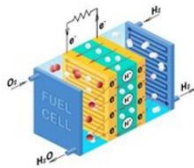


WHAT IS A FUEL CELL?

ISRO recently said it has successfully tested a futuristic fuel cell-based power system.



About Fuel Cell:

- A fuel cell is a device that **generates electricity by a chemical reaction.**
- Fuel cells can be used in a **wide range of applications**, providing power for **applications** across multiple sectors, including transportation, industrial/commercial/residential buildings, and **long-term energy storage for the grid** in reversible systems.

Working:

- A fuel cell **consists of two electrodes**—a negative electrode (or **anode**) and a positive electrode (or **cathode**).
- Both electrodes must be immersed in and **separated by an electrolyte**, which may be a liquid or a solid but must, in either case, **conduct ions between the electrodes** in order to complete the chemistry of the system.
- A **fuel, such as hydrogen, is supplied to the anode**, where it is **oxidised, producing hydrogen ions and electrons.**
- An **oxidizer, such as oxygen, is supplied to the cathode**, where the **hydrogen ions from the anode absorb electrons from the latter and react with the oxygen to produce water.**
- The **difference between the respective energy levels at the electrodes** (electromotive force) **is the voltage** per unit cell.
- The **amount of electric current** available to the external circuit **depends on the chemical activity and amount of the substances supplied as fuel.**
- A **single fuel cell generates a tiny amount of direct-current (DC) electricity.** In practice, many fuel cells are usually assembled into a stack.

- **Advantages of Fuel Cells:**

- Fuel cells have **lower or zero emissions** compared to combustion engines. Hydrogen fuel cells **emit only water**, addressing critical climate challenges as there are **no carbon dioxide emissions**.
- There are also **no air pollutants** that create smog and cause health problems during the operation of a fuel cell.
- They are **quiet during operation** as they have few moving parts.
- They can **operate at higher efficiencies** than combustion engines.
- A fuel cell resembles a battery in many respects, but it can **supply electrical energy over a much longer period of time**.
 - This is because a **fuel cell is continuously supplied with fuel and air** (or oxygen) from an external source, whereas a battery contains only a limited amount of fuel material and oxidant that are depleted with use.

INS CHENNAI

The Indian Navy recently said that it has responded to a hijacking attempt on vessel MV Lila Norfolk by engaging its mission-deployed platforms, including its maritime patrol aircraft (MPA) P8I and INS Chennai.



About INS Chennai:

- It is the Indian Navy's **indigenously designed and constructed guided missile destroyer**.
- It is the **third and last ship of the Kolkata-class** stealth-guided missile destroyers (Project 15A).
- It was **constructed by the Mazagon Dock Limited (MDL)** at Mumbai.
- It was commissioned into the Indian Navy on November 21, 2016.

Features:

- It measures 163 metres in length and has a beam of 17.4 metres.

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- **Displacement: Over 7,500 tons.**
- Top Speed: 30 knots (approx. 55 KM/hour)
- It is powered by four reversible **gas turbine engines.**
- It can **carry 350 to 400 people.**
- **Armament:** It is armed with Vertical launch and long-range surface-to-air and surface-to-surface missile systems like **supersonic BrahMos, ‘Barak-8’ Long Range Surface to Air missiles.**
- The ship is equipped to fight under nuclear, biological and chemical (NBC) warfare conditions.
- It is fitted with a **modern Surveillance Radar**, which provides target data to the gunnery weapon systems of the ship.
- The ship’s **Anti-Submarine Warfare capabilities** are provided by the **indigenously developed Rocket Launchers and Torpedo Launchers.**

PRITHVI VIGYAN SCHEME

To enhance the understanding of the Earth and its vital signs, the Union Cabinet recently approved the “PRITHvi Vigyan (PRITHVI)” scheme.



About the PRITHVI Scheme:

- It is an initiative of the **Ministry of Earth Sciences (MoES)** to **enhance the understanding of the Earth and its vital signs.**
- This overarching initiative, with an allocation of Rs 4,797 crore for the **period 2021-26**, aims to significantly **enhance research, modelling, and service delivery across crucial areas like weather, climate, oceans, and the polar regions.**
- The Prithvi scheme **integrates five existing sub-schemes:**
 - **Atmosphere and Climate Research-Modelling Observing Systems and Services (ACROSS)**
 - **Ocean Services, Modelling Application, Resources and Technology (O-SMART)**

- Polar Science and Cryosphere Research (PACER)
- Seismology and Geosciences (SAGE)
- Research, Education, Training, and Outreach (REACHOUT).
- These programs collectively aim to enhance our understanding of the Earth's vital signs and translate scientific knowledge into practical services that benefit society, environment and economy.

