

## NavIC played a crucial role in the success of Operation Sindoor

During Operation, India used **NavIC (Navigation with Indian Constellation)** across several layers of combat operations such as Missile guidance, Drone navigation, Battle Damage Assessment, etc.

### About NavIC

- Developed by **ISRO**
  - It was erstwhile officially known as **Indian Regional Navigation Satellite System (IRNSS)**.
- Coverage:** Provides accurate **Position, Velocity and Timing (PVT)** service up to region extending about **1500 km** beyond the **Indian landmass**.
- Satellite Constellation:** Consists of **7 satellites** and a **network of ground stations** operating **24 x 7**.
  - 3 satellites** are placed in **geostationary orbit** and **4** in inclined **geosynchronous orbit**.
  - These satellites are equipped with **dual-band signals (L5 and S-band)**.
    - The **L5 signal** is encrypted for **military use**.
- Key services:** **Standard Position Service (SPS)** for civilian users and **Restricted Service (RS)** for strategic users.



### Countries with Autonomous Satellite Navigation Systems



United States – GPS



Russia – GLONASS



European Union – Galileo



China – BeiDou

### Strategic advantages of NavIC

- Independence from GPS:** India could strike deep without relying on any **foreign-owned navigation signals**. (In 1999 Kargil War, USA denied use of GPS)
- Encrypted Military Channel:** Prevents jamming or spoofing during missile and drone missions.
- Faster Signal Lock:** Provides higher accuracy over the **Indian subcontinent than even GPS in some regions**.
- Tactical Depth:** With NavIC's expansion to include **NVS (NavIC Second Generation Satellite)** series satellites, India aims to cover the **Indian Ocean Region** more comprehensively.

### India's vision for NavIC includes

- Hypersonic Weapon Integration:** Guiding future **hypersonic glide vehicles (HGVs)**.
- Space Command Network:** Serving as the **digital backbone** for India's **Defense Space Agency, Intelligence, Surveillance, And Reconnaissance (ISR)** satellites, and **kinetic space response units**.

## Ministry Of Earth Science Launches Bharat Forecast System with Improved 6 Km-Grid Accuracy

With the successful integration of the Bharat Forecast System (BFS) into the IMD, India has become the **only country** operating a **global forecast system at such a high resolution in real time**.

### Key Features

- Indigenously Developed:** It is a next-generation weather forecasting model developed by **women scientists** from **Indian Institute of Tropical Meteorology (IITM), Pune**.
  - Installation of the new supercomputer Arka at the IITM facilitated development of BFS.
- High-Resolution Forecasting:** It can provide **6 km resolution forecasts** for the tropical region that falls between **30 degrees South and 30 degrees North Latitudes**.
  - Global forecast models run by the European, British and the US have a resolution between 9 km & 14 km.
- Local Forecasting:** It will deliver **operational forecasts down to the panchayat level**, significantly enhancing the country's ability to **anticipate extreme rainfall & other localized weather events**.
- Accuracy:** It has shown **30%--64% improvement in extreme rainfall forecasts** using real-time modeling based on the '**Triangular Cubic Octahedral Grid model**'.
  - It is a **deterministic model** that produces a **single-model based output**. This means it provides a **definitive forecast** rather than a range of possibilities.
- Doppler Weather Radar Network:** Utilize data from a **nationwide network of 40 Doppler Weather Radars**, ensuring robust, real-time input for accurate forecasting.
  - The number of Doppler radars will gradually increase to 100, enabling nationwide nowcasts i.e., 2-hour weather forecasts.

### Doppler Weather Radar (DWR)

- A Doppler Weather Radar is specialized radar that uses the **Doppler Effect** to track the **movement and intensity of weather systems** like rain, thunderstorms, and cyclones.
  - The **Doppler Effect** refers to the change in frequency or wavelength of a wave, such as sound or light, as perceived by an observer moving relative to the source of the wave.
- It improves weather forecasting accuracy, particularly for severe weather like cyclones.

## Autonomous satellites will redefine the Space technology

Countries are focussing on developing Autonomous satellites.

- In 2024, **China** has successfully launched the world's **first 'self-driving' satellites**; they can autonomously maintain or change flight paths without ground intervention.

### About Autonomous Satellites

- These are satellites designed to perform their functions with **minimal to no human intervention** by utilizing a suite of **advanced technologies** and **algorithms** like Artificial Intelligence (AI).
  - ⊕ These technologies are transforming satellites from **passive observers** into **active, thinking machines**.
- The onboard intelligence is referred as **satellite edge computing** and allows satellites to analyse their environment and make decisions.

