice in decisions that impacted them.
- Eco-feminism:
- Ecofeminism is a social and political movement that blends elements of feminism and environmentalism.
- It explores the relationships between women and nature.
- It explores the intersections of gender oppression and environmental degradation, arguing that both are rooted in similar systems of domination, exploitation, and hierarchy.
- Ecofeminists believe that **patriarchy and capitalism** are the causes of both women's oppression and the degradation of the environment, and that any strategy to address one must also consider the impact on the other.
- Factors that led to emergence of Eco-feminism:
- **Interconnectedness of exploitation:** Ecofeminism links women's rights and environmental concerns, promoting both simultaneously.
- Women, disproportionately affected by poverty, bear the brunt of agricultural challenges due to climate change, like food shortages.
- **Women's lived experiences:** Women, being solely in charge of cultivation, livestock and children, suffered the most due to floods and landslides, caused due to rise in deforestation in the face of urbanisation.

- **Importance of traditional knowledge:** Eco-feminism recognizes the significance of traditional knowledge, often held and transmitted by women, in promoting sustainable practices.
- **Globalization and industrialization:** It disproportionately affected women, prompting scrutiny of capitalist systems.
- Relevance of Ecofeminism in present time:
- Ecofeminism is relevant in present time because it helps to analyze the profit-driven, sexist system of capitalist patriarchy that harms the ecosystem by exploiting natural resources and the people who live there.
- For example, research shows that **climate change is not gender-neutral**, and women are increasingly vulnerable to its impacts than men.
- Women are often the majority of the world's poor and more dependent on local natural resources.
- Ecofeminism also explores the sustainable relationship between women and the environment.
- Other Important eco-feminist movement in India:
- **Narmada Bachao Andolan:** It started in 1985 to oppose the construction of large dams on the Narmada River.
- Led by native tribes, farmers, environmentalists, and human rights activists, including **Medha Patkar**.
- **The Appiko Movement (1980s):** It was inspired by the Chipko movement, with women in Karnataka's Western Ghats hugging trees to halt deforestation.
- **The Silent Valley Movement (1973):** It aimed to protect a rainforest in Kerala from being flooded for a hydroelectric project.

GEOGRAPHY

Red sea crisis Gujarat exporters turn to costly aerial routes

About Red Sea:

- It is a **semi-enclosed inlet**(or extension) of the Indian Ocean between the continents of Africa and Asia. It is one of the world's **warmest seas**.
- It is **connected to the Arabian Sea** and the Indian Ocean to the south through the **Gulf of Aden** and the narrow **strait of Bab El-Mandeb**.
- The northern portion of the Red Sea is bifurcated by **the Sinai Peninsula into** the **Gulf of Aqaba** and the **Gulf of Suez**, where it is connected to the Mediterranean Sea via the famous Suez Canal.
- **Bordering Countries:**
 - **Yemen** and **Saudi Arabia** border the Red Sea to the east.
 - It is bordered by **Egypt** to the north and west and by **Sudan, Eritrea,** and **Djibouti** to the west.
- The Red Sea contains some of the world's **hottest and saltiest seawater**.
- **Islands:** Some well-known islands include **Tiran Island**, which is located near the mouth of the Gulf of Aqaba and **Shadwan Island**, which is located at the entrance of the Gulf of Suez.
- With its connection to the Mediterranean Sea via the Suez Canal, it is one of the most **heavily traveled waterways** in the world, carrying maritime traffic between Europe and Asia.

168 roads closed in Himachal Pradesh as snow and rain hit region

About Atal Tunnel:

- Atal Tunnel, formerly known as **Rohtang Tunnel**, is the **world's longest high-altitude tunnel**, situated at an elevation of approximately **3,100 meters** (10,171 feet) above sea level.

- It is located in the **Pir Panjal Range** of the Himalayas, in **Himachal Pradesh**. It passes through **Rohtang pass**.
- It stretches 9.02 km, **connecting Manali to Lahaul and Spiti Valley** throughout the year, previously cut off for about six months each year due to heavy snowfall.
- The tunnel is a **horseshoe-shaped, single tube, double lane tunnel**. The tunnel features a **semi-transverse ventilation system**, emergency exits every 500 meters, evacuation lighting, broadcasting systems and fire hydrants for safety.

Melting ice sheets may postpone need for 'negative leap second

About Leap Second:

- It is used as a measure to combat the long-term **slowdown in the Earth's rotation** which is caused by the constant melting and refreezing of ice caps.
- It is **added every** now and then to **Coordinated Universal Time (UTC)** in order to synchronize a clock worldwide with the Earth's ever **slowing rotation**.
- UTC consists of a time scale that combines the output of more than 300 highly precise Atomic clocks worldwide. Atomic clocks are very accurate and are stable within 1 second over a period of millions of years.
 - The system of leap seconds was introduced in the early 1970s. So far, 27 positive leap seconds have been added.
- On the other hand, the **Astronomical Time** known as **Universal Time (UT1)** refers to the Earth's rotation around its own axis and determines the length of a day.
- **Reason for addition:** The **Earth's rotation** around its own **axis is not regular**, as sometimes it speeds up and sometimes it slows down, due to various factors including the moon's gravitational Earth-braking forces that often results in ocean tides.

- As a result, Astronomical Time (UT1) gradually falls out of sync with Atomic time (UTC), and as and when the difference between UTC and UT1 **approaches 0.9 seconds**, a “Leap Second” is added to UTC through Atomic clocks worldwide.
- A leap second is normally inserted either on June 30 or December 31.
- **What is Negative Leap second?**
- It is a second that is **subtracted from our clocks** to keep them in sync with the Earth's rotation.
- Till date **no negative leap second** was introduced because, in the last few decades the Earth's rotation has generally been a bit slow
- The **International Earth Rotation and Reference Systems Service** (IERS) monitors the Earth's rotation, and takes decisions on when to add or subtract a leap second.
- Since Earth is **spinning faster than** usual recently, timekeepers had thought of using negative leap seconds for the first time.
- In other words, they thought of subtracting leap seconds from our clocks to synchronise them with Earth's rotation.

Jalpaiguri disaster: Tornadoes a symptom of warming & anomalous wind patterns

About Tornado:

- It is a **land-based** vertical column of **violently rotating air** that forms from a thunderstorm to the ground. It can have wind speeds in the range of 105-322 km/h. The tornado over the sea is called **waterspouts**.
- The rotating column is physically connected to the cloud base or wall cloud and is often visible as a **cloud-filled "condensation funnel"**. If the air is dry enough, the tornado may only appear as a swirl of dirt on the ground without a visible connection to the cloud above.
- **Formation:** Any collision of warm, moist air with dry, cool air in the **presence of a low pressure system** like a trough causes thunderstorms and tornadoes.

- **Geographical distribution:**

- It occurs most commonly on continents in the **mid-latitudes** (between 20 and 60 degrees north and south), where they are frequently associated with thunderstorms that develop in regions where cold polar air meets warm tropical air.
- They are the most common in the **United States, Argentina and Bangladesh.**
- The **Enhanced Fujita scale** is used to measure tornado strength. It is used to assign tornado a "rating" based on estimated **wind speeds and related damage.**

Swell waves inundate coastal areas in southern, central Kerala

About Swell waves:

- A swell is the formation of **long wavelength waves** on the surface of the seas. These are composed of a series of surface gravity waves.
- **Formation:**
 - They occur **not** due to **the local winds**, but rather due to distant storms like hurricanes or even long periods of fierce gale winds.
 - During such storms, huge energy transfer takes place from the air into the water, leading to the formation of very high waves.
- **Features:**
 - Swells have a **narrower range of frequencies** and directions than locally generated wind waves, because swell waves have dispersed from their generation area, taking on a more defined shape and direction.
 - These waves **can propagate** in directions that **differ** from the **direction of the wind**, in contrast to a wind sea.

- Their wavelengths may rarely exceed more than 150 m. Occasionally, swells which are longer than 700 m occur as a result of the most severe storms.
- It occurs without precursors or any kind of local wind activity and as a result.
- In India early warning systems like the **Swell Surge Forecast System** launched by the **Indian National Centre for Ocean Information Services (INCOIS)** in 2020 — gives forewarning seven days in advance.

Massive earthquake hits Taiwan: What is the Ring of Fire?

About Ring of Fire:

- It is a string of hundreds of **volcanoes and earthquake-sites** which runs along the **Pacific Ocean**. It is a semicircle or horse shoe in shape and stretches nearly 40,250 kilometres.
- It traces the meeting points of numerous tectonic plates, including the **Eurasian**, North American, **Juan de Fuca, Cocos, Caribbean, Nazca, Antarctic**, Indian, Australian, Philippine and other smaller plates, which all encircle the large Pacific Plate.
- It runs through 15 more countries including the USA, Indonesia, Mexico, Japan, Canada, Guatemala, Russia, Chile, Peru and the Philippines.
- **Why is it more prone to earthquakes?**
- It witnesses so many earthquakes due to **constant sliding past**, colliding into, or moving above or below each other **of the tectonic plates**. As the edges of these plates are quite rough, they get stuck with one another while the rest of the plate keeps moving.
- An earthquake occurs when the plate has moved far enough and the edges unstick on one of the faults.

- There are **many volcanoes** in the Ring of Fire due to the movement of tectonic plates. Many of the volcanoes have been formed through a **process known as subduction**.
- It takes place when two plates collide with each other and the heavier plate is shoved under another, creating a deep trench.
- Most of the subduction zones on the planet are located in the Ring of Fire and that's why it hosts a large number of volcanoes.

○

Indian Coast Guard rescues injured fisherman in Gulf of Khambhat

About Gulf of Khambhat:

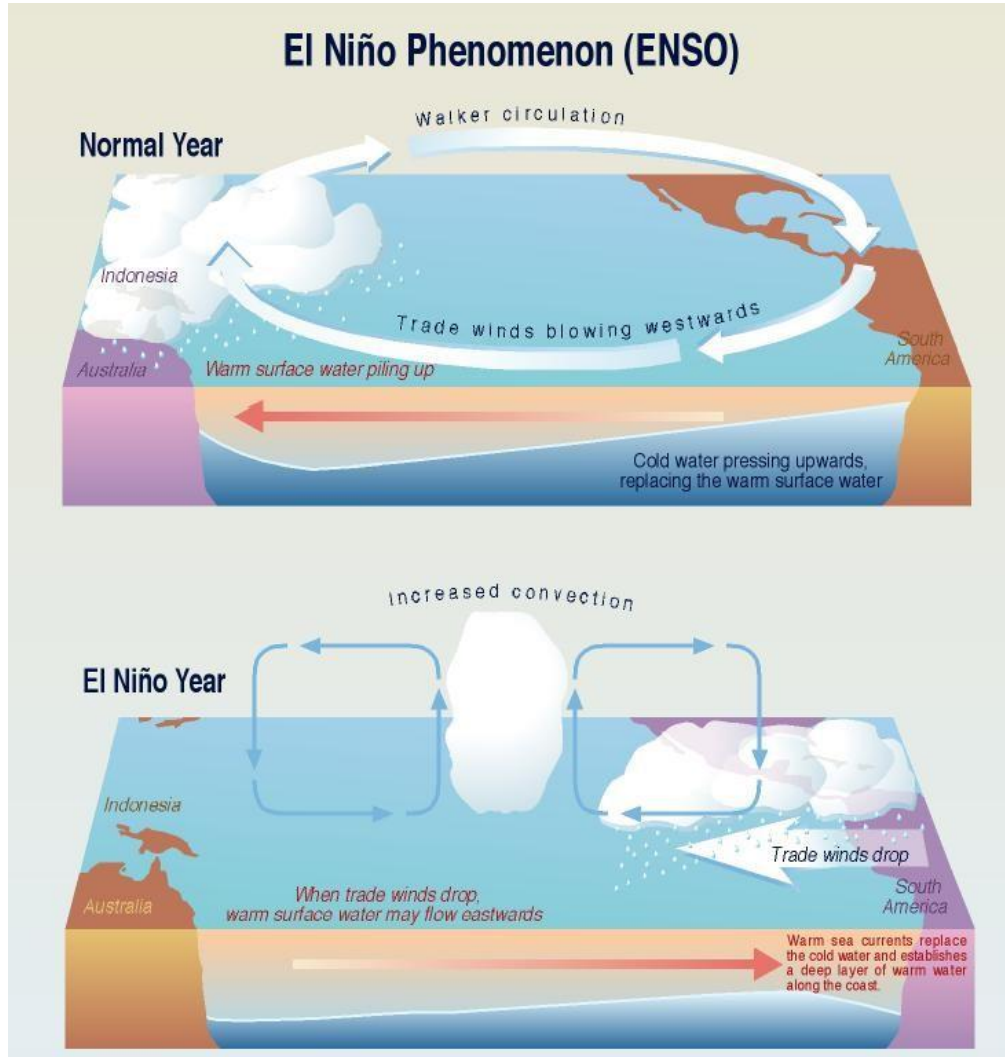
- The Gulf of Khambhat (also known as the Gulf of Cambay) is an inlet of the **Arabian Sea** along the west coast of India, in the state of Gujarat. It **divides the Kathiawar Peninsula from the south-eastern part of Gujarat**.
- **Geography:**
- The periphery of the Gulf of Khambhat is an extensive area of **estuarine habitats**.
- The **Narmada, Tapti, Mahi and Sabarmati** rivers drain into it.
- These rivers have **deposited alluvium** over large areas as the marine recession has united Saurashtra with the mainland of Gujarat.
- The Gulf is not very deep and has abundant **shoals and sandbanks**.
- There are extensive areas of **intertidal mud** and **sand flats** in the deltas of the Mahi and Sabarmati rivers.
- There are some **coral reefs** around small inlets in the western part of the Gulf.
- Its shape and its orientation in relation to the southwest monsoon winds account for its high tidal range (12 metres) and the high velocity of the entering tides.
- On the eastern side of the gulf are **Bharuch, one of the oldest Indian ports, and Surat**, identified with early European commercial contacts with India.

- The **town of Khambhat** is at the head of the gulf.

US National Oceanic and Atmospheric Administration has predicted an 83% probability of the Oceanic Niño Index (ONI) transitioning to a neutral range by April-June 2024.

Oceanic Niño Index:

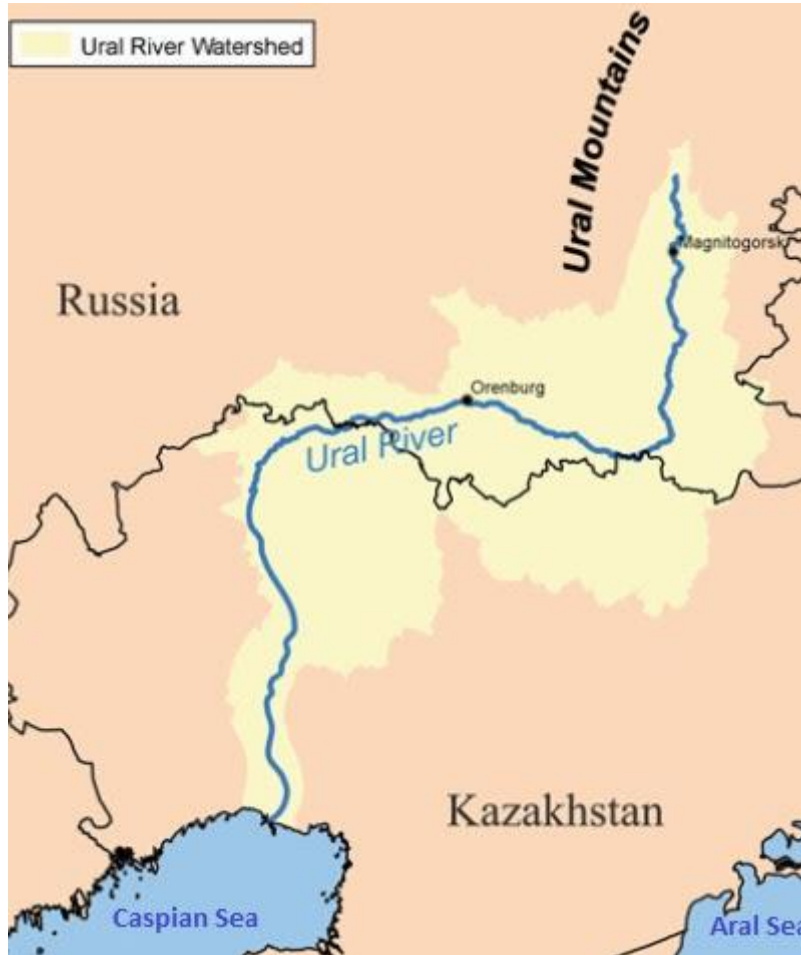
- It is the National Oceanic and Atmospheric Administration's (**NOAA**) primary indicator for monitoring the ocean part of the seasonal climate pattern called the **El Niño-Southern Oscillation, or "ENSO"**.
- The ONI tracks the running **3-month average sea surface temperatures** in the **east-central tropical Pacific** between **120°-170°W**, near the **International Dateline**, and whether they are warmer or cooler than average.
- Index values of **+0.5 or higher indicate El Niño** and values of **-0.5 or lower indicate La Niña**.
- El Nino and La Nina:
- El Nino and La Nina are two opposing climate trends that deviate from the normal conditions and normally run nine to twelve months, but can often extend.
- These events occur **every two to seven years** on average (**El Nino is more frequent** than La Nina), but not on a regular basis and together are referred to as the El Nino-Southern Oscillation (ENSO) cycle by scientists.
- El Nino is typically known as the **warm phase** (a band of warmer water spreading from west to east in the equatorial Pacific Ocean) and La Nina is identified as the cold phase (a band of cooler water spreads east-west) of ENSO.
- Both El Nino and La Nina can have global effects on weather, wildfires, ecosystems and economics.



Russia Declares Federal Emergency As Ural River Floods Orsk, Thousands Evacuated.

Ural River:

- It is a 2,428 km long river that flows through Russia and Kazakhstan along the continental boundary between Europe and Asia.
- It is also referred to as the **Zhayyq** River in the native Kazakh language.



-
- Course:
- The river **originates in the Ural Mountains**, close to Mount **Kruglaya** in Russia.
- It empties into the **Caspian Sea; the world's largest inland sea** that lies between Europe and Asia.
- It is Europe's third-longest river, after the **Volga** and the **Danube rivers**, and Asia's 19th longest river.
- Melting snow constitutes about 60% to 70% of the river's water source, while precipitation is a minor source.
- A prominent feature of the Ural River is its digitate delta, or tree-like structure, that can be seen as the river enters the Caspian Sea.

- Tributaries:
- It has a total of 58 tributaries, with the most prominent ones being Kushum, Derkul, Chagan, Irtek, Utva, Elek, Bolshaya Chobda, Kindel, Sakmara, Tanalyk, Salmys, Or, and Suunduk.
- Tributaries from the right side are typical mountain rivers, while the left side tributaries have flatland characteristics.
- Orsk City:
- It is located in the **Orenburg** Oblast region, Russia.
- It lies about 150 miles (240 km) south of Magnitogorsk at the confluence of the **Ural and Or** rivers.
- It lies adjacent to the **Kazakhstan–Russia border**.
- Orsk is now a major industrial centre, with a large oil refinery using petroleum piped from fields on the Caspian Sea.

Volcanic Vortex Rings

- **Mount Etna** volcano has been sending up almost perfect rings of smoke into the air which are a rare phenomenon that scientists refer to as **volcanic vortex rings**.
- Volcanic Vortex Rings:
- Vortex rings are generated when gas, predominantly water vapour, is released rapidly through a vent in the crater.
- The rings can remain in the air for up to 10 minutes, but tend to disintegrate quickly if conditions are windy and turbulent.
- This phenomenon was first observed at **Etna** and **Vesuvius** in Italy in 1724.
- In more recent times, volcanic vortex rings have been observed at volcanoes such as

- Redoubt in Alaska, Tungurahua in Ecuador, Pacaya in Guatemala, Eyjafjallajökull and Hekla in Iceland, Stromboli in Italy, Aso and Sakurajima in Japan, Yasur in Vanuatu, Whakaari in New Zealand, and Momotombo in Nicaragua.
- Mount Etna:
- It is sometimes referred to simply as Etna, is an active volcano on the east coast of **Sicily**, the **largest island** in the Mediterranean Sea.
- Etna's peak is the **highest in Italy south of the Alps**, and it is Europe's largest and one of the most active volcanoes.
- Etna's summit has five craters, which are responsible for most of the volcano's eruptions; there are also "**flank**" eruptions that occur out of 300-odd vents of varying sizes along the slopes of the mountain.
- It is in almost constant activity, and has seen, since the year 1600, at least 60 flank eruptions and many more summit eruptions.
- **Summit Eruption:** It refers to volcanic activity occurring at the central vent, usually at or near the very top of the volcano. This is the primary vent where the main conduit from the magma chamber reaches the surface.
- **Flank Eruptions:** It occur on the sides or lower parts of a volcano, rather than at the peak. These eruptions emerge from side vents or fissures that are typically connected to the main magma conduit but can have separate pathways.

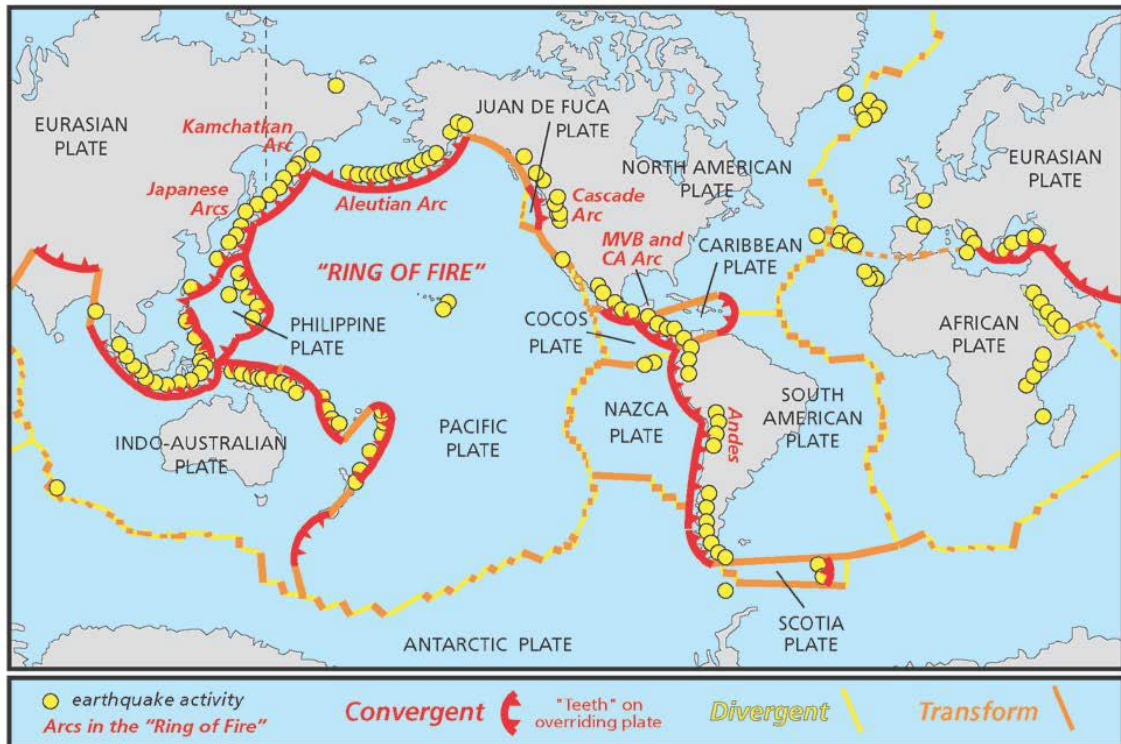


Volcanoes:

- According to the US Geological Survey: “Volcanoes are openings, or vents where lava, tephra (small rocks), and steam erupt onto the Earth’s surface.”
- They can be found on land and in the ocean and are formed when material significantly hotter than its surroundings is erupted onto the surface of the Earth.
- The material could be **liquid rock** (known as “**magma**”, when it’s underground and “**lava**” when it breaks through the surface), ash, and/or gasses.
- According to NASA, the rise of magma can take place in three different ways.

- **Divergence:** When tectonic plates (massive, irregularly shaped slabs of solid rock that carry both continents and oceans and are constantly in motion) move away from each other. The magma rises up to fill in the space.
- **Convergence:** When the plates move towards each other part of Earth's crust can be forced deep into its interior. The high heat and pressure cause the crust to melt and rise as magma.
- **Hotspots:** Magma also rises at the hotspots i.e. hot areas inside of the Earth, where magma gets heated up. As magma gets warmer, it becomes less dense, leading to its rise.
- Major Types of Volcanoes:
- **Stratovolcano/Composite Volcanoes:** They are steep-sided volcanoes composed of many layers of volcanic rocks, usually made from high-viscosity lava, ash and rock debris.
- These types of volcanoes are tall conical mountains composed of lava flows in alternate layers, the strata that give rise to the name.
- **Cinder Cones:** Cinder cones are circular or oval cones made up of small fragments of lava from a single vent that have been blown up.
- Cinder cones result from eruptions of mostly small pieces of scoria and pyroclastics that build up around the vent. Most cinder cones erupt only once.
- **Shield Volcano:** These volcanoes are shaped like a bowl or shield in the middle with long gentle slopes made by basaltic lava flows. These are formed by the eruption of low-viscosity lava that can flow a great distance from a vent.
- Shield volcanoes are more common in oceanic than continental settings. The Hawaiian volcanic chain is a series of shield cones, and they are common in Iceland, as well.
- **Lava Domes:** They are formed when erupting lava is too thick to flow and makes a steep-sided mound as the lava piles up near the volcanic vent. They are built by slow eruptions of highly viscous lava.