Objectives:

- One of the primary objectives of Prithvi is to **augment and sustain long-term observations** across the atmosphere, ocean, geosphere, cryosphere, and solid earth.
- This will enable recording and **monitoring of the Earth System's vital signs** and changes.
- Additionally, the scheme focuses on **developing predictive models for weather, ocean, and climate hazards**, as well as advancing the understanding of **climate change science**.
- **Exploration of the polar regions and high seas** is another key aspect, aiming at discovering new phenomena and resources.
- The scheme also emphasises the **development of technology for the exploration** and sustainable **harnessing of oceanic resources** for societal applications.
- **Various components of the PRITHVI scheme are interdependent** and are carried out **in an integrated manner** through the combined efforts of the concerned institutes under the MoES.

[NATIONAL REAL ESTATE DEVELOPMENT COUNCIL \(NAREDCO\)](#)

Real estate body NAREDCO recently said it plans to organise a builders' conference in Ayodhya to tap its commercial and residential opportunities.



About the National Real Estate Development Council (NAREDCO):

- It was established in 1998 under the Ministry of Housing and Urban Affairs of the Government of India.
- It is the **leading industry association for the real estate sector** in the country.
- Its **primary objective is to provide a legitimate platform** for the government, the real estate industry, and the general public to **address their concerns and find effective solutions to the challenges faced by the real estate sector.**
- NAREDCO's mission is to **improve the real estate industry's building, construction, and marketing standards.**
- It contributes to the development of national fiscal policies and acts as a catalyst for economic growth in the Indian real estate sector.
- All **major national developers and public sector organisations** in the fields of **housing and real estate development, finance, and marketing** are members of NAREDCO.

Structure:

- The organisational structure of NAREDCO includes **National, State, and City Councils.**
- The **councils ensure that the policy recommendations accurately reflect the real conditions on the ground** and cover the entire geography.
- The **National Council focuses on macro-level issues**, the State Councils address state-level concerns, and the **City Councils tackle local and on-ground issues.**
- **The Union Minister for Housing and Urban Affairs, Govt. of India, serves as the Chief Patron of NAREDCO.**



KADAMBA INSCRIPTION

Recently, an inscription said to be of the 10th century A.D. from the Kadamba period was discovered in the Mahadeva temple at Cacoda in southern Goa.

About Kadamba inscription:

- It is written in **Kannada and Sanskrit**. The inscription opens with an auspicious word **be it well (Swasthi Shri)**.
- It records that when **Talara Nevayya** was administering the mandala, his son Gundayya having taken a vow to fulfil his father's desire of capturing a gopura of the port of Goa, fought and died after fulfilling his father's wish.
- Very interestingly, the record is composed as a vocal statement on the death of his son from the mouth of a lamenting father.
- It is in the **literary style of the Talangre inscription** of Jayasimha I of the same period.

Key facts about Kadambas of Goa:

- The Kadambas of Goa were the subordinates of **Chalukyas of Kalyani**.
- Chalukyan emperor **Tailapa II** appointed **Kadamba Shasthadeva** as mahamandaleshwar of Goa for his help in overthrowing the Rashtrakutas.
- Kadamba Shasthadeva conquered the city of Chandavara from the **Shilaharas in 960 A.D.**
- Later, he conquered the port of **Gopakapattana** (present day Goa).

CENTRE'S DIGI YATRA ENROLMENT TAKES OFF

Why in news?

- Recently, air travellers took to social media to express their shock and anger because their privacy was being violated at airports.
- This was mainly happening due to the forceful promotion of the Digi Yatra initiative by the Union government.

DigiYatra:

- DigiYatrawas rolled out as an entirely voluntary programme from December 2022.
 - In December 2022, it was rolled out at three airports, including Delhi.
 - Since then, it has been implemented at 11 airports, and will be expanded to 14 more in the months to come.
- It is an industry-led initiative co-ordinated by the **Ministry of Civil Aviation** in line with Digital India's vision to transform the nation into a digitally empowered society.
- The 'DigiYatra' is a **Biometric Enabled Seamless Travel experience (BEST)** based on **Facial Recognition Technology**.
- With this technology, the entry of passengers would be automatically processed based on the facial recognition system at all checkpoints – including entry into the airport, security check areas, aircraft boarding, etc.

