TNPSC BITS

- Birla Institute of Technology & Science would develop a first-of-its-kind advanced AI+ campus in Amaravati, Andhra Pradesh.
- Indian astronaut Group Captain Shubhanshu Shukla successfully piloted his Axiom Mission 4 (Ax-4) crew members back to Earth after 18 days and splashed down off the coast of San Diego, USA.
- Sierra Leone's Gola-Tiwai complex, which comprises the Gola Rainforest National Park (GRNP) and the Tiwai Island Wildlife Sanctuary, has been inscribed as its first UNESCO World Heritage Site.
- Three Indian fertiliser companies sign five-year deal with Saudi Arabia's Maaden to import 3.1 million metric tonnes of diammonium phosphate (DAP) annually from 2025–26.
  - Indian Potash Limited (IPL), Krishak Bharati Cooperative (KRIBHCO), and Coromandel join hands with Saudi mining company Maaden.
- For the first time, Tamil Nadu has appointed four senior IAS officers as official spokespersons to improve public communication.
  - J. Radhakrishnan, Gagandeep Singh Bedi, Dheeraj Kumar, and P. Amudha will represent the government in sharing updates and welfare initiatives.
- The Deputy Chief Minister of Tamil Nadu inaugurated the renovated Francis Library at Varaganeri, Tiruchi.
  - This library was established in 1952 by the Dravidar Kazhagam (DK) founder, E.V. Ramasamy, in honour of the leader Francis.

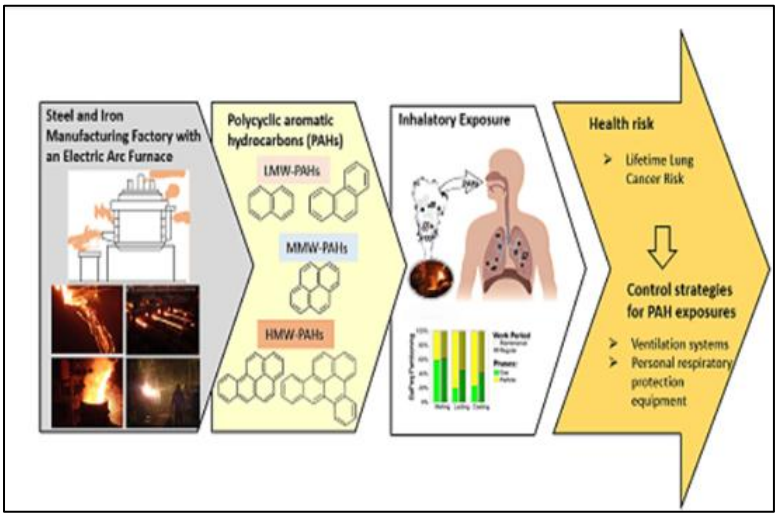
INTERNATIONAL NEWS

More Autonomy to New Caledonia

- France has announced a "historic" deal with New Caledonia, the South Pacific overseas territory.
- The deal had proposed to create a "State of New Caledonia" within the French Republic.
- This offers greater autonomy without full independence.
- The deal still needs approval from both the French Parliament and the people of New Caledonia through a referendum.

SCIENCE AND TECHNOLOGY NEWS

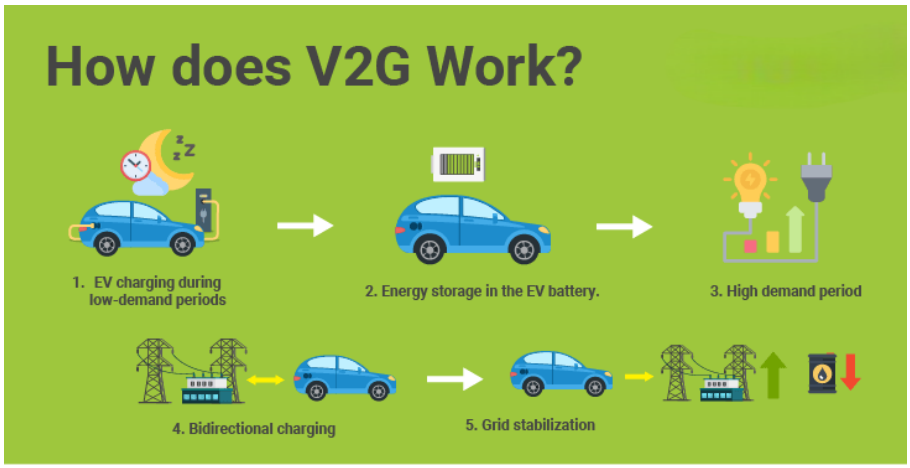
Polycyclic Aromatic Hydrocarbons in space