- Distribution of Volcanoes:
- There are about 500 volcanoes in the world. Most of these volcanoes are found in three well defined belts.
- **The Circum-Pacific Belt:** Circum-Pacific region has the greatest concentration of volcanoes, that is why it is called '**Pacific Ring of Fire**'. It is a horseshoe-shaped zone encircling the Pacific Ocean.
- This ring extends along the Andes mountains of South America to Alaska and from the Aleutian Islands to Japan, Philippines, Indonesia to New Zealand.
- Major Volcanoes: Mount St. Helena, Mauna Loa, Mount Ruapehu, Mount Krakatoa, Mount Fuji
- **The Mid-World Mountain Belt:** The Mid-world mountain belt occupies the second position with regard to the numbers of volcanoes.
- It runs from Alps in Europe to Asia Minor and crossing through Himalayan region joins the Circum-Pacific belt
- Major Volcanoes: Mt. Stromboli , Mt. Vesuvius , Mt. Karakoram
- India's only active volcano is located in **Barren island of Andaman**, which is also the only confirmed active volcano in South Asia
- **The African Rift Valley belt:** The African Rift Valley region ranks third. Most of the volcanoes are extinct here.
- **Mt. Cameroon** is the only active volcano which is situated in Central West Africa.
- Other Volcanoes: **Mount Kilimanjaro, Mount Kenya, Mount Longonot.**



Acidification may strip Indian soils of 3.3 billion tonnes of essential carbon, affecting crop growth, sequestration: Study

Soil Acidification:

- **Soil acidification:** It refers to the process by which soil becomes **more acidic**, typically due to natural factors like rainfall and biological processes, as well as human activities such as **industrial emissions** and the extensive use of **nitrogen-based fertilizers**.
- This process leads to a decrease in soil pH, which can adversely affect plant growth, nutrient availability, and soil biology.
- Geographical Spread of Soil Acidification in India:
- Soil acidification is already a concern in the country, affecting about **48 million hectares (mha)** out of **142 mha of arable land**.

- Acidic soils in India are widespread in the **humid southwestern, northeastern** and **Himalayan regions**. The northeastern region, in particular, has recorded **acidity in approximately 95 per cent of the soils**.
- **Highlights of the study:**
- Globally, soils contain more than **three times the carbon** found in vegetation and **twice** that in the atmosphere.
- By 2100, changes in global warming and soil pH could reduce **SIC by 1.35 to 5.83 gigatonnes** under various warming scenarios.
- India and China are likely to experience the most significant SIC losses, primarily due to vast SIC reserves and widespread soil acidification from nitrogen additions.
- Annually, **1.13 billion tonnes of inorganic carbon** are **transferred from soils to inland waters**, highlighting a significant cycle of carbon among land, atmosphere, freshwater, and oceans.
- The study underscores the importance of SIC in maintaining soil health, supporting ecosystem services, and aiding in climate change mitigation, recommending its consideration in carbon storage enhancement strategies.
- **About Soil Carbon:**
- **Carbon in Soil:** It can be stored in the form of **Soil Inorganic Carbon (SIC)** or **Soil Organic Carbon (SOC)**.
- **Global Stocks of SIC and SOC:**
- The global stock of SOC is estimated to be **2,376-2,456 petagram** ($\text{Pg} = 10^{15} \text{g}$) at a depth of **2 meters**.
- However, new research has revealed that the global soils store 2,305 (± 636) billion tonnes (1 petagram is a billion tonnes) of carbon as SIC over the top 2 meter depth.

- **Soil Inorganic Carbon:** It includes mineral forms of carbon like **calcium carbonate** produced by weathering parent material in soil or from the reaction of soil minerals with atmospheric **carbon dioxide**.
- SIC is important for soil health, ecosystem services and functions along with carbon sequestration.
- **Soil Organic Carbon:** It plays a role in nutrient cycling and is the main component of soil organic matter such as plant and animal waste, microbes and microbial byproducts.
- India is likely to be most affected by SIC losses due to relatively large stocks of SIC and the magnitude of soil acidification associated with nitrogen additions.
- **Climate Change causing SIC loss:** Globally, future global warming and soil pH changes will deplete **SIC in the top 0.3 m** of soil by 1.35, 3.45 and 5.83 gigatonnes of carbon (GtC) under different scenarios, where temperatures could likely reach around 1.8°C, 2.7°C and 4.4°C warming by 2100, respectively.
- **Loss of SIC to inland waters:** Further, every year, approximately 1.13 billion tonnes of inorganic carbon are lost from soils to inland waters.
- Remediation:
- **Soil pH Monitoring and Management:** Soil Health Cards provide the status of nutrients and pH of soil which can be used for regular monitoring of soil quality. Furthermore, soil can be treated with calcium carbonate to neutralize acidity and raise the pH.
- **Optimized Fertilizer Use:** Reduce dependency on synthetic fertilizers by integrating organic fertilizers such as compost and manure.
- **Crop Rotation and Diverse Cropping:** Rotating crops and including **legumes or deep-rooted plants** in rotations can enhance soil structure, increase biodiversity, and improve **nutrient cycling**, which helps maintain a healthy pH balance.

- **Controlled Water Management:** Implement water management practices that optimize moisture levels without leading to *waterlogging or excessive dryness, which can exacerbate acidification.*
- **Soil Organic Matter Management:** Promote **conservation tillage** and **cover cropping** practices among farmers to build up organic matter and improve soil structure.

A recent study has discovered that the desert formed by the drying Aral Sea has significantly increased dustiness in Central Asia.

The Aral Sea:

- It is also known as **Orol Dengizi (Uzbek)** or **Aral Tengizi (Kazakh)**.
- It was the **fourth** largest inland lake in Central Asia.
- After the 1960s, It dried up and got converted into desert.
- Desert name: **The Aralkum Desert**
- It is smaller than neighboring deserts namely **Karakum** (350,000 sq km) in Turkmenistan and **Kyzylkum** (300,000 sq km) in Uzbekistan and Kazakhstan.
- Despite its size, the Aralkum Desert is a major human-made dust source worldwide.
- Location of Aral Sea : It lies across the border **between Uzbekistan and Kazakhstan**, extending from the south to the north.
- Climate: The area has a **desert-continental climate** with hot summers and cold winters.
- Major rivers: The **Amu Darya**, known as Oxus in ancient times, and the **Syr Darya**, also called Jaxartes.
- They flowed from **the Pamir** and **Tien Shan** mountain ranges, respectively.



Socio-economic impacts of the Aral Sea disaster:

- Increased Desertification: Over the past three decades, the drying of the Aral Sea has caused a **7% rise** in dust levels across Central Asia. During the period from 1985 to 2015, emissions of dust from the expanding desert nearly doubled, increasing from 14 to 27 million tonnes.
- **Desertification** is when drylands become less productive because of natural or human-made causes.
- More cooling and heating: The two fold rise in dust emissions over the Aral Sea/Aralkum area has caused more cooling and heating at both the surface and in the air.
- Dust cools during the day by blocking sunlight and warms at night by releasing heat from the ground.
- The overall effect of dust on temperature depends on factors like dust amount, time of day, season, surface brightness, and dust properties.
- Dust storm: The aral sea has become a source of dust storms.
- Impact of Dust:

- Deteriorated air qualities: It can affect air quality in cities hundreds of kilometers away, thus can affect Dushanbe, capital of Tajikistan and Asgabat, capital of Turkmenistan.
- The Siberian High:
- *It is a big area of cold, dry air that gathers in northeastern Eurasia from November to February.*
- Change in weather pattern: It can pressure air to go up by up to +0.76 Pascal each month.
- It can make the Siberian High stronger in winter and the Central Asian warm low weaker in summer.
- The dust events are seasonal and occur more in June, September, November, December and March .
- International efforts to address the Aral Sea crisis:
- **United Nations Joint Programme:**
- A consortium of United Nations agencies, including UNDP, the World Health Organization, UNESCO, the UN Population Fund, and UN Volunteers, collaborates through a joint program called **“Sustaining Livelihoods Affected by the Aral Sea Disaster.”**
- Their tireless work aims to improve the lives and livelihoods of those impacted by the crisis
- **UN General Assembly Resolution:**
- The United Nations General Assembly passed a resolution recognizing the Aral Sea region as a “zone of ecological innovations and technologies.”
- The resolution calls on all member countries to support the region.
- It focuses on the role of science and technology in overcoming challenges

- It also encourages investment in innovative solutions grounded in local knowledge.
- **Comprehensive Program of Measures:**
- In 2018, the Presidents of Central Asian countries convened in Turkmenistan and established the **Comprehensive Program of Measures to Mitigate the Consequences of the Aral Disaster and the Development of the Aral Sea Region.**
- This program addresses water conservation, ecological protection, and coordinated efforts among Central Asian nations
- In October 2019, the United Nations team in Uzbekistan helped the government arrange a major conference.
- The International Fund for Saving the Aral Sea, created by neighboring countries, deals with economic, social, or humanitarian issues.
- The UN Trust Fund, with multiple partners, focuses on human security.

A Gigantic Ocean 700 km under the Earth Discovered by Scientists.

- A massive ocean hidden deep beneath the Earth's crust. This subterranean reservoir is located 700 kilometers below the surface of the Earth in a rock called **ringwoodite**.
- Ringwoodite:
- It is a fascinating mineral that exists in the Earth's **transition zone**.
- It has a unique crystal structure that allows it to absorb water and hydrogen, acting like a **sponge**. This mineral can **hold a significant amount** of water.
- It is a rare type of mineral that forms from **olivine** under very high pressures and temperatures.

- The weight of hundreds of kilometers of rock and very high temperatures above 1,000 degrees Celsius (1,832 Fahrenheit) break down water into its components.
- When the minerals containing this water reach certain depths, they break down in a process called **dehydration** and release the water to form magmas.
- Such "**dehydration melting**" is common in the **shallow mantle** and forms the source for magmas in many volcanoes.
- *Implications for Earth's water cycle:*
- The discovery of this deep water reservoir has significant implications for our understanding of the **Earth's water cycle**.
- It suggests that water can be transported to the Earth's surface from deep within its mantle, contributing to the water found in oceans, rivers, and lakes.
- This internal water source could also play a role in **volcanic activity and the formation of new crust**.

World Meteorological Organization's (WMO) report -"State of the Climate in Asia 2023".

- Asia is experiencing a warming trend that is almost **twice as fast as the global average** compared to the period from 1961 to 1990.
- State of the Climate in Asia
- **Published by:** World Meteorological Organization (WMO).
- **Objective:** To assess and present the current state of climate conditions and trends across Asia.
- **Scope:** It covers various aspects such as temperature patterns, precipitation levels, extreme weather events, and their impacts on ecosystems, agriculture, and human populations.

- **Data Sources:** The report relies on data collected from weather stations, satellite observations, climate models, and scientific research conducted by experts in the field.
- WMO Report:
- *Global Climate*
- **Sea Level:** In 2023, the global average sea level continued to rise at a sustained rate (3.43 ± 0.3 mm/year over the period from January 1993 to May 2023).
- However, the rise in sea level is not uniform in all regions.
- *Climate in Asia*
- **Most disaster-hit region:** Asia was the region most affected by weather, climate, and water-related disasters in 2023.
- **Heat wave intensification:** The impact of heat waves in Asia worsened in 2023.
- **Dominant disasters:** Floods and storms were the most common disasters, leading to the highest number of casualties and economic losses.
- **Disaster statistics:** 79 hydro-meteorological disasters struck Asia in 2023, with floods and storms making up over 80% of these events.
- These disasters resulted in more than 2,000 deaths and affected over 9 million people.
- **Climate change impact:** The report highlights that climate change is increasing the frequency and severity of extreme weather events.
- **Sea surface temperature rise:** In 2023, area average Sea-surface temperatures in the northwest Pacific Ocean reached record highs, with a **marine heat wave** even affecting the Arctic Ocean.
- The upper layer of the ocean (0 m–700 m) is heating up significantly faster in specific areas like the North-Western Arabian Sea, the Philippine Sea, and the seas east of Japan.

- In these regions, the warming is over three times faster than the global average.
- **Precipitation:** In 2023, many regions experienced below-average rainfall:
- **The Turan Lowland (Turkmenistan, Uzbekistan, Kazakhstan)**
- **The Hindu Kush (Afghanistan, Pakistan)**
- **The Himalayas**
- **Areas around the Ganges and lower course of the Brahmaputra Rivers (India and Bangladesh)**
- **The Arakan Mountains (Myanmar)**
- **The lower course of the Mekong River**
- **Drought in Southwest China:** In 2023, southwestern China experienced a drought, with lower-than-usual rainfall throughout the year.
- **Temperature anomaly:** The annual average near-surface temperature across Asia in 2023 was the second-highest ever recorded.
- It exceeded the 1991-2020 baseline by 0.91 degrees Celsius and the 1961-1990 baseline by **1.87 degrees Celsius**.
- Severe Heat Waves:
- **Japan's Record Summer Heat:**
- Japan and Kazakhstan both experienced their hottest years ever in 2023.
- The temperatures reached incredibly high levels all over the country.
- **China's High Temperature Events:**
- China witnessed 14 extreme heat events during the summer.
- Approximately 70% of the country's meteorological stations recorded temperatures exceeding 40°C.

- Sixteen stations broke their previous temperature records.
- Indian Climate:
- **Extreme event:** In India, floods were the main reason due to which many people died.
- In the North Indian Ocean basin, Extremely Severe Cyclonic Storm Mocha made landfall along the Rakhine Coast in Myanmar.
- It caused widespread destruction.
- **Severe Heat Waves:** Severe heat waves in April and June caused around 110 reported deaths in India due to heatstroke.
- **Widespread Heat in South-East Asia:** A big and long-lasting heat wave affected many areas of South-East Asia during April and May.
- It reached from Bangladesh and Eastern India to southern China, with extremely high temperatures.
- During this time, record-breaking heat was recorded.
- **Sea- level:** In 2023, the sea level rise in the Bay of Bengal was the second-highest in the area, exceeding the global average by 30 percent.
- **Precipitation:** Rains in the summer-monsoon were below average in India.

Antarctica's France-Sized Ice Shelf Makes Daily Jumps, Raising Icequake Concerns.

- Researchers have uncovered a surprising phenomenon in Antarctica: the massive **Ross Ice Shelf**, roughly the size of France, lurches forward several centimetres once or twice a day.
- Ross Ice Shelf:
- **Location:** It is the largest ice shelf of **Antarctica**.
- It is situated in the **Ross Sea**, extending off the continent's coast into the ocean.

- It is the **world's largest floating body of ice**, covering approximately 487,000 square kilometres, about the size of France.
- Only ten percent of the ice shelf is visible, with the majority hidden in several hundred metres of ice below the surface.
- **Thickness:** Its thickness varies significantly, ranging from about 100 meters to several hundred meters. The thickest parts are generally found where the shelf anchors against the continent.
- **Formation:**
- It is formed by the accumulation and compaction of snow, which, over time, turns into ice.
- It is being fed a constant flow of ice from glaciers draining from both the East and West Antarctic Ice Sheets.
- As new ice is added, existing ice is being removed through melting at the base and ice calving at the front.
- It plays an important role in stabilising the Antarctic ice sheet, buttressing the ice that is constantly moving over the land surface.



Ross Sea:

- It is a giant bay just **320 kms from the South Pole.**
- The sea is remote and positioned south and slightly east of New Zealand.
- It is the **largest polar marine ecosystem** in the world.
- The Ross Sea is relatively shallow, and it accounts for an area of approximately 960,000 square km (370,000 square miles).
- A large portion of the sea is covered by the Ross Ice Shelf.

- It is strongly influenced by the coastal **East-Wind Drift** that sets up a vast clockwise gyre accompanied by deep water upwelling.
- It is the **first protected area in Antarctica** and home to most of the world's penguins and many species of whale.
- Numerous scientific research stations are located along its coasts.

IMD Study warns of 'decreasing trend' in solar radiation for electricity in India

Solar photovoltaic (SPV) potential:

- SPV potential refers to the maximum amount of solar radiation that can be converted into electricity using **photovoltaic (PV)** technology in a particular area.
- It is measured as kilowatt-hours per installed kilowatt of capacity (kWh/kWp).
- It depends on factors like sunlight availability, weather, and geographical location.
- Assessing this potential helps determine the feasibility of installing solar panels for electricity generation.

Global solar radiation:

- Global solar radiation is the total amount of solar radiation that reaches the Earth's surface, made up of **direct and diffuse radiation**.
- It is important for the climate system because it affects air temperature, evaporation, biological growth, and how much solar energy is available.
- Global solar radiation exhibited a decreasing trend from 1981 to 2006, with **greater dimming** observed from 1971 to 2000 compared to 1981 to 2006.

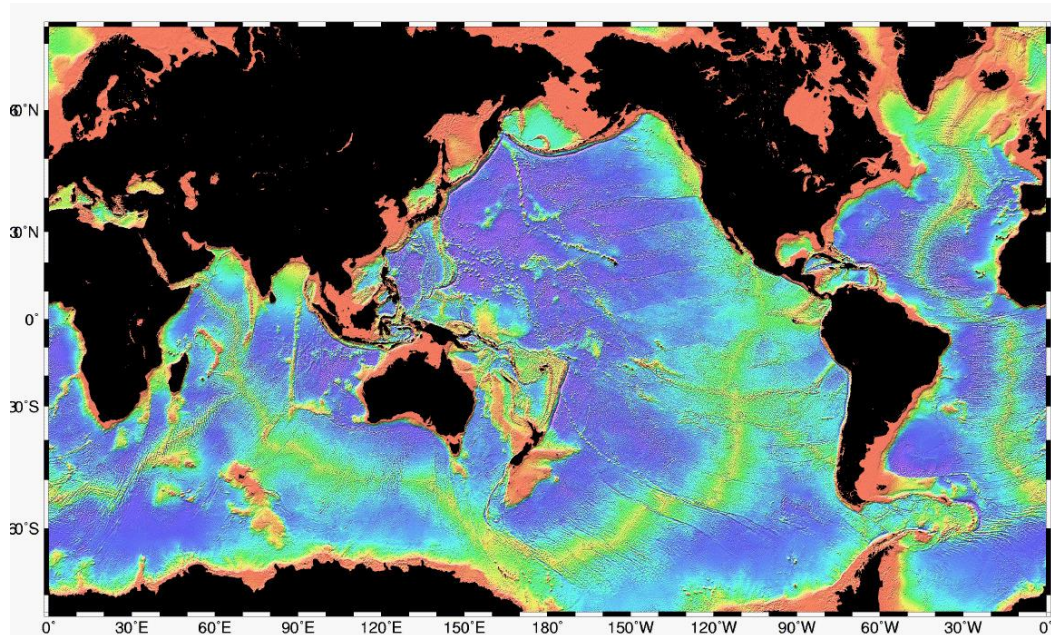
- However, a reversal in trends occurred after 2001, with unclear causes for this shift.
- Decreasing Solar Radiation Trends:
- **Study Findings:**
- Analysis by IMD scientists shows a decreasing trend in solar radiation suitable for conversion to electricity by solar panels.
- Analysis conducted at 45 IMD stations revealed declining trends in SPV potential.
- **Locations Affected:**
- SPV potential showed a general decline in all stations which included Ahmedabad, Chennai, Goa, Jodhpur, Kolkata, Mumbai, Nagpur, New Delhi, Pune, Shillong, Thiruvananthapuram, and Vishakhapatnam.
- India's largest solar parks, mainly in Gujarat and Rajasthan, are also experiencing a decrease in solar photovoltaic (SPV) potential.
- Factors Contributing to Decline:
- **Increased Aerosol Load:** Emissions from carbon, fossil fuel burning, and dust contribute to higher aerosol presence.
- **Impact of Aerosols and Clouds:** Aerosols absorb the sunlight and deflect it away from the ground and they can also aid the formation of dense clouds, that again block sunlight.
- Implications for Solar Energy:
- The efficiency of solar panels are significantly influenced by the amount of sunlight incident on them.
- India's Solar Power Capacity:
- As of now, India's installed solar capacity stands at approximately **81 GW**, about **17% of the total electricity capacity**.

- The country's solar energy potential, estimated by the **National Institute of Solar Energy, is 748 GW.**
- India ranks **5th globally in Solar Power Capacity.**
- India plans to obtain around **500 GW**, almost half of its electricity needs, **from non-fossil fuel sources by 2030.**
- This includes achieving **at least 280 GW from solar power** by that year, requiring an annual addition of **at least 40 GW of solar capacity until 2030.**
- Government Initiatives:
- **Rooftop Solar Initiative:** A major initiative to fund rooftop solar installations in at least one crore houses across the country, announced earlier this year.
- **National Solar Mission (NSM):** Launched in 2010, this initiative promotes solar energy use for grid-connected and off-grid applications through financial incentives, subsidies, and policy support.
- **Solar Park Scheme:** It aims to create 50 solar parks, each with a capacity of **500 MW** or more, totaling approximately 38 GW by 2025-26.
- These parks serve as key hubs for solar energy generation, attracting investments and facilitating solar power development.
- **The Production Linked Incentive (PLI) Scheme** for High-Efficiency Solar Photovoltaic Modules: It aims to incentivize the production of such modules as part of the national program.
- **PM Surya Ghar Muft Bijli Yojana:** Offers subsidies for rooftop solar panel installations.

INCOIS scientists map Indian Ocean floor to study currents

- Recently, a study titled "Impact of bathymetry on Indian Ocean circulation in a nested regional ocean model" was undertaken by scientists from the Indian National Centre for Ocean Information Services (INCOIS).

- **Bathymetry** involves mapping the depths of various water bodies, including rivers, seas, and oceans.



Findings in the Study:

- **East India Coastal Current (EICC):** At depths of 1,000 meters and 2,000 meters, the EICC flows in the **opposite** direction to surface currents. This finding contradicts previous models and highlights a more accurate representation of the EICC's behavior at depth.
- **Equatorial Under Current (EUC):** The EUC, influenced by the presence of the **Maldives Islands**, extends westward and displays significant seasonal variations. During the northeast monsoon, it's centered on the equator and can be found as deep as 150 meters.
- **Currents along Andaman and Nicobar Islands:** A significant boundary current was identified at a depth of 2,000 meters along the coast of these islands, indicating complex deep-sea dynamics not previously recognized.
- **Salinity and temperature:** The study confirmed that salinity and temperature measurements of the upper ocean are very close to observed values near the coast, validating the improvements in ocean modeling.

- The study's insights are crucial for improving weather and climate forecasts, which affect not only environmental understanding but also maritime and economic activities.

Deepest "blue hole" on Earth is discovered in Mexico.

- Scientists have yet to reach the bottom of the **Taam Ja" Blue Hole** in Mexico's **Chetumal Bay**, which new measurements hint could be connected to a labyrinth of submarine caves and tunnels.
- Blue Hole?
- Blue holes are water-filled vertical caverns, **or sinkholes**, found in coastal regions where the bedrock is made of soluble material, such as **limestone, marble, or gypsum**.
- They form when water on the surface percolates through the rock, dissolving minerals and widening cracks, which eventually causes the rock to collapse.
- Famous examples include **Dean's Blue Hole** in the **Bahamas**, the **Dahab Blue Hole** in **Egypt**, and **the Great Blue Hole in Belize**.
- Taam Ja" Blue Hole:
- It is the **deepest** known underwater sinkhole in the world.
- It sits in Chetumal Bay off the southeast coast of the **Yucatan Peninsula** in Mexico.
- It extends at least 1,380 feet (420 meters) below sea level.
- It is 390 feet (119 m) deeper than the previous record holder — the 990-foot-deep (301 m) **Sansha Yongle Blue Hole**, also known as the **Dragon Hole**, in the **South China Sea**.
- Spread over an area of 13,660 square meters, the giant, underwater cavern has been named Taam Ja' which means "**deep water**" in **Mayan**.

- The submerged blue hole has a nearly circular shape at its surface with steep sides that form a large conic structure covered by biofilms, sediments, limestone, and gypsum ledges.



Yucatan Peninsula:

- It is a northeastern projection of Central America, extending into the Atlantic Ocean.
- The Gulf of Mexico lies on its western and northern sides. The Caribbean Sea lies on its eastern side.
- The northern part of Yucatán is in Mexico. Belize and a part of Guatemala are in the south.
- The peninsula is almost wholly composed of beds of **coralline** and porous limestone rocks.