How can people avail this facility?

Domestic passengers at three airports, including Delhi's, will be now able to authenticate their travel through facial recognition from today, as the first phase of the Digi Yatra system rolls out. Here's how it works. By Neha LM Tripathi

HOW DOES THE NEW SYSTEM WORK?

SETTING UP THE APP

- Step 1** You download and install Digi Yatra app on your phone and complete your registration
- Step 2** You then have to either feed in your Aadhaar card to the app or link your Digi Locker app
- Step 3** You will be asked to take selfie that will record your facial features

WHAT IS Digi Yatra?
Digi Yatra is a facility that allows passengers to link their travel, identity documents with a facial scan - doing away with the need for them to show their boarding passes or ID cards at the airport.

WHAT IT PLANS TO ACHIEVE
It is conceived to achieve contactless, seamless processing of passengers based on facial recognition technology. Officials say it will help drastically cut down queues and waiting times at security check and boarding gates.

Where is it rolling out?
The scheme is originally rolling out for domestic passengers at the airports in three cities - Delhi, Bengaluru and Varanasi - from December 1, 2022. The first phase will also cover another four airports - Hyderabad, Kolkata, Pune, and Vijayanwada - which will get the scheme by March 2023. Later it will be implemented across various airports in the country.

AT THE AIRPORT...

ENTRY GATE

- First, you scan your boarding pass at the E-gate
- You will be asked to stand in a marked area, facing a camera which captures your facial data
- The gate opens as your facial data matches the boarding pass

AT THE TERMINAL

- You can visit the respective air line counter to drop off your check-in baggage, where your boarding pass will also be validated with a facial scan
- If you're performing a self-check-in, then you validate your boarding pass after a facial capture and match

SECURITY CHECK AND BOARDING

- You stand in a demarcated area where your face is scanned by the camera
- The E-gate opens once it matches your facial biometric with tickets and boarding pass

- To use this facility, passengers will need to first download the **DigiYatra app**.
- Users can register on the app using Aadhaar credentials. Then, the person will have to scan his or her boarding pass with the QR code or Bar code, after which the credentials will be shared with the airport.
- For entry into the airport, passengers will need to scan their boarding passes at the e-gate and look into the facial recognition system camera installed there. A similar method will be applicable for entry into other checkpoints.

Recently, the Border Roads Organisation (BRO) has utilised road construction technology i.e. Rejupave technology to build high-altitude bituminous road sections at the Sela tunnel and LGG-Damteng-Yangste (LDY) road near the India-China border in Arunachal Pradesh.



About the Rejupave Technology:

- It is developed by India's oldest and premier road research organisation, CSIR-Central Road Research Institute (CSIR-CRRI).
- It is beneficial in **constructing high-altitude bituminous roads** at low and **sub-zero temperature conditions**.
- This technology brings down the production and rolling temperature of bituminous mixes by 30 degrees Celsius to 400 degrees Celsius with negligible heat loss in the bituminous mix during transit, despite long haulage time amid snowfall.
- This technology's asphalt modifier is a **bio-oil-based product**, which significantly lowers the heating requirement of bituminous mixes besides preserving the bituminous mix temperature during transit.

Significance:

- Rejupave' asphalt modifier in cold climatic regions will **have improved long-term durability** and **better resistance to thermal cracking** under low-temperature conditions.
- It also brings **down the greenhouse gas emissions** in the pristine eco-sensitive mountainous environment of Arunachal Pradesh.

Key facts about CSIR-Central Road Research Institute (CRRI)

- It is a premier national laboratory established in 1952, a **constituent of Council of Scientific and Industrial Research (CSIR)**.
- The major R&D programmes of CRRI related to the research and development projects on design, construction and maintenance of roads and runways, traffic and transportation



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planning of mega and medium cities, management of roads in different terrains, improvement of marginal materials, utilisation of industrial waste in road construction and landslide control etc.

- The institute provides **technical and consultancy services** to various user organisations in India and abroad.
- For capacity building of **human resources** in the area of highway Engineering to undertake and execute roads and runway projects.