- Taurus Molecular Cloud 1 (TMC1) contains many small, closed-shell PAHs that surprisingly survive intense starlight.
- They make up about 20% of the carbon in interstellar space and are stable due to their ring-like structure.
- Polycyclic aromatic hydrocarbons (PAHs) are flat carbon and hydrogen molecules commonly found in space.
- Scientists from Australia, Sweden, and the UK found that indenyl cations cool quickly by releasing light (recurrent fluorescence), helping them survive in space.
- At the DESIREE lab in Stockholm, they saw these ions lose energy faster than other PAHs at extremely low temperatures.

V2G technology

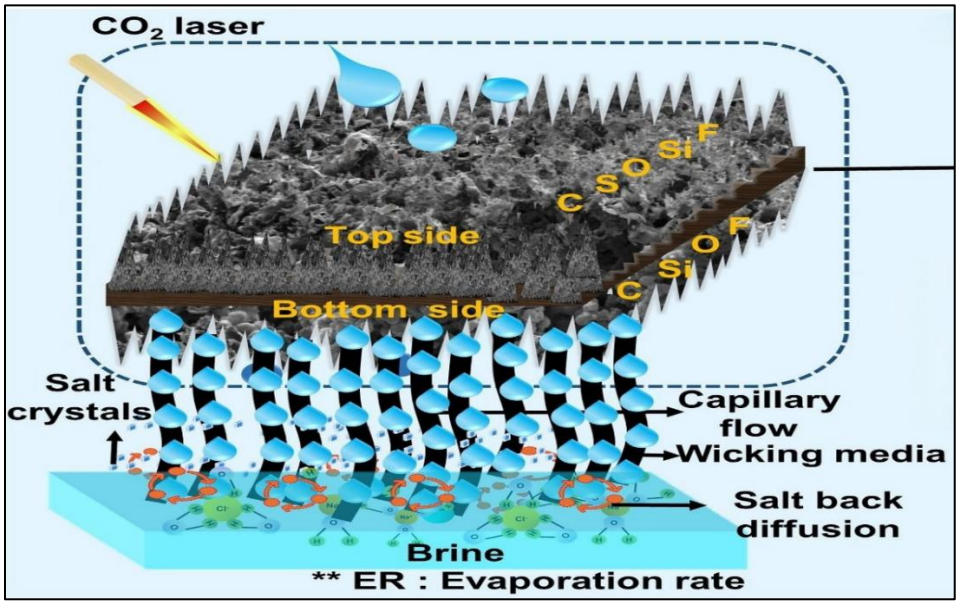
- The Kerala State Electricity Board (KSEB) and the Indian Institute of Technology Bombay (IIT Bombay) have initiated a pilot project to explore the implementation of Vehicle-to-Grid (V2G) technology across the State.
- V2G refers to technologies that enable EV batteries to send power back to the grid.
- When an EV is not in use, it can act as a decentralised battery energy storage device.
- An idle EV, when connected to a bi-directional charger, can provide support to the distribution grid.
- Thus, it has two modes:
  - Grid-to-Vehicle (G2V): Charging EVs using grid power.
  - Vehicle-to-Grid (V2G): Discharging EV power back to the grid.
- This collaboration aims to assess the feasibility of integrating Electric Vehicles (EVs) into the State's power grid.
- The U.S., U.K. and Netherlands lead with EV owners compensated for supplying power during peak demand.



Lotus leaf-like Solar Evaporators

- IIT-Bombay Scientists developed a new hydrophobic Graphene-based material.
- It can facilitate water desalination and could be a significant breakthrough to address the freshwater crisis in the world.
- While water is abundant on Earth, only about 3% of it is freshwater.
- And even within that, less than 0.05% is easily accessible.

- The Dual-Sided Superhydrophobic Laser-Induced Graphene (DSLIG) evaporator addresses multiple shortcomings of earlier evaporators and has the potential for large-scale applications.
- The solar energy-based desalination methods are considered very desirable due to their reduced carbon footprint.
- However, factors such as fluctuations in intensity and availability of sunlight and reduced rates of absorption of light greatly affect the efficiency and consistency of solar energy-based desalination techniques.