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SCIENCE AND TECHNOLOGY

Meet EVI, the world's first conversational AI with emotional intelligence from Hume

About Hume AI:

- It is the world's first **emotionally intelligent voice AI**. It accepts **live audio input** and returns both generated audio and transcripts augmented with measures of vocal expression.
- It is essentially an API that is powered by its proprietary **empathic large language model** (eLLM). This eLLM reportedly understands and emulates tones of voices and word emphasis to optimise human-AI conversations.
- It is trained on human reactions to optimize for positive expressions like happiness and satisfaction. EVI will continue to learn from users' reactions.
- By processing the **tune, rhythm and timbre of speech**, EVI unlocks a variety of new capabilities, like knowing when to speak and generating more empathic language with the right tone of voice.
- **What is large language model?**
- It is a type of **artificial intelligence** (AI) program that can recognize and generate text, among other tasks.
- They are trained on huge sets of data—hence the name "large". They are built on machine learning: specifically, a type of neural network called a transformer model.
- In simpler terms, an LLM is a computer program that has been fed enough examples to be able to recognize and interpret human language or other types of complex data.

A new strategy for fabricating high-density vertical organic electrochemical transistor arrays

About Organic Electrochemical Transistor:

- It is an emerging class of transistor based on **organic superconducting materials** known for their ability to modulate electrical current in response to small changes in the voltage applied to their gate electrode.
- It is a device capable of **simultaneously** controlling the flow of **electronic and ionic currents**.
- **Advantages:** They have various notable advantages, including promising amplification and sensing capabilities, **low power consumption, low driving voltages** and a versatile structure.
- **Applications:** They can be used to create **biosensors, wearable devices and neuromorphic systems**.
- **What is transistor?**
- It is a **semiconductor device** for amplifying, controlling and generating electrical signals. It is the active components of integrated circuits or “microchips,” which often contain billions of these minuscule devices etched into their shiny surfaces.
- There are three terminals for transistor as mentioned below:
 - **Base:** To activate the transistor
 - **Collector:** It is a positive lead of transistor
 - **Emitter:** It is a negative lead of transistor
- **Types of Transistors:**
- **Bipolar Junction Transistor:** It is considered one of the most common types of transistors and it can be either NPN or PNP. It can able to amplify the electrical signal by joining all three layers into one. In current flow, there are two types of electrical charges involved i.e., electrons and holes.

- **Field effect transistor:** It is a three-terminal semiconductor device. Its operation is based on a controlled input voltage. It uses an electric field to control the field of electric current in a semiconductor. They are also known as **unipolar transistors** since they contain single-carrier-type operations.

Study finds one way statins can cause diabetes, and a solution

About Statins:

- Statins are prescription **medications** that people take **to bring their cholesterol down** to normal levels. It works by blocking the action of the liver enzyme that is responsible for producing cholesterol.
- **Too much cholesterol** in the blood can cause a **buildup of plaque on the walls of the arteries**. That buildup can eventually cause the arteries to narrow or harden. Sudden blood clots in these narrowed arteries can cause a heart attack or stroke.
- **Some statins** can **decrease your LDL**(low-density lipoprotein, or “bad”) **cholesterol by 50%** or more. Providers often call LDL “bad” because it builds up inside your arteries, making it harder for blood to move through them.
- These medicines also have been linked to a **lower risk of heart disease** and stroke. Statins may also help reduce the risk of certain blood clots.
- Statins can sometimes **interact with other medicines**, increasing the risk of serious side effects, such as muscle damage.

Punnett square: A genetics puzzle

About Punnett square:

- It is named after **British geneticist Reginald Punnett**.
- **How does it work?**

- Along the top and side of the grid, the possible genetic traits of one parent on one side and the other parent on the other side is listed.
- Then, you fill in the squares by combining the traits from each parent. Each square effectively represents a possible combination of traits that their offspring could inherit.
- It's a simple way to visualise the probabilities of different traits showing up in the offspring.
- **Applications:**
 - They are commonly **used in biology** to understand **inheritance patterns**, like when you learn about dominant and recessive genes in school.
 - It is a useful tool that helps predict the **variations and probabilities** resulting from **cross-breeding**.
 - It can also be used to understand the **genetic traits** in the offspring of animals, including humans.
 - Researchers typically use them together with Mendelian inheritance.

Bengaluru's C-CAMP develops platform for studying single cells cost-effectively

About OptiDrop Platform:

- It is an innovative **microfluidic chip-based** platform that simplifies and reduces the cost of studying single cells. It employs a novel approach that enables precise and cost-effective analysis of single cells encapsulated in droplets.
- The platform's unique features include **live data visualisation**, a smaller data footprint, and a 'closed' system design that **prevents external contamination**.
- This research was supported by the **Biotechnology Industry Research Council (BIRAC)**, the Department of Science and Technology (DST) and the Ministry of Human Resource Development (MHRD).

- **Applications:**

- This cutting-edge technology has potential applications in **diagnostics, therapeutics, agriculture and animal health.**
- It helps in studying the impact on individual cells during a drug screen, environment control (water contamination counter), detection and sorting of CAR-T cells in immuno-oncotherapeutics, **selection of CRISPR-modified single cells** and selection of high-efficiency clones in single-cell genomics

- **What is C-CAMP?**

- It is an initiative supported by the **Department of Biotechnology** and has been a catalyst of cutting-edge **research and innovation** in the **life sciences** since 2009.
- It is mandated to **promote entrepreneurship and innovation.** It has created and fostered an entrepreneur-friendly culture in and around the Academic/Research environment through its involvement in Seed Funding Schemes for Startups.

Evolution in action? New study finds possibility of nitrogen-fixing organelles

About Nitrogen-fixing bacteria:

- These are **prokaryotic microorganisms** that are capable of transforming **nitrogen gas** from the atmosphere into **“fixed nitrogen” compounds**, such as ammonia, that are usable by plants.
- **Types:** There are two main types of nitrogen-fixing bacteria.
 - **Symbiotic or mutualistic:** These species live in **root nodules** of certain plants. Plants of the pea family, known as legumes which are some of the most important hosts for nitrogen-fixing bacteria. **Examples:** Rhizobium, which is associated with plants in the pea family and various Azospirillum species, which are associated with cereal grasses.
 - Other nitrogen-fixing bacteria **are free-living** and do not require a host. They are commonly found in **soil or in aquatic**

environments. Examples: Cyanobacteria Anabaena and Nostoc and genera such as Azotobacter, Beijerinckia and Clostridium.

- **Significance:**

- Nitrogen is a component of proteins and nucleic acids and is essential to life on Earth. Although nitrogen is abundant in the atmosphere, most organisms cannot use it in that form.
- **Nitrogen-fixing bacteria** accomplish more than 90 percent of all nitrogen fixation and thus play an **important role in the nitrogen cycle.**

"Monumental Step": Scientists Create Biodegradable Microplastics

About Microplastics:

- Microplastics are **tiny plastic particles** that result from both commercial product development and the breakdown of larger plastics. Officially, they are defined as **plastics less than five millimeters** (0.2 inches) in diameter.
 - The name is used to differentiate them from “macroplastics”, such as bottles and bags made of plastic.
- They are **present in a variety of products**, from cosmetics to synthetic clothing to plastic bags and bottles. Many of these products readily enter the environment as waste.
- They **consist of carbon and hydrogen atoms** bound together **in polymer chains. Other chemicals**, such as phthalates, polybrominated diphenyl ethers (PBDEs), and tetrabromobisphenol A (TBBPA), are typically also present in microplastics.
- There are two categories of microplastics: primary and secondary.

- **Primary microplastics** are tiny particles designed for commercial use, such as cosmetics, as well as microfibers shed from clothing and other textiles, such as fishing nets.
- **Secondary microplastics** are particles that result from the breakdown of larger plastic items, such as water bottles. This breakdown is caused by exposure to environmental factors, mainly the sun's radiation and ocean waves.
- **Environmental Impacts:**
 - The problem with microplastics is that, like plastic items of any size, they do **not readily break down** into harmless molecules.
 - Thus, **once in the environment**, primary and secondary microplastics **accumulate and persist**.
 - Microplastics **in the ocean can bind with other harmful chemicals** before being ingested by marine organisms. Standard water treatment facilities cannot remove all traces of microplastics.
 - Microplastics are also a **source of air pollution**, occurring in dust and airborne fibrous particles.
- **What are Polymers?**
- Polymers are **materials made of long, repeating chains of molecules**. The materials have unique properties, depending on the type of molecules being bonded and how they are bonded.
- **Some polymers bend and stretch**, like rubber and polyester. **Others are hard and tough**, like epoxies and glass.
- The term polymer is often used to describe plastics, which are **synthetic polymers**. However, **natural polymers** also exist; rubber and wood, for example, are natural polymers that consist of a simple hydrocarbon, isoprene.

More than deepfakes, shallow fakes should worry everyone

About Shallowfakes:

- Like deepfake, shallowfake is also an act of **morphing people's pictures** and using them for malicious activities. But unlike deepfake, which is created by using advanced artificial intelligence (AI) software, shallowfake can be **created by simply** using **basic editing software**.
- They are **made with existing technologies**—for example, a conventional edit on a photo, slowing-down a video to change the speech patterns of an individual or more often, relying on mis-captioning or mis-contextualising an existing image or video, claiming it is from a time or place which it is not from.
- And precisely because of this easier way to create them, many experts consider shallowfakes to be **bigger threats than deepfakes**.
- **Why are they called shallow?** The term 'shallow' implies the quality of such fakes, which are lower in quality compared to deepfakes.
- They are **used to create a false proof of identity** or address, including photo ID documents like passports, driving licences etc.
- It is also used to **create fake supporting evidence** to support a claim or transaction, like contracts, agreements and invoices for services, no claims discount certificates, etc.
- **What are Deepfakes?**
- Deepfakes are a **compilation of artificial images and audio** put together **with machine-learning algorithms** to spread misinformation and replace a real person's appearance, voice, or both with similar artificial likenesses or voices. The term "deepfake" combines the deep learning concept with something fake.
- It can **create people who do not exist** and it can fake real people saying and doing things they did not say or do.
- **Working:**
 - They are created by **machine learning models**, which use neural networks to manipulate images and videos.
 - To make a deepfake video of someone, a creator would first train a neural network on many hours of real video footage of the person to give it a

realistic "understanding" of what he or she looks like from many angles and under different lighting.

- Then they'd combine the trained network with computer-graphics techniques to superimpose a copy of the person onto a different actor.
- Deep fakes differ from other forms of false information by being **very difficult to identify as false**.

NASA Will Create a New Time Zone for the Moon, Called Coordinated Lunar Time

Coordinated Lunar Time (LTC):

- The purpose of LTC is to establish a uniform time reference for all lunar activities. This consistency is crucial for planning and executing missions on the moon.
- LTC is necessary due to the moon's **weaker gravitational pull**, which results in time moving slightly faster on the moon than on Earth. To put it in perspective, this difference amounts to **58.7 microseconds each day**.
- Moreover, LTC will assist in managing the lunar day, which lasts **29.5 Earth days**. This extended duration influences the length of day and night on the moon, impacting operations and activities.
 - Time Dilation:
- Time dilation is a concept that explains why time moves at different speeds in various gravitational fields or states of motion.
- On the moon, time progresses faster than on Earth.
- This phenomenon is in line with **Einstein's theories of relativity**, which relate time speed to gravitational strength.

- **Coordinated Lunar time** will serve as a **timekeeping baseline for lunar missions**, compensating for the **differences in gravity forces and other factors that influence time perception on the moon**.
- **Aim of the Programme:** To **improve precision in lunar missions, ease data exchanges between spacecraft, and coordinate operations as commercial activities** extend on the moon.
- **ISS Timekeeping:** Due to agreements with many governments, the **International Space Station (ISS)** works on **Coordinated Universal Time (UTC), which accounts for the station's orbit and gravity variances**.
- **Technical obstacles:** The lunar environment has unique obstacles for timekeeping, such as gravity forces and the duration of a lunar day, **forcing the development of "Coordinated Lunar Time" or "Lunar Standard Time."**
- Timekeeping on the Moon
- **Moon's Timing:** The Moon has its day-night cycle, which lasts **approximately 29.5 Earth days**.
- **Need for Timekeeping System for Humans:** If humans were to reside on the Moon, they would **have to create their timekeeping system**.
- **Measurement of Moon's time:** Currently, time on the Moon is measured in **Universal Time Coordinated (UTC), the same timekeeping system used on Earth**.
- **Difficulty with UTC:** However, because the Moon's day is significantly longer than Earth's, it would be **challenging to use UTC for day-to-day activity there**.
 - Universal Time Coordinated (UTC):
- **About:** Universal Time Coordinated (UTC) is a time standard that ensures **time consistency worldwide**.
- **Based Upon:** UTC is based on **International Atomic Time (TAI)**, synchronized by **atomic clocks worldwide**.

- **Primary Time Standard:** Numerous countries, international organizations, and scientific research institutions use this standard as their primary time.
- **Time offset:** UTC is a **24-hour clock** that represents the **time offset from Coordinated Universal Time (UTC+0)**.
- **Time zones:** Time zones are specified as an offset from UTC, with some ahead of UTC (**UTC+1, UTC+2, etc.**) and others behind UTC (**UTC-1, UTC-2, etc.**).
- **Periodic Adjustments:** UTC is modified regularly to **account for fluctuations in the Earth's rotation**, which can result in **variations in day length**.
- **Sync with Earth's Rotation:** These modifications are achieved by adding leap seconds to UTC, which helps to keep the **time standard in sync with the Earth's rotation**.
 - Need for the Moon Time Zone:
- **Improved communication:** A series of space operations around the moon will require spacecraft and controllers to communicate and determine **their whereabouts independently of Earth**.
- **Universal Time Zone:** The primary goal of developing a global timekeeping system for the moon is to **improve communication among the various governments and institutions, both governmental and private, that coordinate travels to and around it**.
- **Successful ISA operational model:** The International Space Station (ISA) has no time zone. Instead, it uses **Coordinated Universal Time, or UTC, based on atomic clocks**.
- This helps to reduce the time gap between **NASA, the Canadian Space Agency, and other space partners in Russia, Japan, and Europe**.
- **No fixed time zone:** Lunar missions have operated according to the time of the country that launched them. However, with many lunar excursions slated for launch, **the European Space Agency has declared the existing method unsustainable**.

○ Challenges in Establishing UTC on the Moon:

- **Difficulty in Syncing Time with Earth:** Atomic clocks perfectly measure time on Earth. However, synchronizing time on the moon is difficult because **clocks run faster, gaining approximately 58.7 microseconds (millionths of a second) daily.**
- **Rugged Terrain:** It would also be challenging to establish a uniform time zone for the entire Moon, considering the **vast differences in terrain and lighting conditions across its surface.**
- **Irregular and Uneven Movement of the Moon:** Any lunar timekeeping system must be able to account for the **Moon's uneven rotation and movement.**

Conclusion:

- Developing a Unified Time Standard for the Moon will require international collaboration.
- TI -Artemis Accords, an agreement signed by multiple nations, **provides a peaceful and cooperative space exploration framework.** NASA will work with international partners to define and implement **LTC, harmonizing lunar activities globally.**
- The gravitational force on the moon impacts the **accuracy of atomic clocks,** leading to a time discrepancy.
- Over 50 years, this discrepancy would result in a **one-second difference** between Earth and the moon.

A Century of discovering the electroencephalogram (EEG)

Electroencephalogram (EEG):

- An EEG is a **recording of brain activity.**
- It is a test that detects abnormalities in your brain waves, or in the electrical activity of your brain.

- Procedure:
- The procedure may be short, often just a 30-minute recording.
- During the procedure, electrodes consisting of small metal discs with thin wires are pasted onto your scalp.
- The electrodes detect tiny electrical charges that result from the activity of your brain cells.
- The charges are amplified and appear as a graph on a computer screen or as a recording that may be printed out on paper.
- The EEG procedure is usually carried out by a highly trained specialist, called a clinical neurophysiologist.
- Applications:
- The EEG is used to evaluate several types of brain disorders. Examples:
- When **epilepsy** is present, seizure activity will appear **as rapid spiking waves** on the EEG.
- People with lesions of their brain, which can result from tumors or strokes, may have unusually slow EEG waves, depending on the size and location of the lesion.
- The EEG may also be used to determine the overall electrical activity of the brain (for example, to evaluate trauma, drug intoxication, or extent of brain damage in comatose patients).
- The EEG may also be used **to monitor blood flow in the brain** during surgical procedures.

The launch of AgniKul 'Agnibaan SOrTeD' has been postponed again.

Agnibaan SOrTeD:

- Agnibaan SubOrbital Technological Demonstrator (SOrTeD) is a **single-stage launch vehicle** powered by AgniKul's patented **Agnilet** engine.
- It is an **entirely 3D-printed**, single-piece, 6 kilonewton (kN) **semi-cryogenic** engine.
- It is the **world's first single piece 3D printed semi-cryogenic rocket engine**.
- It will be launched from India's first private launchpad, ALP-01, located inside the Indian space agency ISRO's Sriharikota spaceport.

- Features:
- It is India's first ever vehicle equipped with a semicryogenic engine, the Agnilet, a **subcooled liquid oxygen**-based propulsion system developed indigenously.
- The rocket engine will burn kerosene in liquid oxygen and can be directly used in the rocket.
- It stands 18 meters tall and is 1.3 meters in diameter.
- It has the capability to carry a **100-kg payload** up to a height of 700 km with a lift of mass of 14,000 Kgs.
- It can access both low- and high-inclination orbits and is completely mobile.
- It will also have the first ever Ethernet-based avionics architecture and fully in-house developed autopilot software from India.
- The rocket is also designed for launch from more than 10 different launch ports.
- To ensure its compatibility with multiple launch ports, AgniKul has built a launch pedestal named "**Dhanush**" that will support the rocket's mobility across all its configurations.
- Facts:

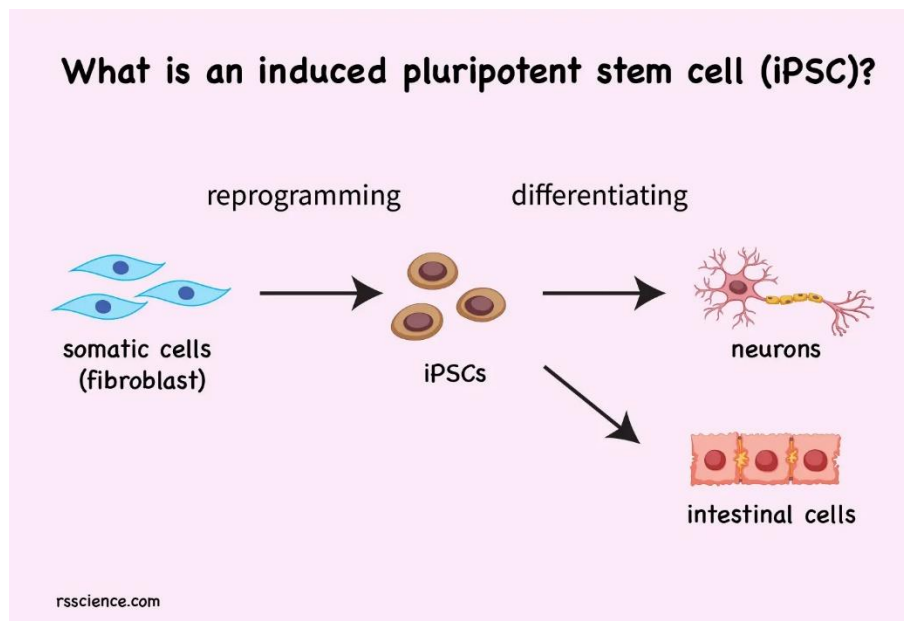
- AgniKul Cosmos is an IIT Madras incubated space start up based in Chennai.
- It was established in 2017.
- It became the first company in the country to sign an agreement with ISRO under the **IN-SPACE initiative** to have access to the space agency's expertise and its facilities to build Agnibaan in December 2020.
- In 2022, Agnikul inaugurated India's first private launchpad and mission control centre at Satish Dhawan Space Centre.
- *Indian National Space Promotion and Authorisation Centre (IN-SPACE):*
- It is a single-window, independent, nodal agency that functions as an autonomous agency in the **Department of Space (DOS)**. It is formed following the Space sector reforms to enable and facilitate the participation of **private players**. The agency acts as an interface between ISRO and Non-Governmental Entities (NGEs) and assesses how to utilize India's space resources better and increase space-based activities.

Lab-grown 'minibrains' help reveal why traumatic brain injury raises dementia risk.

Lab-grown Minibrains:

- These are scientifically known as brain organoids, but often called "minibrains" and serve as miniature, simplified models of full-size human brains.
- How are minibrains made?
- Scientists typically grow brain organoids from stem cells, a type of immature cell that can give rise to any cell type, whether blood, skin, bowel or brain.
- The stem cells used to grow organoids can either come from adult human cells, or more rarely, human embryonic tissue.

- Scientists collect adult cells and then expose them to chemicals in order to revert them into a **stem cell-like state**. The resulting stem cells are called "**induced pluripotent stem cells**" (**iPSC**), which can be made to grow into any kind of tissue.
- To give rise to a minibrain, scientists embed these stem cells in a protein-rich matrix, a substance that supports the cells as they divide and form a 3D shape. Alternatively, the cells may be grown atop a physical, 3D scaffold.
- Application: These organoids can potentially be useful in basic research, drug development and even computer science.



Forever Chemicals in Band-Aids

Forever Chemicals: Per- and Poly-Fluoroalkyl substances PFAS

- These are a **class of synthetic man-made chemicals** also called “forever chemicals” because the bonds in their chemical compounds are so strong they don’t degrade down for hundreds to thousands of years.

- PFAS molecules have a **chain of linked carbon and fluorine atoms**. **Example: Perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA)** are classified as persistent organic pollutants (POPs).
- PFAS are a **group of nearly 15,000 synthetic chemicals**, according to a chemicals database (CompTox) maintained by the U.S. Environmental Protection Agency.
- They are a **group of chemicals used to make fluoropolymer coatings and products that resist heat, oil, stains, grease, and water**.
- **Found in:** Fluoropolymer coatings can be in a variety of products and industries including,
- **Other Industries: Clothing** (active and sports wear), **intimate hygiene products** (tampons, diapers, condoms, sanitary pads), papermaking, printing inks, sealants. Recent studies have found PFAS in **personal hygiene and care products** such as cosmetics, dental floss, toilet paper and make up.
- **Health risk:** They pose a negative health effect such as decreased immune system performance and vaccine response, infant and child learning and developmental issues, certain cancers, decreased fertility, endocrine disruption etc.
 - PFOS, PFOA and PFHxS are **transferred to foetus through cord blood and to infant through breast milk**
- Concerns
- **Widespread occurrence:** PFAS contaminated water or food is the most likely source of exposure, by using products made with PFAS, or breathing air containing PFAS.
 - Studies find PFAS in the blood and urine of people with 97% of Americans having traces of PFAS in their blood.
- **Persistent:** They remain in the environment for an unknown amount of time as they do not break down in the environment easily.

- **Bioaccumulation:** Over time, people may take in more of the chemicals than they excrete, a process that leads to bioaccumulation in bodies. Also it can move through soils and build up (bioaccumulate) in fish and wildlife.
- **Contaminate drinking water sources:** A study by the Environmental Protection Agency found that about 31 percent of groundwater samples tested around the world had PFAS levels considered harmful to human health.
- **Expensive detection:** Insitu methods of detection of PFAS are still in the early stages of development. Current chemical and biological remediation technologies are expensive/not effective.
- What can be done to Remove these Chemicals?
- **Filtering PFAS using activated Carbon:** This technique is expensive and only filters out the contaminated water but the real challenge is the disposal of PFAS-loaded activated carbons.
- **Incineration:** Most PFAS will break down completely **at incineration temperatures around 1,500 degrees Celsius** (2,730 degrees Fahrenheit), but it's energy intensive and suitable incinerators are scarce.
- **Upcoming developments:**
 - **Development of a supercritical water oxidation** to destroy PFAS: High temperatures and pressures **change the state of water**, accelerating chemistry in a way that can destroy hazardous substances.
 - **Plasma reactors:** It uses **water, electricity and argon gas** to break down PFAS. They're fast, but also not easy to scale up.
- **Inhibitors:** Scientists at the Michigan State University are working on materials which, **added to soil would prevent plants from taking up PFAS**, but it would leave PFAS in the soil.
- **Using sodium hydroxide** A paper published in the journal Science, shows how one class of **PFAS can be broken down into mostly harmless components using sodium hydroxide, or lye, an inexpensive compound used in soap.**
- PFASs and the Stockholm Convention for Persistent Organic Pollutants

- **PFHxS, PFOA and PFOS** are the three subgroups of PFASs currently listed under the Stockholm Convention as industrial POPs.
- **Perfluorooctanoic acid (PFOA):** It is **listed in Annex A (elimination) since 2019.**
- They are used widely to **produce non-stick kitchen ware, and food processing equipment. Also it is a by product of inadequate incineration of municipal solid waste** within inappropriate or open burning facilities.
- **Perfluorooctane sulfonic acid (PFOS):** It is **listed in Annex B (restriction)** since 2009
- Its acceptable uses include as an **active ingredient in insect bait to control leaf-cutting ants**, in closed-loops systems in metal plating and as fire-fighting foam and textiles.
- **Perfluorohexane sulfonic acid (PFHxS):** Widely used in fire-fighting foam, carpets, and non-stick cookware, it is listed in 2022
- **Candidate POP for Inclusion: Perfluorocarboxylic acids (PFCAs)** used in coating products, fabric/carpet protectors, textile impregnation agents and firefighting foams is a candidate POPs **proposed for listing under the Stockholm Convention.**

The World Health Organisation published the 2024 Global Hepatitis Report

Hepatitis

- Hepatitis refers to an **inflammatory condition of the liver.**
- It is commonly the result of a **viral infection**, but there are other possible causes of hepatitis.
 - These include autoimmune hepatitis and hepatitis that occurs as a secondary result of medications, drugs, toxins, and alcohol.
 - Autoimmune hepatitis is a disease that occurs when your body makes antibodies against your liver tissue.

- The liver is a vital organ that processes nutrients, filters the blood, and fights infections.
- When the liver is inflamed or damaged, its function can be affected.
- The five main viral classifications of hepatitis are hepatitis A, B, C, D, and E. A different virus is responsible for each type of viral hepatitis.

Classification of Hepatitis Virus

Hepatitis A:

- Hepatitis A is the result of an infection with the hepatitis A virus (HAV). This type of hepatitis is an acute, **short-term disease**.
- **Treatment:** Since it is a short-term illness, it may not require treatment.

Hepatitis B:

- The hepatitis B virus (HBV) causes hepatitis B. This is often an **ongoing, chronic condition**.
- **Treatment:** There is no specific treatment program for acute hepatitis B.

Hepatitis C:

- Hepatitis C comes from the hepatitis C virus (HCV).
- HCV is among the most common bloodborne viral infections and typically presents as a **long-term condition**.
- **Treatment:** Antiviral medications can treat both acute / chronic forms of hepatitis C.

Hepatitis D:

- This is a **rare form of hepatitis** that only occurs in conjunction with hepatitis B infection.
- The hepatitis D virus (HDV) causes liver inflammation like other strains, but **a person cannot contract HDV without an existing hepatitis B infection**.

- **Treatment:** The WHO lists pegylated interferon alpha as a treatment for hepatitis D.
- However, this medication can have severe side effects.
- As a result, it's not recommended for people with cirrhosis liver damage.

Hepatitis E:

- Hepatitis E is a waterborne disease that results from exposure to the hepatitis E virus (HEV).
- Hepatitis E is **mainly found in areas with poor sanitation** and typically results from ingesting fecal matter that contaminates the water supply.
- **Treatment:** Currently, no specific medical therapies are available to treat hepatitis E.
- Because the infection is often acute, it typically resolves on its own.
- Causes of Hepatitis
- **Causes of non-infectious Hepatitis:**
- Although hepatitis is most commonly the result of an infection, other factors can cause the condition.
- **Alcohol and other toxins:**
 - Excess alcohol consumption can cause liver damage and inflammation. This may also be referred to as alcoholic hepatitis.
 - The alcohol directly injures the cells of your liver. Over time, it can cause permanent damage and lead to thickening or scarring of liver tissue (cirrhosis) and liver failure.
 - Other toxic causes of hepatitis include misuse of medications and exposure to toxins.
- **Autoimmune System Response:**

- In some cases, the immune system mistakes the liver as harmful and attacks it.
- This causes ongoing inflammation that can range from mild to severe, often hindering liver function.
- It's three times more common in women than in men.
- Common Symptoms of Infectious Hepatitis
- Fatigue, flu-like symptoms, dark urine, pale stool, abdominal pain, loss of appetite, unexplained weight loss, yellow skin and eyes, which may be signs of jaundice.
- Prevention of Hepatitis
- There are **vaccines** that can help protect against many hepatitis viruses.
 - There are vaccines for prevention against Hepatitis A, B and D.
 - However, it is important to note that **currently there is no vaccine for Hepatitis C or E.**
- Minimizing the risk of exposure to substances containing these viruses can also be an important preventive measure.

Higgs Boson : God's Particle

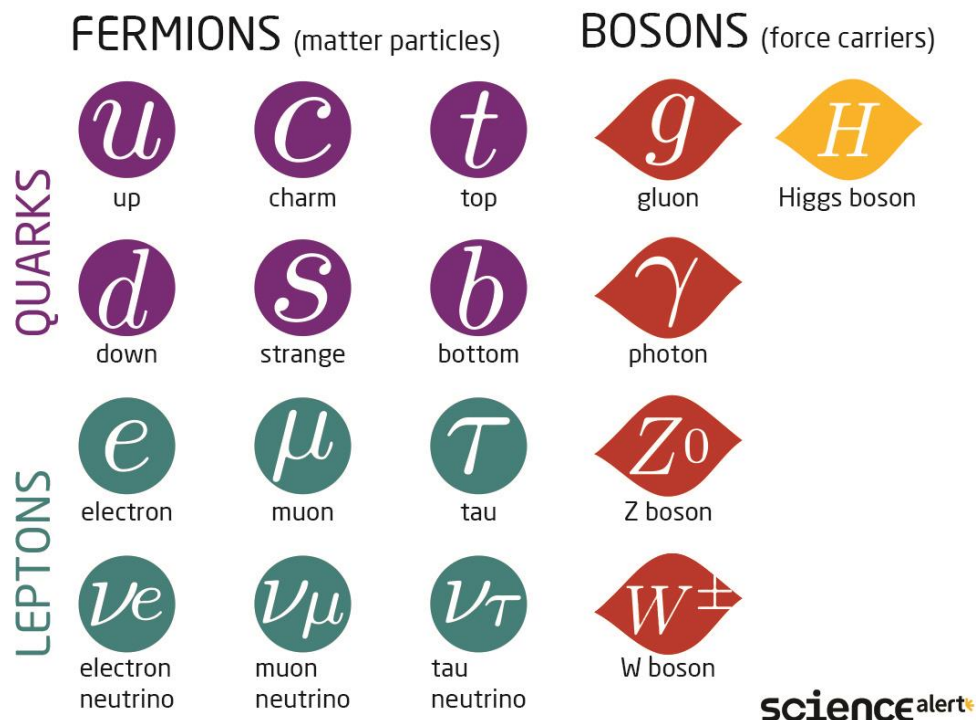
Higgs bosons:

- The Higgs boson, **a type of boson**, is a **force-carrying subatomic particle**.
- It **carries the force** that **a particle experiences** when **traversing the Higgs field**(a universal energy field),which is responsible **for granting fundamental particles their mass**.
- A **particle's mass** is **directly correlated** with its **interaction strength with the Higgs boson**.

- Therefore, Electrons possess a specific mass, while protons have more, and neutrons slightly surpass protons.
- A Higgs boson **can also interact with another Higgs boson** — this is how we know that **its mass is greater than that of protons or neutrons**.
- Features:
- The Higgs Boson has a **mass of 125 billion electron volts**, approximately **130 times more massive than protons**.
- It is also **chargeless with zero spin**, a quantum mechanical equivalent to angular momentum.
- It is **only elementary particles with no spin**.
- **Significance of Higgs Boson Study** : Researchers aspire to employ the Higgs Boson as a mechanism for learning deeper into the mysteries of the cosmos, including the enigma of dark matter.
- What is a Boson?
- A boson is a **“force carrier” particle** that comes into play when particles interact with each other, with a boson exchanged during this interaction.
- For example, when two electrons interact they exchange a photon —the force-carrying particle of electromagnetic fields.
- The Standard Model of Particle:
- The **Standard Model of Particle Physics** is scientists’ current best theory to describe the most basic building blocks of the universe.
- It explains how particles called **quarks** (which make up protons and neutrons) and **leptons** (which include electrons) make up all known matter.
- It also explains how force carrying particles, which belong to a broader group of **bosons**, influence the quarks and leptons.
- The Standard Model explains **three of the four fundamental forces** that govern the universe: **electromagnetism, the strong force, and the weak force**.

- **Electromagnetism** is carried by photons and involves the interaction of **electric fields and magnetic fields**.
- The strong force, which is carried by **gluons**, binds together atomic nuclei to make them stable.
- The **weak force**, carried by **W and Z bosons**, causes nuclear reactions that have powered our Sun and other stars for billions of years.
- The fourth fundamental force is **gravity**, which is **not adequately explained** by the Standard Model.

The Standard Model of Particle Physics



Experiments in Large Hadron Collider (LHC):

- **LHC** generated a Higgs boson by colliding together billions of high-energy protons which resulted in a release of immense energy that forms various particles.
- Being heavy, the **Higgs boson is unstable** and breaks down into lighter particles.

- It can decay into a **lepton pair and a photon in three** different ways.
- Recent evidence indicates Higgs Boson **Decay** : It says that a Higgs boson will decay to a **Z boson and a photon 0.1%** of the time.
- This means the Large Hadron Collider (LHC) needed to have created at least 1,000 Higgs bosons to have been able to spot one of them decaying to a Z boson and a photon.
- **CERN (European Council for Nuclear Research):**
- **Aim:** To study the basic **constituents of matter** ie. fundamental particles and to advance the boundaries of human knowledge by delving into the smallest building blocks of our universe.
- **Founded in** : 1954.
- **Location** : at Franco-Swiss border near **Geneva, Switzerland.**
- **Member states:** **23 members** with **India being the associate member.**

Dark Energy Spectroscopic Instrument (DESI)

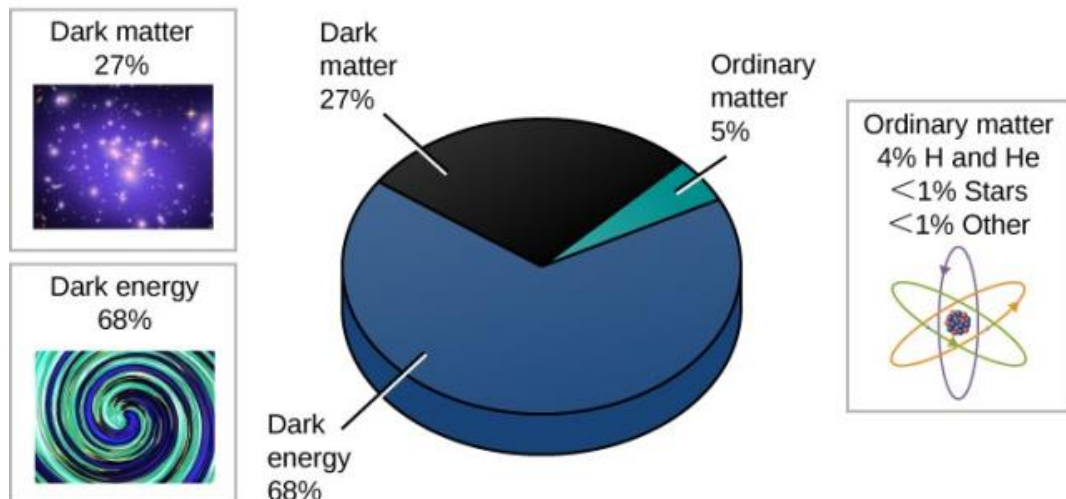
About Dark Energy Spectroscopic Instrument (DESI)

- DESI is a unique piece of equipment that, once **fitted over a telescope**, can **capture light from 5,000 galaxies at the same time.** It is **mounted over the Mayall 4-Meter Telescope in Arizona, United States.**
- **Scheduled Operation:** It is scheduled to run for **five years.** On **March 31, DESI completed three years of operations.**
- **Joint Collaboration:** DESI is a **collaboration of more than 900 researchers** in institutions across the world. From **India, TIFR is the only participating institution.**
- **Preparation of Detailed Map of Universe:** Using DESI, researchers have been able to **measure light from six million galaxies** to prepare the **most detailed map of the universe yet** with very precise information about the distances between these galaxies.

- The distances between these galaxies have been measured with a very high degree of accuracy. Thus, it is called a **three-dimensional map**.
- Knowing the precise distances of the galaxies is crucial because that allows us to **calculate the expansion rate of the universe**.
- First year observations of DESI:
- **Mapping of the Distribution and Movement of these Galaxies:** The precise distances calculated have resulted in the mapping of the distribution and movement of these galaxies over time.
- This has been done by comparing the data with similar data for some of the galaxies obtained through other experiments.
- **Measurement of the Expansion Rate of the Universe:** The DESI collaboration has measured that the expansion rate of the universe was increasing by 68.5 km per second after every 3.26 million light years of distance, defined as **megaparsec**.
- Through these precise measurements, the scientists have found that some of the calculated values are not consistent with current well-established theoretical models, which otherwise describe the universe very well.
- **Change in Energy Density:** The results from DESI suggest that there are changes in energy density in contrast to the theoretical models.
- The theoretical models suggest that the energy density of dark energy, or the amount of dark energy contained in any volume of space, remains constant even under expansion.
- In these theoretical models, a change in energy density would make the universe unstable.
- **Significance:** Scientists expect that this could reveal some clues about dark energy.
- Hypothesis of Dark Energy:

- Dark energy is the mysterious force that is believed to be **causing the universe to expand uncontrollably**.
- **Expanding Universe:** The hypothesis comes mainly from the observed phenomenon of the **universe expanding at a rapid rate**.
- The vast **empty spaces between stars and galaxies** have been measured to be **expanding at an accelerating pace**, despite the **countervailing force of gravitation** that has the effect of pulling things together.
- Scientists have been unable to find any explanation for this rapid expansion, and have been forced to hypothesize that **there must be some "dark" energy causing this expansion**.
- **Significance:** Understanding the nature of dark energy can offer key **insights into the origin and evolution of the universe**, as well as its eventual fate.
- It can **reveal new fundamental forces at work**, and could **unravel our entire knowledge of the physical world**.

Composition of the Universe



Dark energy Vs Dark matter

- **Composition of the Universe:** Dark energy accounts for roughly **68 percent of the universe's total mass and energy**. Dark matter makes up 27 percent.

- The rest i.e., around **5 percent is all the regular matter** we see and interact with every day.
- **Dark matter:** It makes up **most of the mass of galaxies and galaxy clusters**, and is **responsible for the way galaxies are organized on grand scales**.
- **Dark energy:** It is the mysterious influence **driving the accelerated expansion of the universe**.
- While **dark matter attracts and holds galaxies together, dark energy repels and causes the expansion of our universe**.
- **Interaction with Gravity: Dark matter does interact with gravity**, but it **doesn't reflect, absorb, or emit light**. On the other hand, **dark energy is a repulsive force** — a sort of anti-gravity that **drives the universe's ever-accelerating expansion**.

Toxic hand sanitisers! US recalls several lots of methanol (CH₃OH)-containing products over risk of 'permanent blindness, coma'

Methanol:

- Methanol is a **colourless, volatile, and flammable liquid** with a **faintly sweet pungent odor**; it is **completely soluble in water** and is used as an **alternative fuel**.
- It is also known as **wood alcohol**. It can completely mix with water.
- **Production:** Preparing methanol is based on the **direct combination of carbon monoxide** gas and **hydrogen** in the presence of a catalyst. Increasingly, syngas, a mixture of hydrogen and carbon monoxide derived from biomass, is used for methanol production.
- This substance finds applications in the production of **synthetic dyestuffs**, copy machine fluid, gas line antifreeze, pharmaceuticals, and perfumes.
- **Exposure** to methanol can cause nausea, vomiting, headache, blurred vision, coma, seizures, permanent blindness, damage to the central nervous system, or death.

- Treatment for methanol poisoning involves administering **ethanol or fomepizole**, which serve as **antidotes**.

ICAR-Indian Institute of Spices Research (ICAR-IISR), Kozhikodei has developed and validated three new microbial formulations based on granular lime and gypsum

Novel microbial formulations:

- These formulations, namely Bactolime, Bactogypsum, and Trichogypsum, are developed to **address soil pH imbalances** and **deliver beneficial microorganisms efficiently**.
- **Bactolime:**
- Bactolime, the first formulation, combines liming material with beneficial bacteria for promoting plant growth known as **Rhizobacteria** in a single product.
- The beneficial bacteria, being a potential tool for sustainable agriculture, not only ensure the **availability of essential nutrients** to plants but also help in **enhancing nutrient use efficiency**.
- "Bactolime" integrates liming material and beneficial bacteria to serve the **dual function** of **ameliorating low soil pH** and **delivering plant beneficial bacteria** through a single product.
- **Bactogypsum and Trichogypsum: Soil pH Management**
- The other two formulations, Bactogypsum and Trichogypsum, are **gypsum-based**.
 - Trichogypsum ensures the delivery of **Trichoderma**, which is a **fungal biocontrol agent**.
 - Bactogypsum ensures the simultaneous delivery of plant-beneficial bacteria.

- Both work by buffering the soil pH to a near-neutral level, creating an **optimal environment for the establishment of microbes.**
- This improves soil physical condition, increases the availability of secondary nutrients, and enhances overall microbial activity.

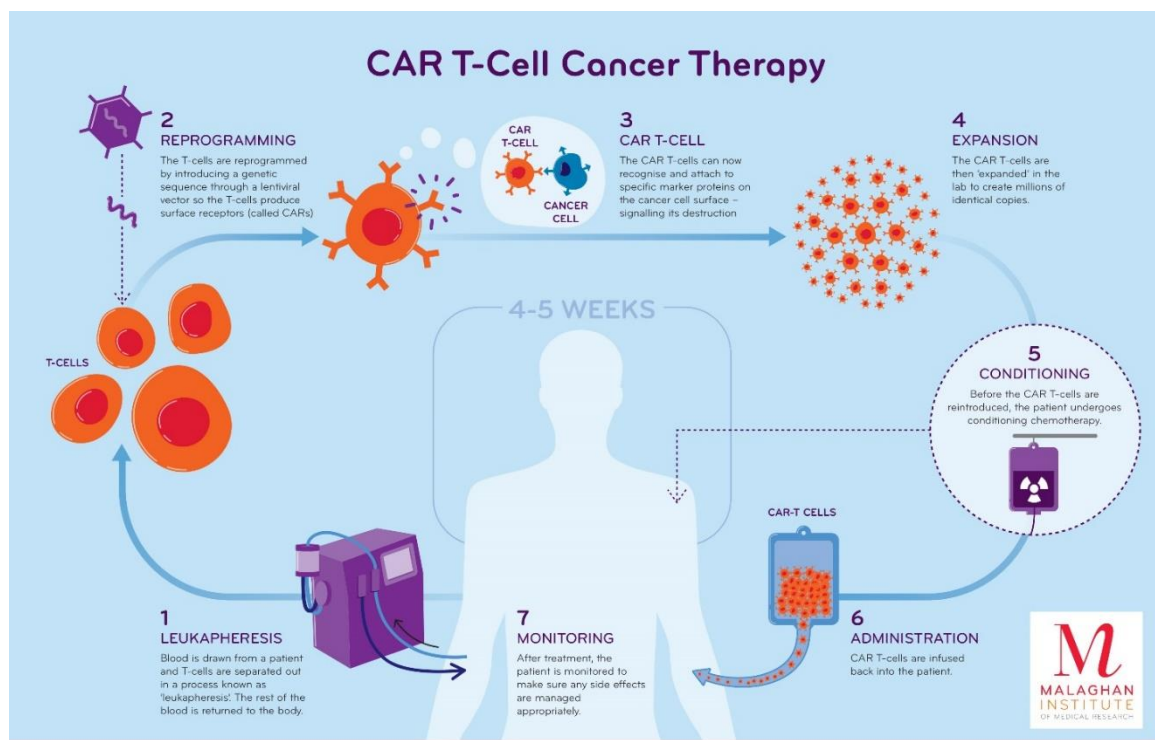
Gypsum

- Gypsum is a soft, **non-metallic mineral** widely used in various applications such as plaster, drywall, and chalk production.
- It also serves as a fertilizer, **supplying crops with calcium and sulfur.**

The President of India, Smt Droupadi Murmu launched India's first home-grown gene therapy (NexCAR19) for cancer at IIT Bombay

Chimeric Antigen Receptor (CAR) T cell therapy:

- CAR-T cell therapy is a type of cancer treatment that modifies a patient's immune cells to target cancer cells more effectively.



- Process of CAR-T Cell Therapy:
- T cells are derived from bone marrow stem cells and are essential components of the immune system responsible for defending the body against infections.
- These cells are a type of white blood cell
- It is extracted through a **procedure called leukapheresis.**
- These T cells are then modified in a laboratory to express proteins called **chimeric antigen receptors (CARs).**
- The CAR has different parts that help it recognize cancer cell antigens and activate the immune system.
- Each CAR stretches across the cell membrane, with parts outside and inside the cell.
- Outside, there are fragments of antibodies made in the lab.
- It is chosen because they stick well to the target.
- Inside, there are two components that send signals when the receptor meets an antigen.
- The gene that makes the CAR is artificially created in the laboratory.
- They then use a carrier called a vector to deliver this gene into the patient's T-cells.
- Viral vectors, like **lentiviral vectors**, are often used in this process.
- The modified T cells are then multiplied in the lab before being infused back into the patient's body.
- The patient usually undergoes chemotherapy before receiving the CAR-T cells.
- FDA Approval:
- The FDA has given the green light to six CAR-T cell therapies so far.

- Four of these therapies are aimed at a protein called CD19 found on the surface of leukemia and lymphoma cells.
- **NexCAR19: Similarities and Differences:**
- NexCAR19 shares similarities with these therapies as it also targets CD19.
- NexCAR19 is a CAR-T therapy developed in India.
- **Difference between US-developed therapies and NexCAR19:**
- In the US, CAR-T cell therapies use antibody fragments from mice.
- NexCAR19, on the other hand, has human proteins mixed with the mouse antibodies, making it more 'human-like.'
- **Objective:**This modification aims to enhance the therapy's safety profile and effectiveness.

Applications of CAR T-cell therapy:

1. It is mainly used for certain types of blood cancers
2. B-cell acute lymphoblastic leukemia (ALL).
3. Diffuse large B-cell lymphoma.
4. Follicular lymphoma.
5. High-grade B-cell lymphoma.
6. Mantle cell lymphoma
7. Multiple myeloma.
8. Primary mediastinal large B-cell lymphoma.

Risks of CAR-T therapy:

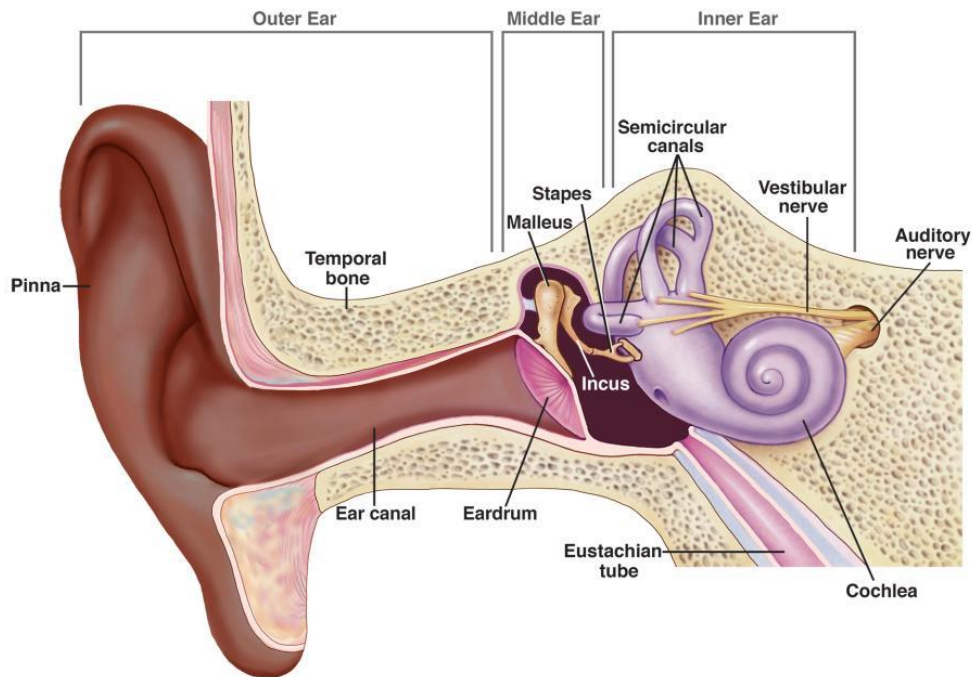
- **Cytokine Release Syndrome (CRS):** This is the most common side effect and involves an intense inflammatory response.
- This can cause Fever, Chills, Fatigue, Muscle aches, Nausea and vomiting, Difficulty breathing, Low blood pressure
- In severe cases, it can be life-threatening.