Warm and Wet Past of Mars

- NASA's Curiosity rover has discovered siderite mineral deposits on Mars.
- It was offering crucial evidence of the planet's warmer, wetter, and more habitable ancient environment.
- It was marking the first solid evidence of a carbon cycle on Mars.
- Siderite contains carbon and oxygen in the sulfate-rich layers of Martian rocks.

- This is the first time this mineral has been found on Mars.
- NASA's Curiosity Rover is a robotic rover launched on November 26, 2011, aboard an Atlas V rocket and landed on Mars on August 5, 2012.
- It is part of NASA's Mars Science Laboratory (MSL) mission.
- It was the first to use a sky crane landing system to reach the Martian surface.

Paste Fill Technology

- The South Eastern Coalfields Limited (SECL) is becoming the first coal PSU to implement paste fill technology for underground coal mining.
- It will transform how coal is extracted in areas with surface constraints while minimising environmental impact.
- It establishes a framework for the large-scale coal production using paste fill technology at the Singhali underground coal mine in the Korba area of Chhattisgarh.
- The process involves extracting coal from underground seams and then filling the resultant voids with a specially engineered paste.
- This paste consists of a mixture of fly ash, crushed overburden from opencast mines, cement, water, and binding chemicals.

Indigenous Stellite Nozzle

- ISRO has successfully tested an indigenous Stellite (KC20WN) alloy nozzle divergent for the PSLV's fourth stage.
- It was made by replacing imported Columbium (C103) and achieving a 90% cost reduction.

- The divergent nozzle is the flared section of a rocket engine that accelerates exhaust gases to generate thrust.
- Divergent Nozzle controls thrust direction and speed, crucial for stabilising and guiding the rocket during ascent.
- It experiences extreme thermal and mechanical stress during rocket operation, often exceeding 1100°C.
- Columbium (C103), a rare, heat-resistant metal previously imported, was used in PSLV's fourth-stage nozzle.
- Stellite (KC20WN), a cobalt-based alloy enriched with Chromium, Nickel, Tungsten, and Iron.
- It was developed and tested indigenously at ISRO's Propulsion Complex, Mahendragiri in Tirunelveli District.
- It eliminates dependence on costly imports and achieves up to 90% cost savings compared to Columbium-based nozzles.

Super-Fast Charging Battery

- The Indian scientists at JNCASR, Bengaluru, have developed a super-fast charging sodium-ion battery (SIB).
- It can reach 80% charge in just 6 minutes and last over 3,000 cycles.
- The conventional SIBs suffer from sluggish charging and short lifespans.
- This new battery uses a clever mix of chemistry and nanotechnology.
- While lithium-ion batteries have powered this revolution so far, they are costly.
- Besides, lithium resources are limited and geopolitically constrained.

- Sodium is cheap and abundantly available in India, unlike lithium, which is scarce and largely imported.
- A battery built on sodium instead of lithium could help the country to become self-reliant in energy storage technology.

STATES' NEWS

Bihar Special Intensive Revision

- The Supreme Court has permitted the Election Commission to proceed with its Special Intensive Revision (SIR) of electoral rolls in poll-bound Bihar.
- However, the Court asked the Commission should consider accepting key identity documents such as Aadhaar, Ration Card, and Voter ID card during the revision.
- An intensive revision involves a full, fresh preparation of electoral rolls through house-to-house enumeration.
- Enumerators visit every household to record eligible electors as of a qualifying date, without reference to existing rolls.

- The nomenclature "Special Intensive Revision" (SIR) indicates that the ECI is exercising its discretionary powers under Section 21(3) of the 1950 law.
- It permits ECI to revise electoral rolls "in such manner as it thinks fit".
- Intensive revisions of electoral rolls, in all or some parts of the country, have been undertaken earlier in 1952-56, 1957, 1961, 1965, 1966, 1983-84, 1987-89, 1992, 1993, 1995, 2002, 2003 and 2004.
- The Supreme Court in the Mohinder Singh Gill Vs Chief Election Commissioner Case, 1977, upheld the ECI's broad powers under Article 324 to ensure free and fair elections.

IMPORTANT DAYS

National Fish Farmers Day 2025 - July 10

- It is celebrated to honour and commemorate the contribution of Professor Dr. Hiralal Chaudhury and his colleague Dr. K. H. Alikunhi in the Indian fisheries sector.
- They had guided the induced breeding and reproduction in Indian Major Carps by the Hypophysation technique in 1957.
- It eventually led to a revolution in Inland Aquaculture.
- India's fish production has risen from 95.79 lakh tonnes in FY 2013-14 to a record 195 lakh tonnes in FY 2024-25.

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