- **Neurotoxicity:** It can affect the nervous system and cause Confusion, Tremors, Seizures, Difficulty speaking. Loss of coordination.
- **Increased Risk of Infections:** CAR-T therapy weakens the immune system, making it harder for the body to fight off infections. This is especially concerning because many patients receiving CAR-T therapy are already battling cancer.
- **Low Blood Cell Counts:** Treatment can decrease the production of important blood cells, leading to Fatigue, Increased risk of bleeding, Higher chance of infection.
- Challenges before CAR-T therapy implementation in India:
- **Limited access to primary healthcare:** Primary healthcare facilities are a challenge in many parts of India.
- This can be a barrier for patients considering CAR-T therapy, as this therapy requires close monitoring and management by specialists throughout the process.
- **Concentration of cancer treatment facilities:** Cancer treatment facilities, especially those equipped for advanced therapies like CAR-T, are concentrated in metropolitan areas.
- This can create a disparity for patients in remote locations who may not be able to easily access the therapy or the required follow-up care.
- **Infrastructure for managing side effects:** CAR-T therapy has various side effects, particularly cytokine release syndrome (CRS). Therefore, it requires intensive care support.
- However, the limited availability of such facilities in some areas could be a challenge.
- **Immunocompromised patients:** CAR-T therapy itself can leave patients immunocompromised, making them more susceptible to infections. India's healthcare system may not be universally equipped to handle such cases effectively, especially in areas with limited resources.

- **High Cost:** Even though NexCAR19 is a more affordable option compared to similar treatments abroad, it remains expensive for many Indian patients, ranging from ₹40 to 45 lakh.
- There are multiple aspects that contribute to the high cost of NexCAR19 production. These include Labor expenses, Logistics, Materials, Facility costs, Marketing, distribution, and intellectual property development.

Command Hospital in Pune conducted two piezoelectric Bone Conduction Hearing Implants (BCI)

- It became the first government hospital across the country to procure and conduct successful piezoelectric bone conduction hearing implants.
- Active **Piezoelectric** Bone Conduction hearing implant system:
- It is an implantable medical electronic device for hearing impaired patients [conductive loss (including aural atresia), mixed hearing loss and single-sided deafness]
- Bone conduction implantation is the definitive hearing solution for certain groups of patients with conductive/ mixed hearing loss or patients with single sided deafness, who are not candidates for cochlear implantation and do not benefit with hearing aids or middle-ear surgery.
- Bone Conduction:
- **Discovery:** It was discovered by **Ludwig van Beethoven**, the famous **18th century composer** who was almost completely deaf. Beethoven found a way to hear the sound of the piano through his jawbone by attaching a rod to his piano and clenching it in his teeth.



Ways of Hearing:

- Eardrums (air-conducted or air-transmitted):
- The vibrations from the environment travel through the air to our eardrums.
- The eardrums in turn vibrate, decoding these sound waves into a different type of vibrations that are received by the **Cochlea**, also known as the **inner ear**.
- The Cochlea is connected to our **auditory nerve**, which transmits the sounds to our brain.
- Bones (bone-conducted or bone-transmitted):
- Bone Conduction bypasses the eardrums whereby the bone conduction devices (such as headphones) perform the role of eardrums.

India's Web3 developer share surges to 12% globally, leads emerging markets: Report

- Web3:
- **Web3** is known as the **third generation** of the Internet, focusing on **decentralization** and peer-to-peer interactions.



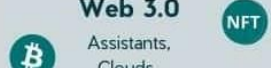
- It allows users to engage directly without the **need for middlemen**, enhancing user autonomy and privacy.

Core Technologies of Web3:

- The technology behind Web3 is decentralized and **emphasizes user privacy**. It is powered by **blockchain technology**, which is the foundation for various innovations in this space.
- Web3 supports **crypto-assets** and aligns with the semantic web, which is further enhanced by **Artificial Intelligence (AI)**.
- This integration promises a smarter, user-centric internet where digital assets like **cryptocurrencies** and **NFTs** (Non-Fungible Tokens) play a crucial role.

Key Features of Web3:

- Web3 gives users the power to control their own data and have a financial stake in the digital ecosystems they participate in.
- It includes features like **cryptocurrencies, NFTs, and social networks** based on blockchain technology.
- These platforms are collectively operated by their users rather than centralized corporations, promoting a more equitable Internet environment.

	 Web 1.0 Basic encyclopaedias	 Web 2.0 Social Networks	 Web 3.0 Assistants, Clouds
Content	Static, read-only content	Shared, dynamic content	Content-connection based through search and analysis
Interaction	(Almost) no interaction	User interaction via social media	AI-driven services
Focus	Company based	Community based	Individual based

Impact and Growth of Web3:

- Web3 seeks to revolutionize how data is created, monetized, shared, and distributed across the internet.
- Users in a Web3 environment can do more than just read and write content; they also have ownership of the content and applications they use, marking a significant shift towards a more inclusive and user-empowered web.

Researchers at the Indian Institute of Science (IISc) have designed a sustainable hydrogel to remove microplastics.

Hydrogel:

- It is a three-dimensional network composed of **hydrophobic polymers** synthesized by crosslinking water-soluble polymers.
- Hydrogels can retain a large quantity of water within their network without disturbing their original structure. This imparts flexibility and swelling properties to the hydrogel structures.
- It is a “**smart**” material that can change its structure in response to its environment, such as the local temperature, pH, salt or water concentration.
- Sustainable hydrogel:
- It is designed by the researchers has a unique **intertwined polymer network** that can bind the contaminants and degrade them using **UV light irradiation**.
- It consists of three different polymer layers – **chitosan, polyvinyl alcohol** and **polyaniline** – intertwined together, making an **interpenetrating polymer network (IPN)** architecture.
- The team infused this matrix with nanoclusters of a material called **copper substitute polyoxometalate (Cu-POM)**. These nanoclusters are catalysts that can use UV light to **degrade the micro plastics**.

- The combination of the polymers and nanoclusters resulted in a strong hydrogel with the ability to adsorb and degrade large amounts of microplastics.
- The hydrogel was found to be highly efficient – it could remove about 95% and 93% of two different types of microplastics in water at near-neutral pH (~6.5).
- Micro plastics:
- It is tiny plastic debris **smaller than 5 mm** in length.
- There are two types of microplastics as follows
- **Primary microplastics** : These are tiny particles (solid plastic particles of less than one millimeter in their largest dimension) intentionally designed for commercial use, such as cosmetics, **nurdles** i.e., plastic pellets used in industrial manufacturing and fibers from synthetic fabrics such as nylon.
- **Secondary microplastics** : These are formed from the degradation of large plastic objects such as bottles, fishing nets and plastic bags. It is caused by exposure to the environment, such as radiation from the sun, wind and ocean waves.

Doxxing incidents are increasing over the internet across the globe.

Doxxing:

- The word “**doxxing**” is derived from “dropping dox”.
- It is a form of **online harassment** involving the publication of personal information about an individual without their consent.
- This information can include details such as their full name, home address, telephone number, place of work, and other sensitive information.
- Doxxing is often carried out to expose, threaten, or intimidate someone and can lead to severe consequences, such as physical harm, stalking, or loss of employment.

- Such information is usually obtained through illegal methods such as hacking or theft.
- How to prevent?
- Use strong passwords that are not repeated across platforms, and set up **multi-factor authentication** where possible.
- Avoid posting photos that reveal your neighbourhood, house facade, house keys, identifiable landmarks etc.
- Avoid posting screenshots of text conversations with others as you may inadvertently doxx your contact or reveal your own number by accident
- Reporting through the **National Cyber Crime Reporting Portal** online etc.

Whooping cough cases outbreak reported around the world.

Whooping cough:

- Whooping cough is a highly contagious respiratory tract infection **only found** in humans.
- Causes:
- Caused by the **Bordetella pertussis bacteria**, which attaches to the **cilia** (tiny, hair-like extensions) in the **upper respiratory system**.
- Symptoms:
- Initial symptoms include runny nose, nasal congestion, red watery eyes, in addition to the previously mentioned cold-like symptoms and low-grade fever.
- Severe coughing fits with the characteristic "**whooping**" sound can lead to vomiting, and in infants and young children, may cause sleep apnea.
- Transmission:
- Spread easily from person to person through the air via droplets when an infected person coughs or sneezes.

- The bacteria produce **toxins that damage the hair-like projections (cilia)** that clear mucus and debris, leading to inflammation in the airways.
- Prevention:
- Vaccination remains the most effective protection. In addition to the **DTaP** and **Tdap** vaccines, **Mission Indradhanush** in India provides immunization against whooping cough.
- Emphasis on hygiene and proper sanitation, such as regular handwashing and covering one's mouth and nose during coughing or sneezing, remains critical.
- Prompt medical checkup and adherence to antibiotic treatment if symptoms develop, alongside proper bed rest, are essential preventive measures.

How fast is the universe expanding? Scientists from Germany and the U.K. led with a radical explanation for the Hubble tension.

Hubble Tension:

- The "**Hubble tension**" refers to a discrepancy between the measurements of the rate of expansion of the universe, known as the **Hubble constant**.
- The Hubble constant, **denoted as H_0** , describes the **rate at which galaxies are moving away from each other** due to the expansion of the universe.
- If a researcher wants to estimate the Hubble constant, they have two main avenues. These are the **cosmic distance ladder** and the **cosmic microwave background (CMB)**.
- Cosmic Microwave Background (CMB):
- CMB is a sea of photons, the particles of light, present throughout the universe. They are left over from the **Big Bang**, its afterglow.
- Scientists have measured temperature changes in the CMB and studied its large-scale properties using complicated trigonometry.

- Based on these studies, cosmologists have estimated space to be expanding at around **68 kilometres per second per megaparsec** ((km/s)/Mpc). That is, an object one megaparsec (3.26 million lightyears) away is moving away at 68 km/s)/Mpc.
- *Cosmic Distance Ladder:*
- It is a set of techniques used to measure the distance to objects that are close, further away, or very far away from the earth. One object in particular is the **Cepheid variable** star.
- The Cepheid variables have a unique feature: their brightness varies in a predictable way over time.
- Based on how bright a Cepheid variable is, scientists can estimate how far away it is. Using this, cosmologists have estimated based on various Cepheid variables (and other such objects) is 73 (km/s)/Mpc.
- Thus, these measurements have yielded slightly different values for the Hubble constant. This discrepancy is known as the Hubble tension.
- The significance of the Hubble tension is that it could potentially indicate **unknown physics or systematic errors** in the measurements.
- Resolving the tension is crucial for refining our understanding of the universe's expansion and its underlying physics.

World's First Orbiter that allows Smartphones to make direct Satellite Calls.

Chinese engineers have developed the world's first satellite series (**Tiantong1**) allowing direct calls from smartphones without the need for ground-based infrastructure using **Base Transceiver Station (BTS) or cellular towers**.

- *Chinese Satellite Communication Technology (SCT):*

- The satellite is part of the **Tiantong Project**, initiated after the **2008 Sichuan earthquake** to enhance communication resilience.
- Named after the term "**connecting with heaven**", the project aims to provide universal communication access, unaffected by socio-economic status.
- The satellite system, Tiantong-1 series, consists of three satellites placed in geosynchronous orbit at 36,000 kilometers altitude, covering the Asia-Pacific region from the Middle East to the Pacific Ocean. This orbit allows the satellites to keep pace with the rotation of the Earth.
- Huawei Technologies introduced the **world's first smartphone capable of making satellite calls in September 2023**, compatible with Tiantong satellites, followed by other Chinese brands like **Xiaomi, Honor, and Oppo**.

April 14 is observed as World Chagas Disease Day.

Chagas disease:

- April 14 is observed as World Chagas Disease Day, because the first diagnosis of the disease was done by a Brazilian physician, Carlos Chagas on 14 April 1909.
- It is also known as **American trypanosomiasis**, is a potentially life-threatening illness caused by the **protozoan parasite** Trypanosoma Cruzi.
- About 6–7 million people worldwide, mostly in **Latin America**, are estimated to be infected with **Trypanosoma cruzi**.
- Transmission & Stages:
- It is transmitted to humans through the bite of infected **triatomine bugs**, also known as "**kissing bugs**".
- However, it can also be transmitted through blood transfusions, organ transplantation, congenital transmission from mother to child, and consumption of contaminated food or beverages.

- Disease progresses through **two main stages: acute and chronic**.
- **Acute stage:** The acute stage typically occurs shortly after infection and may exhibit mild or no symptoms at all, making it difficult to diagnose.
- Common symptoms include fever, fatigue, body aches, headache, rash, loss of appetite, vomiting, and swelling at the site of infection (chagoma).
- **Chronic Stage:** If left untreated, the infection progresses to the chronic stage, which can manifest years or even decades after the initial infection
- Chronic Chagas disease can lead to severe complications, including cardiac issues such as **cardiomyopathy**, **arrhythmias**, heart failure, and gastrointestinal problems such as megaesophagus and megacolon.
- Diagnosis of Chagas disease:
- **Asymptomatic Chronic Stage:** Diagnosing Chagas disease can be challenging due to its often asymptomatic or nonspecific symptoms, especially in the chronic stage.
- **Serological Tests:** Diagnosis typically involves a combination of serological tests to detect antibodies against *T. cruzi* and molecular techniques to identify the parasite's DNA.
- Early detection is crucial for preventing the progression of the disease and reducing the risk of complications.
- Treatment:
- The primary medication used to treat Chagas disease is **benznidazole** or **nifurtimox**, both of which are **antiparasitic drugs** that work by killing the parasite.
- Treatment aims to reduce the parasite's burden, alleviate symptoms, and prevent the development of complications.
- Geographical Spread of Disease:
- **Endemic Regions:** Chagas disease is endemic to Latin America, primarily in rural areas of Mexico, Central America, and South America.

- **Global Spread:** However, due to increased migration and globalization, Chagas disease has become a growing concern in non-endemic regions, including North America, Europe, and the Western Pacific.
- Chagas a.k.a “silent and silenced disease”:
- **Asymptomatic Onset:** Chagas disease typically begins with either no symptoms or mild, nonspecific ones, making it easily confused with other common illnesses. Consequently, many individuals do not realize they are infected until serious complications develop much later.
- **Limited Recognition and Funding:** Historically, Chagas disease has not received as much attention or funding as other infectious diseases, despite its substantial health impact and risk of severe complications.
- **Gaps in Healthcare Provision:** The insufficient awareness and funding have resulted in significant gaps in surveillance, diagnosis, and treatment, especially in areas where the disease is endemic and healthcare access is constrained.
- Prevention and Control:
- **Vector Control Measures:** Preventing Chagas disease primarily involves vector control measures to reduce the risk of triatomine bug bites and interrupt transmission.
- This includes improving housing conditions to minimize insect infestations, using insecticide-treated bed nets, and implementing community-based vector surveillance and control programs.
- **Other Preventive Measures:** Includes screening blood donors and implementing measures to reduce the risk of vertical transmission from mother to child.

A patient suffering from Parkinson’s plus syndrome has undergone a high cervical spinal cord stimulation.

Parkinson Plus Syndrome:

- It is a neurodegenerative disorder that manifest in a similar fashion to **Parkinson's Disease**.
- It is also called **atypical parkinsonism**, refers to a group of **neurodegenerative movement disorders** that resemble **idiopathic Parkinson's disease (PD)** with certain distinguishing clinical and pathophysiological features.
- They attack the brain cells and nerves and lead to movement disorders, just like Parkinson's.
- There are several conditions that are categorized as Parkinson's Plus Syndrome, some of which include;
- **Multiple System Atrophy (MSA), Progressive Supranuclear Palsy (PSP),** Lewy Body Dementia (LBD), and **Corticobasal Ganglionic Degeneration (CBGD)**.
- The cause of Parkinson's Plus Syndrome is unknown, with a combination of genetic and environmental factors usually held responsible.
- Symptoms:
- Tremors in one hand
- Balance and coordination problems
- Difficulty walking or shuffling gait
- Stiffness in the jaw or reduced facial expressions
- Treatment: Medication can help some people move more easily and feel less stiff.

World Health Organization (WHO) has approved a new oral cholera vaccine called Euvichol-S.

Euvichol-S:

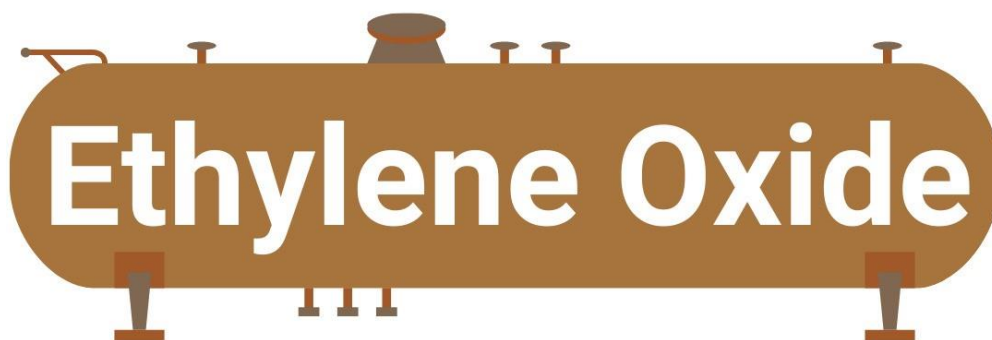
- This new vaccine is simpler and cheaper than its predecessor, **Euvichol-Plus**.

- It uses fewer ingredients and can be produced more quickly.
- Euvichol-S is part of a family of **inactivated oral cholera vaccines**, which includes **Euvichol and Euvichol-Plus**.
- It is the third vaccine from this family to be prequalified by the WHO.
- About Cholera:
- Cholera is a severe diarrheal disease caused by ***Vibrio cholerae* bacteria**. It leads to acute watery diarrhoea, vomiting, and leg cramps.
- The disease spreads through contaminated food or water and poses a significant global public health threat.
- Cholera is prevalent in regions with **poor sanitation** and limited clean water access, mainly in the **Middle East and Africa**.
- As of July 2023, *India had reported 132 cholera cases*, highlighting its ongoing global impact.

The Food Safety and Standards Authority of India (FSSAI) has commissioned quality checks on the spice mixes of 2 leading spice brands in India.

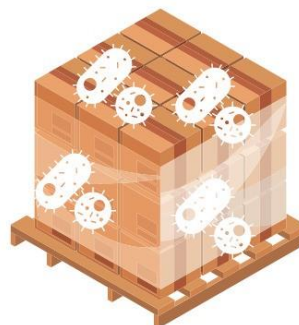
- FSSAI Investigates **Ethylene Oxide** in Spice Mixes Amid International Recalls
- FSSAI actions follows complaints of traces of ethylene oxide more than the permissible levels in several popular spice mixes of the two leading brands.
- *Food Safety and Standards Authority of India (FSSAI):*
- **Established:** It is an **independent statutory Authority** that has been established under the **Food Safety and Standards Act 2006**.
- **Administrative Ministry:** Ministry of Health & Family Welfare, Government of India

- **Objective:** FSSAI has been created for laying down science based standards for articles of food and to regulate their manufacture, storage, distribution, sale and import to ensure availability of safe and wholesome food for human consumption.
- Hong Kong and Singapore have also recalled some variants as their respective Food Regulators found the presence of a **pesticide** named ethylene oxide in their spice mix.
- Centre for Food Safety (CFS) Hong Kong has recalled 4 variants namely, MDH Madras Curry Powder, Curry Powder Mixed Masala Powder, Sambhar Masala Mixed Masala Powder and Everest Fish Curry Masala.
- FSSAI, in its quality checks, will also assess whether the products sold by the concerned brands match the Indian standards of chemical residue as prescribed by the law.
- In 2023, US Food & Drug Administration recalled **Everest Sambhar Masala** and Garam Masala as samples tested positive for **Salmonella**.
- Ethylene Oxide:
- It is a **flammable colorless gas** with a sweet odor.
- It is primarily used to produce other chemicals like antifreeze, detergents and pesticides.
- As a **sterilizing** agent: It is used to sterilize medical equipment and cosmetics by destroying the DNA of bacteria and viruses.
- **Pesticide:** It can be used to fumigate agricultural products to prevent microbial contamination.
- **Source of Exposure:** Humans can be exposed to Ethylene oxide via inhalation and ingestion, which may occur through occupational (uncontrolled industrial emissions), consumer (consumption of products that have been sterilized with ethylene oxide) and environmental (generated from water-logged soil, manure, and sewage sludge) exposure.



EtO is used to make chemicals such as antifreeze, detergents, and pesticides

EtO is used to sterilize medical equipment and cosmetics by destroying the DNA of bacteria and viruses



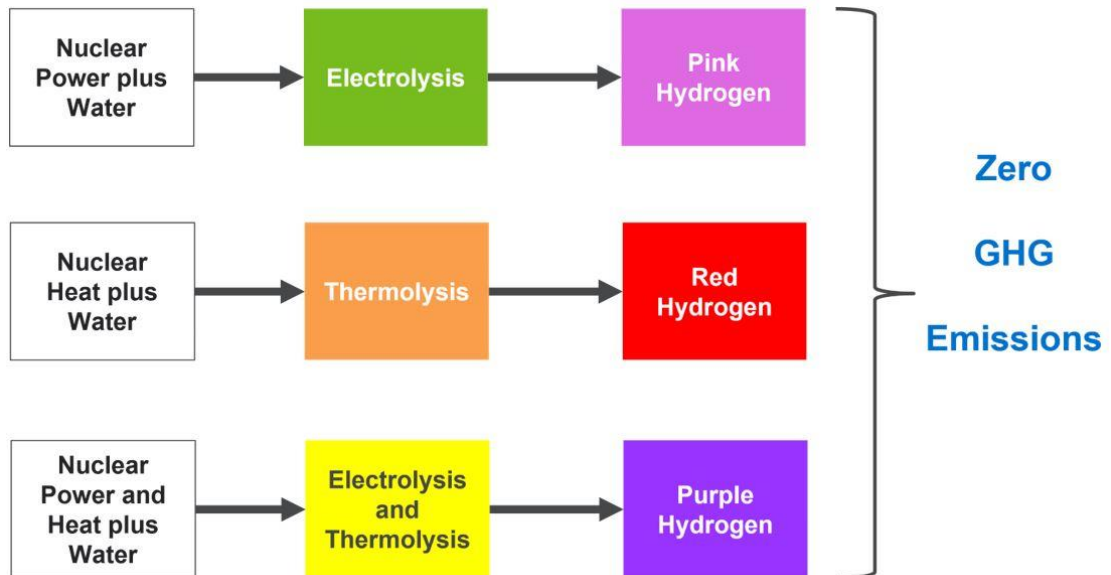
Carcinogenic Agent:

- WHO's The **International Agency for Research on Cancer** has classified ethylene oxide as a **Group 1 carcinogen**.
- Short-term exposure: It can affect the human central nervous system, and cause depression and irritation of the eyes and mucous membranes
- Long term exposure: It can irritate the eyes, skin, nose, throat, and lungs, and damage the brain and nervous system.

Amending nuclear law to spur 'pink' hydrogen generation.

- India is in talks with large domestic companies to invest in the regulated nuclear sector, including promoting clean power.

- The **Atomic Energy Act, 1962**, restricts private ownership of nuclear plants. The central government holds the power to produce, develop, use and dispose of 'atomic energy'. After legislative amendments, such powers can be exercised through any authority/corporation established by the government in which the former holds at least 51 per cent of the paid-up share capital.
- The amended Atomic Energy Act also allows the **Nuclear Power Corporation of India (NPCIL)** to form **joint ventures with other public sector units** to secure funding for new projects. This does **not** extend to private or foreign companies. However, private companies **may** participate in certain related activities, including **supply of components and reactors**.
- *Pink Hydrogen:*
- **Pink hydrogen** is generated through **electrolysis** powered by **nuclear energy**.
- It can also be referred to as **purple hydrogen or red hydrogen**.
- In addition, the very high temperatures from nuclear reactors could be used in other hydrogen productions by producing steam for more efficient electrolysis or fossil gas-based steam methane reforming.
- Nuclear power offers significant advantages for pink hydrogen production, including reducing production costs and emissions, making it a sustainable and more cost-effective alternative to conventional methods.
- **Applications:** Pink hydrogen is a promising replacement for fossil fuels in the cement industry, steel industry, aviation, and heavy transportation, as it can be used as a feedstock and energy source with no greenhouse gas emissions.
- It is a promising option for carbon-free hydrogen production from renewable and nuclear resources.



Electrolysis:

- Electrolysis is the process of **using electricity to split water into hydrogen and oxygen**. This reaction takes place in a unit called an **electrolyzer**.

A few days after Meta unveiled its Llama 3 Large Language Model (LLM), Microsoft unveiled the latest version of its 'lightweight' AI model – the Phi-3-Mini.

Phi-3-Mini

- It is believed to be first among the three 'small models' that Microsoft is planning to release.
- Other Two Models : **Phi-3-small (7B)** and **Phi-3-Medium** will be available shortly.
- It has outperformed models of the same size and the next size up across a variety of benchmarks, in areas like language, reasoning, coding, and math.

- **Variants** : It is available in two variants, one with 4K context window, and another with 128K tokens.
- This model is instruction-tuned, which means that it is trained to follow the different types of instructions given by users.
- This also means that the model is **'ready to use out-of-the-box'**.
- **Potential uses** :
 - Providing summaries of long documents or trends within market research reports.
 - Also, marketing and sales departments could use it to write product descriptions or social media posts.
 - It could also **underpin a customer chatbot** to answer basic questions about products and services.
- What are Language Models ?
- Language models are the **backbone of AI applications** like **ChatGPT, Claude, Gemini, etc.** These models are trained on existing data to solve common language problems such as text classification, answering questions, text generation, document summarisation, etc.
- **Large Language Models(LLMs)** : LLMs are large general-purpose language models that can be pre-trained and then fine-tuned for specific purposes.
- 'Large' in LLMs has two meanings — **the enormous size of training data; and the parameter count.**
- In the field of Machine Learning, where machines are equipped to learn things themselves without being instructed, parameters are the memories and knowledge that a machine has learned during its model training.
- They define the skill of the model in solving a specific problem.
- **Small Language Models(SLMs)** : SLMs are more streamlined versions of large language models.

- When compared to LLMs, smaller AI models are also cost-effective to develop and operate, and
- They perform better on smaller devices like laptops and smartphones.
- SLMs are great for resource-constrained environments including on-device and offline inference scenarios.

Fiat to monitor use of liquid nitrogen in food items.

Liquid Nitrogen:

- It is an inert, colorless, odorless, noncorrosive, nonflammable, and extremely cold element.
- It is a **cryogenic liquid** (Cryogenic liquids are liquefied gases that have a normal boiling point below -130°F (-90°C)).
- Liquid nitrogen has a boiling point of -320°F (-196°C).
- Health impacts:
- Liquid nitrogen can scorch the organ or part of the body it contacts, making it appear like frost bites.
- It can damage the lips, tongue, throat, lungs, and stomach. It may cause lesions or burn tissues.
- If it reaches the stomach, the organ could get perforated. In the lungs, **it could produce CO₂** and the person could become unconscious.
- Applications:
- It is used to cool and freeze food rapidly.

- In food production and industrial processes, a cooling tray filled with liquid nitrogen is used to rapidly cool materials or equipment by immersing the product in nitrogen.
- In the wellness and sports industry, **cryosaunas** with liquid nitrogen vapor are used for **cryotherapy**.
- Liquid nitrogen test chambers are used in technology and material sciences to test the performance and durability of materials and devices at extremely low temperatures.
- Cryosurgery:
- **Cryosurgery** is a minimally invasive surgical technique that involves the use of extreme cold to **destroy or remove abnormal tissues**, such as tumors or warts. The procedure involves applying a freezing agent, such as liquid nitrogen or argon gas, directly onto the targeted area.

Biohacking is picking up in India especially in metro cities like Delhi and Mumbai and also slowly making inroads into Tier II and III cities too.

Biohacking:

- It is a term used to describe various tips and tricks for **enhancing the body's ability** to function at peak performance—and maybe even extend one's lifespan.
- It includes the practice of employing methods drawn from fields like biology, genetics, neuroscience and nutrition to enhance physical or mental performance, improve overall health and well-being, or achieve a specific health outcome.
- The term was coined by **Dave Asprey**, an entrepreneur and author, back in 2011.
- For Asprey, **biohacking meant** “changing the environment outside of you and inside of you so you have full control of your biology”.

- Most types of biohacking generally fall into one of the following categories below:
- **Lifestyle:** This category focuses on making positive health and behavior choices. It is probably the most accessible way most people can start experiencing biohacking, as it includes factors like dietary shifts, breathwork, meditation and exercise.
- **Molecular:** It involves the use of natural and synthetic molecules that can help shift one's biology. Taking supplements would fall into this biohacking category.
- **Biologics:** These are biological products that are meant to improve or enhance biology. They could be cells, or they could be small little information packets like **exosomes**, which are basically biological bundles of DNA, mRNA proteins and growth factors. Biologics typically need to be ingested, injected (such as stem cells) or delivered intravenously (i.e. by IV transfusion).
- **Technology:** This category includes devices like wearables (such as smartwatches) and diagnostics (such as blood sugar monitors). In such cases, biohacking uses technology to gather data about the body and its functioning so an individual can use that information to adjust their health as they strive for improved performance.
- There are currently **no laws in India** that specifically address biohacking.

Research conducted on using drugs to target H3 and H4 receptors for the potential treatment of neurological and immunological disorders.

Histamine:

- Histamine is a critical compound in the body, involved in various physiological processes such as allergies, inflammation, autoimmune disorders, and the regulation of gastric acid secretion.
- Histamine consists of two main components: **ethylamine (CH₃CH₂NH₂)** and **imidazole (C₂N₂H₄)**, which have a ring-like structure.
- It is primarily stored in the secretory granules of **mast cells** and **basophils**.

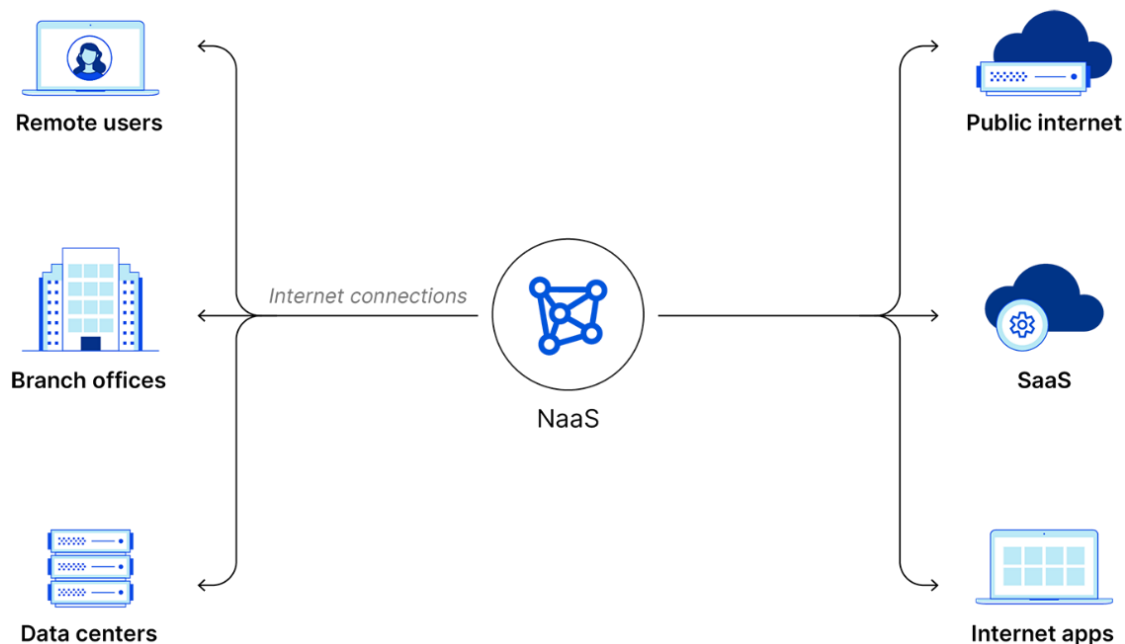
- Release Triggers:
- Immune-related triggers include allergens and snake venom.
- Non-immune triggers involve physical injuries.
- Roles of Histamine:
- **H1 receptors** are found in blood vessels, neurons, and smooth muscles.
- **H2 receptors** enhance gastric acid secretion in the stomach.
- **H3 receptors** are present in the central nervous system and play a role in regulating neurotransmitters.
- **H4 receptors** are involved in controlling inflammatory and allergic responses.
- Antihistamines:
- Antihistamines are drugs designed to counteract the effects of histamine by **blocking its receptors**.
- These medications are widely used and can be purchased over-the-counter for treating common allergic symptoms such as sneezing and itching.
- They effectively mitigate the actions of histamine, providing relief from **minor allergic reactions**.

Internet economy should embrace NaaS.

- The last decade has seen the emergence of numerous **internet-based tech startups**, often referred to as the children of the internet as these unicorns and consumer companies will not exist without the internet.
- **Expanding User Base:** The consumer user base is rapidly expanding to access services from e-commerce, mobility, food delivery, home, edutech, finance, insurance, gaming, etc in addition to availing services from the government.
- **Rising India's Internet Economy:** India is most likely to meet its target of **\$1 trillion** by 2030.

- India has over **850 million** active internet users, and the **digital economy** will contribute about **20% to the GDP** by 2026.
- Growth Projections for India's Data Centre Market: With the rise and expansion of cloud-based services, there has been an increasing investment in data centers.
- According to an **Arizton Advisory and Intelligence research report** in 2022, the value of India's data centre market is expected to increase from \$4.35 billion in 2021 to \$10.09 billion by 2027 at a **compound annual growth rate (CAGR)** of 15.07%.
- NaaS (network as a service):
- NaaS is a **cloud-like networking model** where network resources are provided to the customer on demand.
- Network infrastructure is the basic framework of a network consisting of hardware and software resources that enable communication paths between users.
- **Need of NaaS:** With enterprises leveraging cloud services seamlessly and dynamically scaling their operations, there exists a gap in network infrastructure to meet the expectations of this evolving cloud ecosystem.
- This gap has catalyzed the rise of NaaS (network as a service), offering software automation functionalities and intelligent network infrastructure in a flexible and on-demand manner akin to cloud services.
- Advantages of NaaS:
- **Flexible Scaling Options:** Similar to other "as-a-service" models (like SaaS, platform as a service or PaaS, etc.), NaaS offers networking functionality without the need for the customer to invest in hardware or manage the infrastructure directly.

- Through simple subscription and options like pay-as-you-go, organizations can **scale their network infrastructure more flexibly and efficiently** according to their needs.
- Presently, NaaS platforms offer improved network performance at exceptional speeds, delivering consumers a seamless and frictionless browsing experience while ensuring robust security measures.
- Facilitating Instantaneous Connections across **Various Network Nodes**: It enables instantaneous connections in any combination between two or more public clouds, data centers, internet exchanges, and content delivery networks.
- This breaks away from the traditional telco approach of manually stitching each connection across weeks and even months at times.
- **Scalable Networks for Dynamic Traffic Handling**: It allows organizations to have scalable networks that can take care of sudden spikes in traffic or eliminate **underutilisation**.



Challenges with NaaS:

- **Limitations of Hardware-based NaaS Solution:** Currently, NaaS solutions are predominantly reliant on hardware, which comes with inherent limitations in terms of flexibility, agility, and cost-effectiveness.
- As businesses increasingly adopt hybrid and multi-cloud environments for enhanced security and control, the integration of a software layer atop the network infrastructure will enable optimal resource utilization.
- **Criticality of Network Performance:** User satisfaction heavily relies on networks swiftly delivering their data.
- If a basic online search lags, a transaction loads slowly, or a video buffers even briefly, it results in user dissatisfaction and a subpar application experience.
- A mere few seconds of delay, or worse, downtime, can result in significant business losses.
- Therefore, a software-defined networking platform providing secure and reliable network infrastructure presents a compelling use case for the banking, financial services, and insurance (BFSI) industry.
- **Inertia to Migrate:** As is the case with any innovation, the inertia to change from legacy solutions hinders its adoption.
- While network security and bandwidth-on-demand are lucrative features of NaaS, enterprises may be hesitant to migrate.

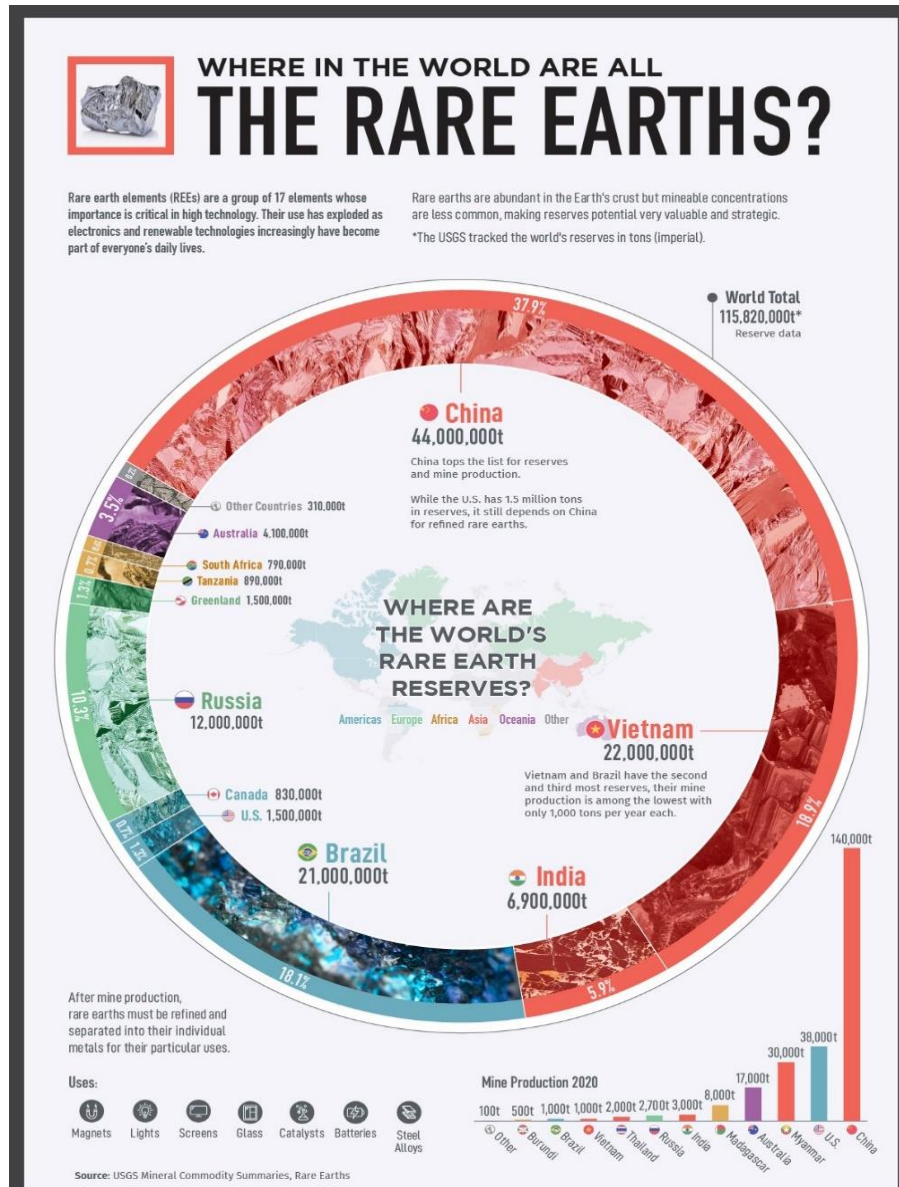
The Ministry of Mines will hold a two day “Critical Minerals Summit: Enhancing Beneficiation and Processing Capabilities”

Critical Minerals Summit:

- It is organised by the **Ministry of Mines**, Government of India, in collaboration with the Shakti Sustainable Energy Foundation (Shakti), the **Council on Energy, Environment and Water (CEEW)**, and the **Indian Institute of Sustainable Development (IISD)**.

- It is designed to foster collaboration, share knowledge, and drive innovation in the field of critical mineral beneficiation and processing.
- The summit will bring together a diverse array of Indian and international stakeholders, including industry leaders, startups, government officials, scientists, academics, and policy experts.
- It will address the increasing demand for **Critical Raw Materials (CRMs)** required for renewable energy systems and electric vehicles as part of India's strategic development goals.
- The Ministry of Mines has identified eight key minerals for focus at the summit, including **Glaucosite (Potash), Lithium – Rare Earth Elements (Laterite), Chromium, Platinum Group, Graphite, Tungsten associated with Graphite, Rare Earths(RE), and Vanadium associated with Graphite.**
- Participants will engage in active dialogue and interactive workshops focused on critical issues such as **mineral auction progress**, policy incentives for CRMs ecosystem development, and the advancement of commercially viable and environmentally sustainable solutions.
- Critical Minerals:
- It is a **metallic or non-metallic** element that has two characteristics.
- It is essential for the functioning of our modern technologies, economies or national security and
- There is a risk that its supply chains could be disrupted.

- The 'criticality' of minerals changes with time as supply and society's needs shift.
- Applications:
- They are used to manufacture advanced technologies, including mobile phones, computers, fibre-optic cables, semiconductors, **banknotes**, and defence, aerospace and medical applications.
- Many are used in low-emission technologies, such as **electric vehicles**, wind turbines, **solar panels**, and **rechargeable batteries**.
- Some are also crucial for common products, such as stainless steel and electronics.
- Examples: antimony, beryllium, bismuth, cobalt, copper, gallium, germanium, lithium, vanadium, etc.
- Top Producers: **Chile, Indonesia, Congo, China, Australia, and South Africa.**
- Critical Minerals in India:
- Government has released a list of **30 critical minerals** for India.
- These minerals are Antimony, Beryllium, Bismuth, Cobalt, Copper, Gallium, Germanium, Graphite, Hafnium, Indium, Lithium, Molybdenum, Niobium, **Nickel, PGE**, Phosphorous, Potash, **REE**, Rhenium, Silicon, Strontium, Tantalum, Tellurium, Tin, **Titanium**, Tungsten, Vanadium, Zirconium, **Selenium**, and Cadmium.



Rare Earth Elements:

- REE are a set of **seventeen** elements in the periodic table. These include the **fifteen lanthanides** on the periodic table plus **scandium and yttrium**. REE are all metals, and the group is often referred to as the "rare earth metals". Although called "rare", they are actually found **relatively abundantly** in the Earth's crust. These metals are very **difficult to mine** because it is unusual to

find them in concentrations high enough for economical extraction .These metals have many similar properties, and that often causes them to be found together in geologic deposits .They are also referred to as "rare earth oxides" because many of them are typically sold as oxide compounds.

UK pharmaceutical giant AstraZeneca has acknowledged that its Covid-19 vaccine can lead to a rare side effect known as Thrombosis with Thrombocytopenia Syndrome (TTS).

In 2023, the **World Health Organization (WHO)** reported that **Thrombosis with Thrombocytopenia Syndrome (TTS)** emerged as a new adverse event following immunization in individuals vaccinated with COVID-19 non-replicant adenovirus vector-based vaccines.

- This includes the **AstraZeneca COVID-19 ChAdOx-1 vaccine** and the **Johnson & Johnson (J&J) Janssen COVID-19 Ad26.COV2-S vaccines**.
- *TTS (Thrombosis with Thrombocytopenia Syndrome):*
- Thrombosis with Thrombocytopenia Syndrome (TTS) is an extremely rare condition characterized by the formation of blood clots (**thrombosis**) and low platelet counts (**thrombocytopenia**).
- It is also known as vaccine-induced immune thrombotic thrombocytopenia (**VITT**).
- Thrombosis occurs when a blood clot forms in a blood vessel, which can impede blood flow.
- Thrombocytopenia is a condition where there is a low count of platelets in the blood.
- Platelets play a crucial role in clotting, which helps prevent excessive bleeding.
- Vaccine Developed By AstraZeneca:

- **Covidshield :**
- Covishield is not based on the **mRNA** platform but rather on the **viral vector platform** which utilizes a **modified chimpanzee adenovirus**, ChAdOx1, to deliver the COVID-19 spike protein into human cells.
- While this cold virus cannot infect the recipient, it can effectively instruct the immune system to prepare defenses against similar viruses.
- TTS is classified into 2 tiers by the **CDC**.

Tier 1:

- Rare blood clots, like in the brain or gut, sometimes alongside more typical ones in the legs or lungs.
- Low platelet count (below 150,000 per microliter).
- Tier 1 cases are usually more severe and riskier.
- This is more common in younger people.

Tier 2 :

- Common blood clots, like in the legs or lungs.
- Low platelet count (below 150,000 per microliter). A positive anti-PF4 ELISA test is necessary for diagnosis.

Symptoms of TTS :

- Severe or persistent headaches,
- Blurred vision,
- Shortness of breath,
- Chest pain,
- Leg swelling,

- Persistent abdominal pain,
- confusion or seizure,
- Easy bruising or tiny blood spots under the skin beyond the injection site.

Link between TTS and the Covid vaccine?

- The link between TTS and the AstraZeneca Covid-19 vaccine was discovered after the vaccine's rollout. Researchers found a connection between the vaccine and VITT.
- VITT is a subset of TTS, a distinction that AstraZeneca does not appear to acknowledge.

SOCIETY

Lalit Kala Akademi chief's powers curbed by Culture Ministry

About Lalit Kala Akademi:

- It was inaugurated on 5th August 1954 by the then Minister for Education, Maulana Abul Kalam Azad and was registered under the **Societies Registration Act 1860**.
- It has preserved and documented a permanent collection of the highest order that reflects the vitality, complexity and unfolding patterns of contemporary, modern, folk and tribal art in India. It is India's national academy of fine arts established by Government of India to promote and propagate understanding of Indian art, **in and outside the country**.
- It promotes Visual Art of India in various countries of the world through **Cultural Agreements and Cultural Exchange Programmes**.

- **Funding:** It is funded by the Ministry of culture.
- **Headquarter:** New Delhi. It has regional centres situated at Chennai, Lucknow, Kolkata, Bhubaneswar, Garhi.

Political affiliation of applicant institution does not influence selection process on new Sainik Schools: Defence Ministry

About Sainik Schools:

- These are **residential schools** for students, providing Public School Education which are affiliated to **Central Board of Secondary Education (CBSE)**, New Delhi.
- **Funding:** These schools are funded by **Central and State governments**.
- The scheme to establish Sainik Schools **was introduced in 1961** with the primary aim of preparing students academically, physically and mentally for entry into the National Defence Academy.
- These schools are under the overall governance of **Sainik Schools Society** (registered under **Societies Registration Act XXI of 1860**) Ministry of Defence. It is established with the primary aim of preparing boys academically, physically and mentally for entry into the National Defence Academy.
- At present, there are 33 Sainik Schools located in various parts of the country. **Girls cadets** have also been given admission in Sainik School, from the academic session **2021-22**.
- **Recent initiative:**
 - Government of India has approved an initiative for **setting up of 100** new Sainik Schools under Sainik Schools Society, Ministry of Defence in partnership with **NGOs/Private Schools and State Govt**.
 - It aims to create an academically strong, culturally aware, intellectually adept, confident, highly skilled, multi-dimensional, patriotic self-reliant youth community with leadership qualities focused on providing utmost priority to the nation.

Climate activist Sonam Wangchuk and Leh Apex Body called off the border march aimed at highlighting the Changpa nomadic tribes' plight.

Changpa Tribe:

- The **Changpa**, or **Champa**, are **semi-nomadic** people found mainly in the **Changtang plateau of southeastern Ladakh**.
- A smaller number resides in the western regions of the Tibet Autonomous Region in China.
- They share linguistic and cultural affinities with **Tibetans**.
- They are high-altitude pastoralists, raising mainly yaks and goats. They live at an average altitude of 4,500 metres above sea level.
- Religion: All Changpa families profess **Tibetan Buddhism** as their religion.
- They can be identified by their conical yak-skin tents called reboo.
- Each **reboo** invariably accommodates the family deity, and a picture of their spiritual head, in most cases, the Dalai Lama.
- Semi-nomadic Lifestyle:
- The Changpa who live nomadic lives are known as **Phalpa**, while those who have settled down in fixed locations are called **Fangpa**.
- For many Changpas, rearing of animals and consuming and selling their produce (milk and its products, hair, and meat) is the only means of livelihood.
- They rear the highly pedigreed and prized **Changra goats** (*Capra Hircus*) that yield the rare **Pashmina (Cashmere) fibre**. It is the finest fibre of all goat hair.
- Their Buddhist belief does not allow them to kill animals for meat. It is only when animals die a natural death that the carcasses can be used for meat and hide, which the Changpas use to line their huts and make garments.
- In 1989, the Changpa were granted official status in India as a **scheduled tribe**.

UNHRC adopts first resolution to protect rights of intersex people.

UN Human Rights Council Adopts Landmark Resolution For Intersex Rights titled “**Combating Discrimination, Violence, and Harmful Practices against Intersex Persons**”.

- **Key Objectives:** To combat discrimination, violence, and harmful practices against intersex individuals and to address the underlying causes of such mistreatment.
- It urges states to address the root causes of these issues and ensure the highest attainable standard of physical and mental health for intersex people.
- The resolution requests the **U.N. High Commissioner** for Human Rights to publish a report examining discriminatory laws, violence, and harmful practices against individuals with innate variations in sex characteristics worldwide.
- *Intersex Individuals:*
- Intersex is when someone is born with reproductive or sexual parts that don't fit typical definitions of male or female.

Intersex can be divided into four categories:

- 46, XX intersex
- 46, XY intersex
- True gonadal intersex
- Complex or undetermined intersex

- Intersex individuals are born with sex characteristics that do not conform to traditional binary notions of male or female.
- These characteristics may include variations in sexual anatomy, reproductive organs, hormonal patterns, and chromosomal patterns.
- Intersex individuals may identify with any gender identity or sexual orientation.
- Intersex people are **distinct** from transgender individuals.

- **Transgender** individuals are born with a body that **possesses clear sexual characteristics** (either male or female), but these characteristics do not align with their gender identity.

Example:

- Penis with Female Hormone Levels
- Absence of Penis but Male Traits
- Outwardly Female, Male-Typical Anatomy Inside: Some individuals may have a female appearance externally but predominantly male-typical internal anatomy.
- Blend of Male and Female Genital Characteristics.
- **Mosaic Genetics:** In some cases, individuals may have mosaic genetics, where certain cells contain XX chromosomes (typically female) while others contain XY chromosomes (typically male).
- Statistics and Demographics:
- Experts estimate that up to 1.7% of the population is born with intersex traits, highlighting the significance of addressing their rights.
- Causes of Intersex Traits:
- Intersex traits are estimated to occur in 1% to 2% of the population, making it more common than having red hair or being an identical twin.
- Underlying Factors:
- Genetic conditions that disrupt hormone levels during fetal development.
- Exposure to hormones from medications or other sources during early stages of development.
- Random variations in chromosomes occurring at conception.
- **UNHRC:**

- The Human Rights Council, an intergovernmental body within the United Nations system, is tasked with enhancing the promotion and safeguarding of human rights worldwide.
- Established in **2006** by the General Assembly, it succeeded the United Nations Commission on Human Rights.
- It addresses instances of human rights violations and provides recommendations to address them.
- It is responsible for strengthening the promotion and protection of human rights around the globe.
- The Council is made of **47 Member States**, which are elected by the majority of members of the General Assembly of the United Nations through direct and secret ballot.
- **India was re-elected** to the United Nations Human Rights Council (UNHRC) for the 2022-2024 term in 2021.
- Key Mandate:
- Reviews the human rights records of all UN Member States through the Universal Periodic Review.
- Authorizes commissions of inquiry and fact-finding missions to investigate war crimes and crimes against humanity, among other issues.
- Challenges faced by Intersex Individuals:
- **Prejudice and Discrimination:** These people face discrimination in the society due to non-alignment of their body with societal norms of sex and gender.
- **Violence, and even infanticide:** In various nations, people having visible intersex traits, such as ambiguous genitalia, face abandonment and violence.
- Intersex infanticide is prevalent in the southern and eastern Africa, South Asia, Brazil, and China.

- **Unnecessary medical intervention:** These people have to go through medical treatment due to People' belief that intersex people need to be "fixed."
- In this process, many young children get traumatized due to the experiences in medical procedures.
- **Legal Identity:** These people face problems in getting identity as society segregates intersex babies and people based on gender.
- Many a time, organizations prohibit them to issue identification which prevent them from doing jobs, opening bank accounts and getting higher education.
- *Impact of Resolution:*
- **Increased awareness and recognition:** The resolution brings greater visibility to the issue of intersex people and their human rights. This can help to combat stigma and discrimination.
- **Protection from harmful practices:** The resolution calls on states to address violence and harmful practices against intersex people, such as medically unnecessary surgeries on infants.
- This can help to protect intersex people from physical and psychological harm.
- **Improved access to healthcare:** The resolution emphasizes the right of intersex people to the highest attainable standard of health.
- This could lead to better access to healthcare services that are sensitive to the needs of intersex people.
- **Empowerment and self-determination:** The resolution calls on states to respect the autonomy and bodily integrity of intersex people.
- This can empower intersex people to make their own decisions about their bodies and their lives.
- **Foundation for further progress:** This resolution is a significant step forward, but it's just the beginning.

- It can pave the way for further legal and policy changes that protect the rights of intersex people around the world.

Union govt sets up six-member committee to examine concerns of queer community.

The Committee on Queer Community:

- The committee will be chaired by the **Cabinet Secretary** and will include senior officials from several key ministries:
- Ministry of Home Affairs
- Ministry of Social Justice and Empowerment
- Ministry of Law and Justice
- Ministry of Women and Child Development
- Ministry of Health and Family Welfare
- This formation is a direct response to the Supreme Court's directives in the **Supriyo v Union of India case of 2023**, where the court held that there is **no fundamental right to marry for LGBTQIA+** persons **under the Special Marriage Act (SMA)**.
- Responsibilities of the Committee
- The committee is tasked with implementing measures to ensure that individuals from the queer community can access goods, services, and **social welfare schemes without discrimination**.
- It will also focus on protecting the community from involuntary medical treatments, violence, and coercion, promoting a safer and more inclusive environment.

Alarming Study Reveals Only 13.5% of STEM Faculty in India Are Women.

Understanding the Gender Gap:

- Only **13.5%** of faculty members in Indian Science, technology, engineering, and mathematics (**STEM**) faculties are women.
- Female representation is particularly low in fields like Engineering, Physics, Computer Science, and Chemistry.
- Engineering faculties showed the **sharpest gender gap**, with only **9.2%** female faculty.
- In contrast, Biology shows a relatively higher representation of women faculty at **25.5%**.
- This variance could be associated with perceptions of biology as a "softer" science compared to other fields.
- Physics, computer science, and chemistry, all had around 11.5% to 13% female faculty.
- Earth sciences and mathematics fared slightly better with 14.4% and 15.8% women, respectively.
- India produces the **world's highest percentage of women STEM graduates**, around 40%.
- However, only **14%** of them pursue scientific research in universities and institutions.
- The gradual departure of women from the STEM workforce is often termed the **'Leaky Pipeline'**.
- Factors Contributing to Low Representation:
- Social Bias in Certain STEM Fields:
- Perceptions of certain fields as "hard" or "soft" sciences discourage women from pursuing disciplines like Engineering, Physics, and Computer Science.
- Societal expectations often push women towards fields perceived as more feminine, impacting their career choices.
- Lack of Support During Postdoc to Faculty Transition:

- The transition *from postdoc to faculty coincides with family planning* for many women, leading to difficult choices and a lack of support structures.
- Societal pressure often prioritizes family responsibilities over career aspirations for women in STEM academia.
- Toxic Workplace Environment:
- Senior women often leave STEM academia due to a toxic work environment characterized by disrespect, limited resources, and **unequal advancement opportunities** compared to male colleagues.
- Such environments deter women from pursuing long-term careers in STEM universities.
- Difficulty Accessing Gender Representation Data:
- The absence of a centralized database tracking women faculty in STEM across India makes it challenging to understand the extent of the gender gap and monitor progress towards gender equity.
- Lack of Resources and Leadership Commitment:
- Achieving gender equity in STEM faculties requires dedicated resources and strong leadership commitment.
- Without adequate financial and policy support, initiatives aimed at improving women's representation in STEM struggle to gain traction.
- Need for women in STEM:
- Women in technical roles and female scientists not only help a nation to leap towards becoming a secure and progressive nation but they will have a positive impact on the science and technology sector of the country.
- **Gender diversity leads to creativity**, productivity, and innovation.

- Offering women equal opportunities in STEM careers reduces the **gender pay gap**, enhances economic security, ensures workforce diversity, and mitigates biases in these fields and their outcomes.
- STEM education can empower girls by challenging gender norms and breaking down societal barriers.
- Steps for promoting Women in STEM careers:
- Establish stable mentorship programs and support networks within each organization.
- Mandate the establishment of an '**Office for Equity and Inclusion**' in every institution.
- Ensure representation of women scientists on all panels, particularly those related to career advancement, recruitment, budget proposals, etc.
- Establish **on-campus daycare** centers.
- *Initiatives that promote women in STEM:*
- **Vigyan Jyoti Scheme:** This initiative from the Ministry of Science and Technology aims to inspire and empower young girls through lectures, workshops, and interaction with experts in STEM disciplines.
- **Women in Engineering, Science, and Technology (WEST):** It will cater to women with a STEM background and empower them to contribute to the science, technology, and innovation ecosystem.
- **Biotechnology Career Advancement and Re-orientation Programme (BioCARE):** This program is implemented by the Department of Biotechnology (DBT) to enhance the participation of Women Scientists in Biotechnology research.
- **Gender Advancement for Transforming Institutions (GATI):** This is a pilot project launched by the Women in Science and Engineering-KIRAN division of the Department of Science and Technology in 2020.

- **Knowledge Involvement in Research Advancement through Nurturing (KIRAN)Scheme:** To encourage women scientists through various programmes in the field of Science and Technology (S&T).
- **CURIE:** Only women Universities are being supported for development of research infrastructure and creation of state-of-the-art research laboratories to enhance women's participation in S&T domain.

The UNFPA's State of World Population report 2024 "Interwoven Lives, Threads of Hope: Ending Inequalities in Sexual and Reproductive Health and Rights".

Highlights of the Report:

- **Population:** India leads globally with an estimated population of **1.44 billion**, followed by China at **1.425 billion**, according to the report.
- India's population was recorded at **1.21 billion** during the last census, conducted in **2011**.
- **Demographic Profile:** The report provided a demographic breakdown that shows around **24% of the population is aged 0-14**, 17% are aged 10-19, and 26% fall in the 10-24 age range.
- The largest demographic, **68%, is the working-age group of 15-64**, while seniors aged 65 and above constitute 7% of the population.
- Life expectancy at birth is **71 years for men and 74 years for women**.
- **Social Issues:** The prevalence of child marriage remains high with 23% of marriages involving underage individuals between 2006-2023.
- **Health Issues:** The report highlights health issues, specifically of women
- **Maternal Health:** Maternal mortality rates have significantly decreased but still present vast inequities across different regions.
- The report highlighted that out of India's 640 districts nearly a third achieved the sustainable development goal of reducing maternal mortality ratio below 70 per 100,000 live births, however 114 districts still have ratios of 210 or more.

- The highest MMR of **1,671 per 100,000 births** is seen in **Tirap district** of Arunachal Pradesh, a rural area with a high proportion of indigenous peoples.
- **Healthcare Access:** Marginalized groups, including women with disabilities, migrants and refugees, ethnic minorities, LGBTQIA+ and those from lower castes like Dalits, often have limited access to necessary health services.
- For instance, nearly **half of Dalit women** do not receive antenatal care.
- Socioeconomic Challenges:
- **Gender-Based Violence:** Women with disabilities are significantly more likely to experience gender-based violence, up to 10 times more than those without disabilities.
- Furthermore, the violence is aggravated by caste based discrimination. Dalit women, have high rates of gender-based violence are considered a means of oppression and control.
- **Economic Dependency:** Economic constraints force many women into cycles of poverty, exacerbating poor health outcomes and continued reliance on inadequate healthcare.
- **Increased Vulnerability:** The vulnerability of women is further compounded by climate change, humanitarian crises, wars and mass migration, which have a disproportionate impact on women.
- **Legal and Social Protections:** The report advocates for legal protections to combat caste-based discrimination in workplaces and educational institutions, highlighting the need for policies that specifically protect vulnerable women from systemic injustices.
- **Global Health Trends:** Globally, progress on key health measures for women is slowing or completely stalled, with 800 women still dying daily from childbirth-related causes and many lacking autonomy over their sexual and reproductive decisions.
- In 40 percent of countries with data, the report said women's bodily autonomy is diminishing.

- Inequitable health benefits in India: India has made progress in healthcare accessibility and quality. However these benefits have been cornered by wealthier women and those belonging to ethnic groups that already had better access to health care.
- **UNFPA:**
- It is a **subsidiary organ** of the UN General Assembly and works as a sexual and reproductive health agency.
- **Establishment:** It was established as a trust fund in 1967 and began operations in 1969.
- In 1987, it was officially renamed the **United Nations Population Fund** but the original abbreviation, 'UNFPA' for the **United Nations Fund for Population Activities** was retained.
- **Objective:** UNFPA works directly to tackle Sustainable Development Goals on **health (SDG3)**, **education (SDG4)** and **gender equality (SDG5)**.
- **Funding:** UNFPA is entirely supported by voluntary contributions of donor governments, intergovernmental organizations, the private sector and foundations and individuals, not by the United Nations regular budget.

Great Nicobar's particularly vulnerable tribal group, Shompen, cast their vote for the first time.

Shompen Tribe:

- Shompen Tribe Belongs the indigenous people of the interior of **Great Nicobar Island**.
- They are designated as a **PVTG within** the list of Scheduled Tribes.
- Characteristics:
- Shompen Tribe are one of the most isolated tribes.
- They are **semi-nomadic hunter-gatherers**.

- Their main sources of livelihood are hunting, gathering, fishing, and a little bit of horticultural activities in a rudimentary form.
- Population: The estimated population of Shompen Tribe was **229 as per the 2011 Census data**.
- Language Known: They speak their own language, which has many dialects. Members of one band do not understand the **dialect** of the other.
- Social structure: The family is controlled by the **eldest male member**, who controls all activities of the women and kids.
- **Monogamy** is the general rule, although **polygamy** is allowed too.
- *The Shompen habitat is also an important biological hotspot and there are two National Parks and one Biosphere Reserve namely:*
- **Campbell Bay National Park**
- **Galathea National Park and**
- **Great Nicobar Biosphere Reserve**

Particularly Vulnerable Tribal Groups (PVTGs):

- These groups are among the **most vulnerable sections** of India as they are few in numbers.
- **75** such groups have been identified and categorised as PVTGs.
- Among the 75 listed PVTG's the highest number are found in **Odisha**.

Characteristics:

- There are certain tribal communities who have:
- **Declining or stagnant population**
- **Low level of literacy**
- **Pre-agricultural level of technology**
- **Economically backward**
- In **1973, the Dhebar Commission** created **Primitive Tribal Groups (PTGs)** as a separate category, which are less developed among the tribal groups.

- In 2006, the Government of India renamed the **PTGs as PVTGs**.

Srinagar vies for global craft city tag as World Craft Council International team tours craft clusters.

Srinagar Seeks World Craft City Nomination:

- To nominate Srinagar as a **World Craft City (WCC)** from India this year.
- They checked out clusters where artisans were busy crafting local items.
- These items included **Pashmina shawls, carpets, and papier mâché**.
- **The Indian National Trust for Art and Cultural Heritage-Kashmir (INTACH-K)** is teaming up with the J&K Handicrafts department.
- They're working together to map out the craft industry before the official nomination process.
- The city's official inclusion announcement is expected within the next couple of months.
- World Crafts Council International (WCCI):
 - It is a non-profit organization dedicated to recognizing and preserving traditional crafts globally.
 - It is based in **Kuwait**.
 - The WCC was founded in **1964**.
 - **Objective:** The WCCI aims to promote, preserve, and evolve handicrafts globally.
- The World Craft City (WCC):
 - Establishment Date: **2014**
 - Organising Institution: The World Crafts Council International (WCCI)
 - Country of Establishment: Kuwait

- Objective: It aims to recognize the efforts of local governments, artisans, and communities in enhancing culture, economy, and society.
- WCC wants to create a worldwide network of craft cities.
- It promotes the ideas of the creative economy and protects traditional crafts.
- Legal Status: WCC is registered in **Belgium** as an international association without lucrative purposes (AISBL).
- This registration status signifies its non-profit nature and international scope of operations.
- It is Affiliated to the UNESCO under Consultative Status
- World Crafts Council (WCC) Regions:
- WCC is divided into five regions: **Africa, Asia Pacific, Europe, Latin America, and North America.**
- These regions help organize and manage WCC activities worldwide.
- Criteria to grant cities WCC Status:
- Cities are granted the prestigious WCC status based on their commitment to craftsmanship, cultural heritage, and sustainable practices.
- Parameters:
- How well crafts have been preserved
- Initiatives for artisans
- Adherence to age-old practices.
- Kashmir Craft:
- Kashmir's rich tradition of handicrafts is significantly influenced by Central Asian countries.

- The handicrafts, including shawls and carpets, reflect centuries-old practices.
- Craftsman and Artisan Base:
- Srinagar is home to **20,822 registered craftsmen** engaged in various crafts such as **papier mâché, walnut wood carving, and hand-knotted carpets.**
- These craftsmen contribute approximately 1.76% to the total workforce of the area.
- *Benefits of selecting Srinagar:*
- Srinagar's centuries-old practices of handicrafts would be highlighted on the global stage.
- The world would come to know about the flawless craft work done by Srinagar's artisans.
- Handicrafts contribute about **2.64%** to Jammu and Kashmir's economy by 2016-17
- Local artisans from Kashmir would get an opportunity to interact with the best of artisans from across the world.
- Close linkage with other countries: Srinagar being included in the WCC would help in building linkages with those countries that influenced the crafts of Kashmir many centuries ago.
- It would be helpful in strengthening relations between India and other countries.

Bombay High Court in its verdict dismissed a suit challenging Syedna Mufaddal Saifuddin's position as the 53rd religious leader of Dawoodi Bohra Community.

- **Ruling Based on the Petition:** In 2014, the **52nd al-Dai al-Mutlaq, Syedna Mohammad Burhanuddin**, passed away, and his son, **Mufaddal Saifuddin**,

succeeded him as Syedna. This was challenged by the late Syedna's (Burhanuddin's) half-brother, Khuzaima Qutbuddin, in the Bombay HC.

- Judgment pronounced Based on the issue of proof and not faith : High Court Considered the Maintainability of Suit, Can the Objective of **Nass** be changed with time ?, On the Validity of Nass to Saifudin, Requirement of Nass, is there any adequate evidence with claimants etc
- Therefore By Considering all the Fact HC observed that : Based on the more evidence with current Dai & nass could be changed with time etc. gave its judgment.
- Dawoodi Bohra Community:
- The Dawoodi Bohra are a **Shia Muslims, sect** of followers of Islam who adhere to the **Fatimi Ismaili Tayyibi** school of thought.
- Their faith is based on the belief in one deity; **Allah Ta'ala**, in the Holy Quran as the word of Allah and in the sacred mission of the Prophets and their successors.
- This sect is known to have originated **from Egypt later shifting to Yemen.**
- The Dawoodi Bohra Muslims settled in India in the **11th century.**
- The seat of the sect was moved to **Sidhpur (Patan district of Gujarat)**, India in the year **1539** from Yemen.
- The Bohra Muslim community considers Surat in Gujarat their base, despite their presence in Maharashtra, and Madhya Pradesh as well.
- **Occupation** : They have traditionally been a community of traders and entrepreneurs & qualified professionals in numerous fields.
- Presence around the World : More than **5 lakh members in India** and more than 10 lakh members over the 40 countries across the world.
- **Power to excommunicate:**
- The leader of the community is recognised by the members as having the right to excommunicate its members.

- In practical terms, excommunication means not being allowed to access a mosque belonging to the community or a burial dedicated to the community.
- Among the members of the community who have faced excommunication in the past are those who contested the headship of the leaders.
- ***Al-Dai-Al-Mutlaq (Spiritual Head):***
- Throughout the world they are guided by their spiritual leader known as the Al-Dai-Al-Mutlaq.
- The present leader is the 53rd al-Dai al-Mutlaq, 'Dr Syedna Mufaddal Saifuddin'
- Their Principal seat in Mumbai.
- *How is the successor of the Dawoodi Bohra leader picked?*
- **Through Nass (Conferment of Succession)**
- As per faith and the Dawoodi Bohra doctrine, a successor to the Dai is appointed through "**divine inspiration**".
- The "nass", or **conferment of succession**, can be conferred upon any deserving member of the community.
- In practice though, the nass is often conferred upon a member of the family of the current Dai.

Global Report on Food Crises: acute hunger remains persistently high in 59 countries.

- Nearly 282 million people faced high levels of acute food insecurity in 59 countries with 1-in-5 people assessed in need of critical urgent action in 2023, according to the 2024 Global Report on Food Crisis (GRFC), released recently.
- *Global Report on Food Crises (GRFC) 2024:*
- **GRFC** is produced annually by the **Food Security Information Network(FSIN)** and launched by the **Global Network Against Food Crises**, a

multi stake holder initiative that includes United Nations agencies, the European Union, the United States Agency for International Development, and non-governmental agencies working to tackle food crises.

- Highlights of GRFC 2024:
- The report analyzed a population of 1.3 billion in 2023 across 59 countries.
- 2023 was the fifth consecutive year of rises in the number of people suffering **acute food insecurity**, defined as when populations face food deprivation that threatens lives or livelihoods, regardless of the causes or length of time.
- Nearly **282 million** people faced high levels of acute food insecurity in 59 countries in 2023.
- The report identifies conflicts, extreme weather events, and economic shocks as the three main drivers behind the exacerbation of food crises in the world.
- With food crisis escalating alarmingly in conflict hotspots in 2023, notably Palestine (**Gaza Strip**) and **Sudan**, conflict / insecurity became the primary driver in 20 countries, directly affecting 135 million people.
- The Gaza Strip became the area with the most severe food crisis in the last eight years of GRFC reporting.
- Sudan is facing one of the worst food crises in the world, with almost a third of the population in need of emergency food aid.
- Meanwhile, weather extremes were the main driver for 18 countries, with over 72 million people facing high levels of acute food insecurity because of such extreme weather events.
- The 10 countries with the **world's largest food crisis in 2023** were the **Democratic Republic of the Congo, Nigeria, Sudan, Afghanistan, Ethiopia, Yemen, the Syrian Arab Republic, Bangladesh, Pakistan, and Myanmar.**

- On a positive note, the situation improved in 17 countries in 2023, including the Democratic Republic of Congo and Ukraine.

ART AND CULTURE

Nuggets of history from Sannati village in Kalaburagi district

About Sannati Buddhist site:

- It is the ancient **Buddhist site** on the bank of **Bhima river** near Kanaganahalli (forming part of Sannati site) in Kalaburagi district, Karnataka. It is also popular among tourists for the **Chandrala Parameshwari Temple**.
- Major findings in this site:
 - It is believed to have been developed in three constructional phases – **Maurya, Early Satavahana and Later Satavahana** periods stretching from 3rd Century B.C. to 3rd Century A.D.
 - **Ranamandala** area of Sannati offers a unique chronological scale from **prehistoric to early historic times**.
 - An **inscription** written in the Prakrit language using the Brahmi script is also found here.
 - The excavation also recovered another precious stone of historical importance – a stone **sculpture portraying Mauryan Emperor Ashoka**. The emperor is seen surrounded by his queens and female attendants in this rare sculpture. The sculpture had the words **“Raya Asoko”** etched on it in **Brahmi script** leaving little scope for mistaking the identity of the man featured in it.
 - The recoveries included around 60 dome slabs with sculptural renderings of selected **Jataka stories**, main events in the life of the

Master, portraits of Shatavahana monarchs and certain unique depictions of Buddhist missionaries sent by Ashoka to different parts

- The site of ancient **Nagavi Ghatikasthan**, which was often termed the Takshashila of the South by historians, is around 40 km away from Sannati.
- The Ghatikasthan, which had the status of a present-day university, was a major education hub during rulers of the Rashtrakuta and Kalyana Chalukya dynasties between the 10th and 12th Centuries.

Kumittipathi Rock Paintings at Pathimalai, TN

Kumittipathi Rock Paintings:

- These Kumittipathi Rock Paintings are among the **most important rock art** in the **Kongu region** and are around **3,000 years old**.
- They are drawn with **white pigments on the walls of a natural cave** and depict animals, human figures, and chariots.
- **Variety of Depictions:** Besides the elephant, the Kumittipathi Rock Paintings portray a chariot (interpreted by some as a peacock), human figures, and scenes from the lives of ancient inhabitants.
- **Caves used for Dwellings:** Small holes are also present that might have been used by the people who lived there to store water and other things.
- **Variety in Age and Materials:**
 - The rock expert suggests not all Kumittipathi Rock Paintings are from the same period.
 - **Materials:** Artists likely used inorganic white pigment and natural gum.
- **Similar Paintings in the Region:** Rock paintings resembling those at Kumittipathi can be found at **Vellarukkam Palayam, Viraliyur, and Kovanur**.
 - They depict hunting scenes and other activities.
- **Interpretation of elephant image**

- Mavuthampathi (suggesting a place inhabited by mahouts)
- Velanthavalam (a place for Vezham, which means elephant).
- **Age:** The elephant image is believed to be among the oldest paintings in the cave.
- **Possible meaning:**
- **Elephant trade:** Some argue that the elephant image indicates the practice of capturing wild elephants and their trade owing to the proximity of Kumittipathi to two places:
 - **There is no evidence to support the claim: Others say there is no historical evidence linking** the paintings to the two places.
- About Rock Art
- Rock art refers to drawings, paintings, or similar works created on or of stone, typically from **ancient or prehistoric times**.
- It includes various forms, such as drawings (**pictographs**), **carvings (petroglyphs)**, **engravings, rock arrangements (petroforms)**, and **ground drawings (geoglyphs)**.
- These artworks often show ancient animals, tools, and human activities, offering insights into past daily life. However, they are often symbolic rather than realistic.
- Rock art sites can have art from **different centuries**, showing the evolution of artistic styles over time.
- **Cave Painting**
- Cave paintings are a type of rock art known **as pictographs**.
- Historian's Perspective on Elephant Trade
- **Denial of Elephant Trade:** Historians disagree that the Kumittipathi Rock Paintings represents elephant trade, citing the absence of a governing empire in the region during the painting's creation.

- **Trade with Romans: Trade in the area with the Romans has been supported, but no historical evidence connects the paintings to the elephant trade.**
- Alternative Interpretation:
- **Daily activities or religious practices:** According to some historians, the rock paintings may depict daily activities or religious practices rather than the elephant trade.
- **Festival or an organized society:** It has been suggested that an image interpreted as people pulling a chariot might symbolize something different, such as a festival or an organized society.
 - Despite being attributed to hunters, the paintings could serve as a representation of broader societal aspects.
- Historian Perspective on Kumittipathi Rock Paintings
- **Purpose:**
- According to the archaeologists, the Kumittipathi Rock Paintings were created by tribal people for entertainment or because they believed that depicting hunting scenes increased hunting success.
 - However, there are few hunting scenes at Kumittipathi.
- Meaning of a Specific Figure (Car):
- According to archaeology, a figure resembling a car might be a peacock.
- **Murugan Temple:**
- A Murugan temple atop the hillock suggests that early inhabitants may have worshipped the deity.
 - There are also megalithic burial sites in the region
- **Dating the Kumittipathi Rock Paintings:**

- By linking the paintings to nearby megalithic burial sites, archaeologists estimate the art could date back to the **5th Century BCE**.
- **Geographical Significance:**
- Kumittipathi is situated in the **Palakkad Gap of the Western Ghats**, a notable break in the mountain range.
 - This geographical feature has historically served as a corridor **connecting Tamil Nadu and Kerala**.
- **Trade route:** There were ancient trade routes **known as Peruvazhi in the Palakkad Gap**.
 - **These trade routes existed between Anamalai and Ayyasamy Malai**.
- **Trade route in the Sangam period:** During the Sangam period, three trade routes passed through Anamalai, Vellalore, and Avinashi.

An earthen pot containing lead coins from Ikshvaku period unearthed in Phanigiri, Suryapet.

Phanigiri:

- It is a famous Buddhist site located 110 km away from Hyderabad.
- This site derived its name from the shape of the hillock, which appears to be like a snake hood. The word **Phani** in Sanskrit means **snake and Giri** means **hillock**.
- It is believed to be one of the important Buddhist monasteries strategically located on the ancient trade route (**Dakshinapatha**) connecting the west and the east coast of the Deccan.
- Other findings of the excavation:
- Coins: Lead coins with elephant symbol on one side and **Ujjain** symbol on the other side are found.
- According to the archaeologists, the coins belong to the **Ikshvaku period** dated between 3rd century and 4th century Common Era.

- Also stone beads, glass beads, shell bangle fragments, **stucco motifs**, broken limestone sculptures, a wheel of a toy cart, final nails and pottery are excavated.
- **Mahastupa**, apsidal **Chaityagrihas**, Votive stupas, pillared congregation halls, Viharas, platforms with staircases at various levels, octagonal stupa chaitya, 24-pillared mandapam, circular chaitya, and cultural materials that included terracotta beads, semi-precious beads, iron objects, **Brahmi** label inscriptions and holy relic casket are also excavated.
- All the cultural material is datable from the **1st century BCE to 4th century CE**.
- The **toranas** discovered at Phanigiri show that **Mahayana and Hinayana schools** coexist here.
- *Other Important Sites In Region:*
- Vardhamanukota, Gajula Banda, Tirumalagiri, Nagaram, Singaram, **Aravapalli**, **Ayyavaripalli**, Arlagaddagudem, and Yeleswaram.
- *Ikshvaku Period:*
- The Ikshvaku dynasty (**c. 225-340 A.D**) was a **feudatory tribe** under the patronage of the great **Satavahana Empire** that ruled the Andhra region, the delta of the Krishna and Godavari rivers on the east coast, situating their capital at **Dharanikota** (present-day Amravati).

The Bihar government took an initiative to promote the Kesariya Stupa, as a major tourist attraction worldwide.

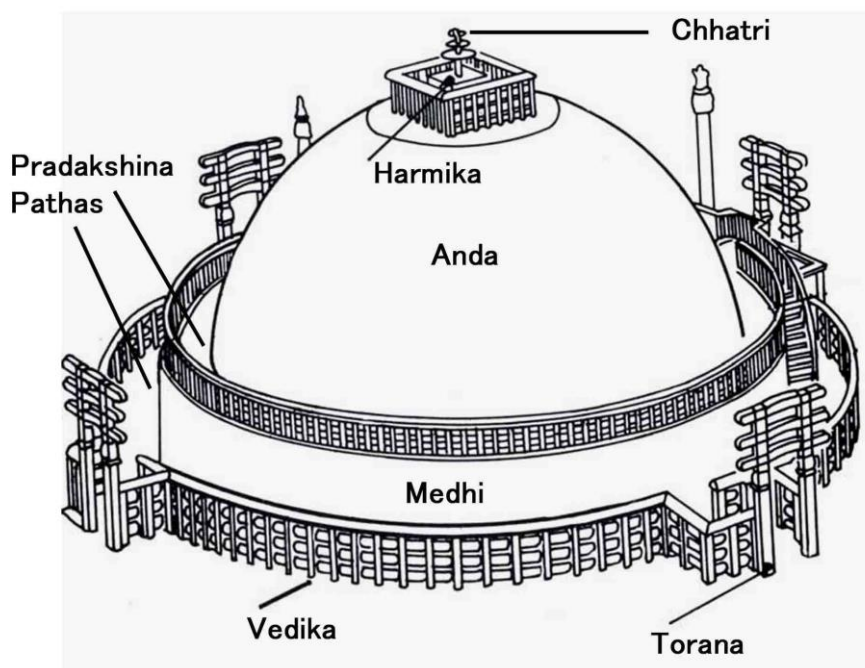
Kesariya Stupa:

- The **Kesariya** Stupa is a significant Buddhist monument. It is also a pilgrimage site for Buddhists worldwide.
- Location: Kesariya village, **Patna**, Bihar

- Significance: It's known for being the **largest and tallest Buddhist stupa** in the world.
- Stupa:
- Stupa is a **burial mound** made of dirt and stones.
- It often keeps religious relics and sacred items of Buddha.
- This spot is used for meditation too.
- Types of Stupas:
- **The Relic stupa**: It contains remains of Buddha and its disciples
- **The object stupa**: It contains belongings of Buddha and its disciples
- **The commemorative stupa**: This Stupa marks events in Buddha's life.
- **The symbolic stupa**: It represents the teachings of Buddhism.
- **The votive stupa**: This stupa was erected on relics for dedication.
- The Kesariya Stupa is a testament to India's rich culture and religion.
- It is a symbol of Buddhism, its values, and teachings.
- Construction Period: This Stupa was Built in the **3rd century BCE** under the Mauryan Empire by the legendary **emperor Ashoka**.
- Construction Belief: The stupa was constructed to commemorate the spot where Lord Buddha delivered his **22nd sermon** and also to mark the place where he announced his **impending death**.
- Discovery of Kesariya Stupa in British Era:
- **Colonel Colin Mackenzie**, who later became **India's first surveyor-general**, visited Kesariya Stupa in **1814**.
- **Excavation by Alexander Cunningham**: Alexander Cunningham, the first head of the Archaeological Survey of India (ASI), conducted a small-scale excavation near the site in **1861**.
- ASI Excavation: The **ASI excavated** significantly at Kesariya Stupa in 1998.

- Features:
- Impressive Height: This Stupa is **104 feet tall**, making it the **world's tallest Buddhist monument**.
- It is of a circular base with a **diameter of 123 metres**.
- **Circular Design:** Built in a circular shape using bricks, mud, and lime mortar.
- **Outer Surface:** Covered with white plaster, enhancing its visual appeal.
- Architectural Features:
- Dome and Chamber: The Kesariya Stupa has a **solid hemispherical dome** with a small chamber.
- It is believed to have **held relics of Lord Buddha**.
- **Harmika:** It is Crowned by an umbrella-like structure called **Harmika**.
- The crown is adorned with intricate stone carvings.
- **Terrace:** The stupa has six terraces or layers with small rooms for Buddha statues.
- On the top of the structure, there is a huge cylindrical drum.
- **Balustrade and Gateways:** The stupa is enclosed by a balustrade with four gateways.
- These gateways are decorated with carvings of Buddha's life scenes.
- **Helical Staircase:** In Stupa, there is a helical staircase that leads to the top of the stupa.
- The staircase has 80 steps, and is thought to have been utilized by monks for circling around the stupa.
- Eight smaller replicas of famous tourist attractions will encircle the Kesariya Stupa. These tourist points are the **Mahabodhi Temple**, ancient **Nalanda** and **Vikramshila universities**, **Ashokan Pillar of Vaishali**, **Vikramshila University**, **Barabar Caves**, **Sujata Stupa**, **Gurpa Hills** Buddhist site, and the **Vishva Shanti Stupa**.

Plan of a Stupa with two pradakshinapathas



Fossils of massive prehistoric snake found in lignite mine in Gujarat.

Vasuki Indicus

- The fossils of **Vasuki indicus** were found in Kutch, Gujarat.
- Vasuki refers to the **mythical snake** often depicted around the neck of the Hindu god Shiva.
- The fossilized Remains: A 27 pieces of a “partial, well preserved” vertebral column were found in **Gujarat’s Panandhro Lignite Mine in Kutch**.
- It lived in the **Middle Eocene period** (roughly 47 million years ago) in India.
- The organism lived at a time when temperatures were relatively warm, at roughly 28 °C.
- It belonged to the now-extinct **Madtsoiidae snake family** but represents a unique lineage from India.

- Madtsoiidae are Gondwanan terrestrial snakes that lived between **the Upper Cretaceous (100.5 million to 66 million years ago) and the Late Pleistocene (0.126 million years ago to 0.012 million years ago)**.
- These snakes spread from India through southern Eurasia and into north Africa after the Indian subcontinent collided with Eurasia about 50 million years ago.
- Features:
- It reached lengths between **10 and 15 metres** long and 1 tonne in weight.
- It likely had a broad and cylindrical body, hinting at a robust and powerful build, and was as big as **Titanoboa**, a massive snake that once roamed the earth and is reportedly the longest ever known.
- Vasuki was a slow-moving ambush predator that would subdue its prey through constriction, like anacondas and pythons.

Three new archaeological sites discovered in Telangana.

- The site was discovered by a team comprising K.P. Rao, history professor of the University of Hyderabad, and Ch Praveen Raju, research scholar from Yogi Vemana University, Andhra Pradesh.
- Unique Features:
- **Dolmenoid Cists Shaped by Cap-Stones:** The side slabs are arranged with slabs following the shape of the cap-stone. Hence, each 'dolmenoid cist' has a unique shape as dictated by the cap-stone.
- In Europe, such monuments are known as **Passage Chambers**.
- This site has new types of monuments, which have not come to light so far anywhere in other regions of India.
- Usually in this region, a type of megalithic monument known as 'Dolmenoid Cists' is found.
- Most of the monuments in this region have squarish or rectangular shapes.

- Two New Rock Art Sites: The team also discovered two new rock art sites at **Damaratogu in Gundala mandal** of Bhadradi Kothagudem district.
- One of the sites, known as '**Devarlabanda Mula**', has only depictions of animals and no humans.
- Since no weapons or domestic animals are shown, it is believed that the paintings may go back to the **mesolithic age**, anywhere between **8000 – 3000 BCE**.
- Iron Age:
- Chronology of the Iron Age in Peninsular India: In peninsular India, the **Iron Age** roughly covers the period from **1000 BC to 100 A.D.**
- This is also a period for which textual evidence is available. Hence, scholars differ in their approach by working only with the archaeological evidence or incorporating the available textual evidence.
- Prominence of Megaliths: In peninsular India, the Iron Age primarily encompasses megalithic structures, often linked with habitation sites, within the region.
- Iron Age in North India: It is archaeologically represented by assemblages that mainly contain particular pottery types such as **Painted Grey Ware (PGW) and Northern Black Polished Ware (NBPW)**.
- Megaliths:
- About: In prehistoric art, a megalith is a large, often undressed stone that has been used in the construction of various types of **Neolithic, Chalcolithic or Bronze Age monuments**, during the period **4500-1000 BCE**.
- Megalithic Monuments: The megalithic monuments of peninsular India, believed to have been erected in the Iron Age (1500 BC – 200 AD).
- Though megalithic sites are found all across India, they are concentrated mostly in peninsular India.

MISCELLANEOUS

Union Health Ministry launches myCGHS iOS app

About myCGHS app:

- It is designed to enhance access to **Electronic Health Records**, information and resources for **Central Government Health Scheme (CGHS) beneficiaries**.
- It is developed by the technical teams of the **National Informatics Centre (NIC)** Himachal Pradesh and NIC Health Team.
- It is a convenient mobile application offering features aimed at enhancing information and accessibility for CGHS beneficiaries.
- It facilitates a wide range of services, including booking and cancellation of online appointments, downloading CGHS card and index card, accessing lab reports from CGHS labs, checking medicine history, checking medical reimbursement claim status, accessing referral details and locating nearby wellness centers etc.
- The app features security features like **2-factor authentication** and functionality of **mPIN** ensuring the confidentiality and integrity of users' data.
- **Key facts about Central Government Health Scheme:**
- It gives healthcare facilities to registered **employees** and **pensioners of the Central Government of India**.
- The enrolled members are provided reimbursement and cashless facilities under this scheme.
- It covers health care under different systems of medicine, such as **Allopathy, Homeopathy, Ayurveda and Unani**.
- CGHS beneficiaries can undergo treatment at any empanelled private hospital of their choice.

Bollywood actor-turned-politician Kangana Ranaut recently stirred up a storm after she claimed that Netaji Subhas Chandra Bose was the first prime minister of India.

Azad Hind Government:

- In **1943, on October 21, Netaji Subhash Chandra Bose** announced the formation of the '**Arzi Hukumat-e-Azad Hind**' or the provincial government of free India in Singapore and declared war on the British Empire.
- Under the provisional Government, **Bose was the Head of State, Prime Minister, and Minister of War.**
- **Captain Lakshmi** headed the women's organisation while **SA Ayer** headed the publicity wing in the newly formed government.
- Revolutionary leader Rash Behari Bose was designated as the supreme adviser by Netaji Subhash Chandra Bose.
- The government was supported by the Axis powers of Imperial Japan, Nazi Germany, the Italian Social Republic, and their allies.
- Significance of the Azad Hind government:
- Soon after the formation of the government, the Azad Hind government proclaimed authority over Indian civilian and military personnel in Southeast Asian British colonial territory and prospective authority over Indian territory to fall to the Japanese forces and the Indian National Army during the Second World War.
- The provisional government not only enabled Bose to negotiate with the Japanese on an equal footing but also allowed him to mobilise Indians living in East Asia to join and support the **Indian National Army (INA).**
- The Indian National Army drew ex-prisoners and thousands of civilian volunteers from the Indian expatriate population in Malaya (present-day Malaysia) and Burma (now Myanmar).

- The provisional government was also formed in the **Japanese-occupied Andaman and Nicobar Islands**. The islands were reoccupied by the British in 1945.
- The Azad Hind government under Bose had in fact started its **own bank, currency, civil code, and stamps**.
- Bose had even formed the **first women's regiment of the INA**, the Rani Jhansi Regiment, thus laying the foundation for equal opportunity for women in armed forces.

WHO launches gen-AI powered digital health promoter S.A.R.A.H. for public health

About S.A.R.A.H.:

- **Smart AI Resource Assistant for Health (S.A.R.A.H.)** is a digital health promoter prototype with enhanced empathetic response powered by **generative artificial intelligence (AI)**.
- It is launched by the **World Health Organisation (WHO)**. It aims to provide an additional tool for people to realize their rights to health, wherever they are.
- **Features:**
 - It is trained to provide information across **major health topics**, including healthy habits and **mental health**
 - It has the ability to **support people** in developing better understanding of risk factors for some of the leading causes of death in the world, including cancer, heart disease
 - It can help people **access up-to-date information** on quitting tobacco, being active, eating a healthy diet and de-stressing among other things.
 - It can engage users 24 hours a day in **8 languages** on multiple health topics, **on any device**. It is now powered by **generative AI** rather than a pre-set algorithm or script helping her to provide more accurate responses in real-time.

‘Voluntary Code of Ethics’ for social media platforms.

Voluntary Code of Ethics (CoE):

- The CoE was introduced in **2019** by social media platforms (**SMPs**) and the **Internet and Mobile Association of India (IAMAI)** to encourage free and ethical electoral processes on social media.
- Features of CoE:
- **Transparency** in paid political ads is a crucial focus, ensuring that the content is openly acknowledged.
- **Pre-certification** requires political ads to be reviewed and certified by the **Media Certification and Monitoring Committee** before they're published on social media.
- Origins and Implementation of CoE:
- As social media's role in politics increased, the **Election Commission of India (ECI)** created a committee, led by **Deputy Election Commissioner Umesh Sinha**, to examine its impact on elections.
- The committee recommended changes to the **Representation of People Act, 1951**, addressing social media activity in the critical 48 hours before polling.
- IAMAI and social media platforms developed the Voluntary Code of Ethics for General Election 2019, which was implemented immediately and applies to all following elections.
- Commitments Under CoE:
- **Rapid Response:** Social media platforms must acknowledge and process ECI's notifications of possible violations within three hours.
- **Prohibition Period:** The CoE emphasizes compliance with Section 126 of the Representation of People Act, which restricts displaying electoral content during the **48-hour period before** polling ends.
- **Dedicated Reporting Mechanism:** SMPs have a high-priority channel for ECI to quickly report and act on violations.

- **Grievance Redressal:** Social media platforms have a dedicated grievance redressal channel to handle reported violations promptly.

Nestlé's baby food sold in Asian, African countries had added sugars: Why is sugar harmful?

- Nestlé's baby food products contain **added sugars** in **Asia, Africa, and Latin America**. In contrast, their products in **Europe** typically **don't have** added sugars.
- A report by the Swiss organization **Public Eye**, titled "**How Nestlé gets children hooked on sugar in lower-income countries**", criticizes Nestlé for varying nutritional standards based on different countries.
- *Findings from the Report:*
- **Cerelac**, a popular baby cereal, has different sugar content in various countries.
- In Germany and the UK, there are no added sugars.
- However, in India, it contains nearly **3 grams** per serving, over **5 grams** in **Ethiopia**, and **6 grams** in **Thailand**.
- Nestlé holds a **20% share** of the **\$70 billion** global baby food market.
- However, sugar content isn't always clearly labelled on the packaging.
- Although added sugars in baby foods are legal in some countries, they conflict with **WHO guidelines**, which suggest reducing free sugar intake to **less than 10%** of total energy, ideally **under 5%**.
- Nestlé India has reduced added sugars by up to 30% in its infant cereals over the last five years, which aligns with WHO recommendations.

ON THE RADAR

Added sugar content of
Cerelec wheat product

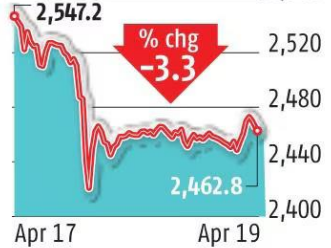
	Grams per portion
Thailand	6.0
Ethiopia	5.2
South Africa	4.0
Pakistan	2.7
India	2.2
Bangladesh	1.6
United Kingdom	0
Germany	0



Sources: Public Eye, IBFAN (2024), Bloomberg

IN THE RED

Nestlé India's intraday
share price in ₹



Compiled by BS Research Bureau

- What Are Added Sugars?
- **Added sugars** are sugars introduced during **food processing** or preparation.
- These can be natural sugars like **white sugar, brown sugar, and honey, or chemically manufactured sweeteners** like **high fructose corn syrup**.
- Why Are Added Sugars Harmful?
- **Nutritional Imbalance:** Consuming added sugars leads to higher calorie intake **without essential nutrients**, which promotes unhealthy diets.
- **Health Risks:** It increases the risk of non-communicable diseases **like diabetes, obesity, and heart disease**.
- **Impact on Children:** Added sugars in baby food can be addictive, especially for babies and young children. The WHO advises against added sugars for children under two years old.
- Ethical and Social Concerns:
- **Consumer Trust:** Selling high-sugar products can breach consumer trust, especially in developing regions.
- **Unfair Practices:** There is evidence of quality differentiation between products sold in **wealthy versus poorer countries**.
- **Transparency Issues:** Companies often fail to disclose the full health impacts of their products.
- Global Trends:

- Growing economies are experiencing increased consumption of products with added sugars due to the **expansion of global brands**.
- UNICEF-Supported Study in Southeast Asia revealed that **nearly half of the children's foods** contained added sugars.

FSSAI order has raised the Maximum residue limit (MRL) of pesticides in herbs.

- The Food Safety Standards Authority of India (FSSAI) order has raised the Maximum Residue Limit (MRL) for pesticides in herbs and spices from **0.01 mg/kg to 0.1 mg/kg**.
- Maximum Residue Limit (MRL) of pesticides in herbs and spices:
- MRL is the highest level of a pesticide residue that is legally tolerated in or on food or animal feed when pesticides are applied correctly in accordance with Good Agricultural Practice.
- **The Codex Alimentarius Commission (CAC)** sets MRLs for all food and animal feed based on recommendations from the FAO/WHO Joint Meeting on Pesticide Residues (JMPR).
- **The Food and Agriculture Organization (FAO) and the World Health Organization (WHO) established the CAC in 1963.**
- Indian Scenario of MRL:
- The FSSAI is responsible for fixing the MRL of pesticides in India.
- The MRLs are outlined under the **Food Safety and Standards (Contaminants, Toxins and Residues) Regulation, 2011**.
- These limits are set based on data from field trials conducted or reported by the **Central Insecticides Board and Registration Committee (CIBRC)**, under the Union Ministry of Agriculture and Family Welfare.
- Issues with increasing MRL:
- It allows for **more pesticides** to be ingested into the human body with severe health implications.

- Differing MRLs can cause trade issues, with importing countries imposing strict limits raising costs for producers, consumers, and possibly halting trade.
- FSSAI:
- The Food Safety and Standards Authority of India is a **statutory body** under the administration of the **Ministry of Health and Family Welfare**.
- It regulates the manufacture, storage, distribution, sale, and import of food articles, while also establishing standards to ensure food safety.
- It was established by the **Food Safety and Standards Act, 2006**, which consolidated all former acts and orders related to food safety that were previously handled by various ministries and departments.

Recently, Indian Air Force's MI 17 V5 helicopter was deployed to extinguish the raging forest fires in Nainital district, Uttarakhand.

Bambi Bucket:

- It was invented by **Don Arney**, a Canadian business, in 1982
- It is a specialized aerial firefighting tool which has been in use since the 1980s.
- The **Bambi Bucket**, also called a helicopter bucket or a **heli-bucket**, is a specialized lightweight collapsible container that releases water from underneath a helicopter to targeted areas.
- The water is released by using a pilot-controlled valve.
- Key features :
- It is available in a variety of sizes and models, with capacities ranging from 270 litres to more than 9,840 litres.
- It can be quickly and easily filled.

- It can be filled from various sources, including lakes and swimming pools, which allows firefighters to swiftly refill it and return to the target area.
- It can be stored within the helicopter until development.
- It discharges a **solid column of water**, “resulting in a more accurate and effective water dump, less evaporation on the descent, and **greater impact force**.”

The US Secretary of State during his three-day visit to China spoke about the production and export of “synthetic opioid precursors” specifically the drug fentanyl.

- The US has primarily blamed Mexico and China for the trafficking of fentanyl.
- Fentanyl synthetic opioids are the leading killer of Americans between the ages of 18 and 49.
- Opioid Menace in India:
- According to the Ministry of Social Justice and Empowerment, the number of opioid users in India stood at **23 million in 2018** – a 600 per cent increase since 2004.
- The number of **cannabis** users stood at 31 million in India.
- **Heroin, pharmaceutical opioids, and opium** were the most commonly-abused opioids in India.
- Opioids:
- They are a class of drugs that “derive from, or mimic, natural substances found in the **opium poppy plant**”.
- Some common opioids include **oxycodone, morphine, codeine, heroin,** and **fentanyl**.
- **Impacts:** According to the US Drug Enforcement Administration (DEA, they are very addictive and have a range of effects, such as euphoria and pain relief.
- Fentanyl Synthetic Opioids:

- **Fentanyl** is a potent synthetic opioid drug approved by the **Food and Drug Administration** for use as an **analgesic [for pain relief] and anesthetic**.
- **Impact:** It is approximately 100 times more potent than morphine and 50 times more potent than heroin as an analgesic.”
- Overdoses can cause “stupor, changes in pupil size, clammy skin, cyanosis [blue skin], coma, and respiratory failure leading to death”.
- Opioids have an instantaneous effect that gets off quickly, necessitating regular use. People who first start taking opioid-based prescription painkillers frequently develop addictions.

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