### Key Applications

- **Automated space operations**: Independent manoeuvring in space to perform tasks like **docking, inspections, in-orbit refuelling, and debris removal**.
- **Self-diagnosis and repair**: Monitoring their own health, identifying faults, and executing repairs without human intervention.
- **Route planning**: Optimising orbital trajectories to avoid hazards and obstacles or to save fuel.
- **Targeted geospatial intelligence**: **Detecting disasters** and other **events of interest** in real-time from orbit and coordinating with other satellites intelligently to prioritise areas of interest.
- **Combat support**: Providing **real-time threat identification** and potentially enabling autonomous target tracking and engagement, directly from orbit.

### Key Concern associated with Autonomous Satellite

- **AI hallucination**: It may misclassify satellites as hostile, risking accidental satellite confrontations.
  - ⊖ AI hallucination is a phenomenon where an AI System creates false perception by detecting patterns or objects that are non-existent.
- **Gaps in Space laws**: Existing treaties (like Outer space treaty 1967, Liability Convention 1972) assume a human is in control.
- **Other**: Cyber threat, etc.

## NITI Aayog Released a report titled "Designing a Policy for Medium Enterprises"

The report highlights the **structural imbalance within the MSME sector**, the **critical role of medium enterprises**, and proposes **targeted policy interventions** to harness their untapped potential.

- The **MSME sector** (Refer info graphic for Classification) contributes nearly **29% to the GDP**, accounting for **40% of total exports**, and providing employment to over **60% of the workforce**.
  - ⊕ However, the sector is **heavily skewed toward micro enterprises**, which make up about **97%** of all registered MSMEs, followed by **small enterprises (2.7%)** & **medium enterprises (0.3%)**.
  - ⊕ Despite constituting just **0.3%** of the MSME base, **medium enterprises contribute nearly 40% of MSME exports**.

### Challenges Faced by Medium Enterprises

- **Outdated Technology**: 82% of Medium Enterprises do not have advanced technologies (Industry 4.0 – AI, IoT, etc.) integrated into their business operations.
- **Low Utilization of Skill Development Schemes**: 88% of Medium Enterprises are not availing themselves of any government skill development or training schemes.
- **Funding**: In India, only 37% of Medium Enterprises are able to secure loans (**World Bank Indian MSME Financing Report**).
- **Compliance burden** due to the numerous inspections from various authorities, including labour inspectors, health inspectors, etc.
- **Inadequate R&D**: Only 22% of medium enterprises engage in R&D, compared to **60%** of large enterprises.

New classification of MSME				
Type	INVESTMENT		TURNOVER	
	Current	Revised	Current	Revised
Micro Enterprise	Rs 1cr	Rs 2.5cr	Rs 5cr	Rs 10cr
Small Enterprise	Rs 10cr	Rs 25cr	Rs 50cr	Rs 100cr
Medium Enterprise	Rs 50cr	Rs 125cr	Rs 250cr	Rs 500cr

### Way Forward - Targeted Policy Interventions

- **Tailored Financial Solutions**: Introduction of a **working capital financing scheme** linked to enterprise turnover; a **₹5 crore credit card facility** at market rates etc.
- **Creation of a dedicated sub-portal** within the **Udyam platform** featuring scheme discovery tools, compliance support, and AI-based assistance.
- **Integration of medium enterprise-centric modules** into existing Entrepreneurship & Skill Development Programmes.
- **Other**: R&D Promotion Mechanism, Cluster-Based Testing Infrastructure etc.

## Establish a Centralized Oversight Mechanism for Tribunals: Confederation of Indian Industry (CII)

The CII recommended amending **Tribunal Reforms Act, 2021** to create a **statutory central oversight body** defining the mandate, structure, scope, and responsibilities.

- Such a central body could undertake functions like performance monitoring, coordination with the Search-Cum-Selection Committees, capacity building etc.

### Need of Centralized Oversight Mechanism for Tribunals

- **Fragmented Administrative Control:** Over 16 central tribunals operate under different ministries which lead to lack of standardization and functional inconsistencies.
- **Judicial Independence:** Executive control over tribunal appointments and service conditions undermines the **separation of powers**. A centralized body would ensure **transparent and merit-based appointments**, shielding tribunals from executive influence.
- **Uniformity:** Currently, there is no uniformity in **composition, selection process or qualifications** of tribunal members.
- **Improve Efficiency of tribunals:** For **unlocking substantial fiscal resources** tied up in disputes and improving the overall ease of doing business.
  - ⊕ E.g., as of 31st December 2024, 6.7 trillion was pending resolution at the Income Tax Appellate Tribunal alone, which constituted nearly 57% of all ligated direct taxes amount in the country.
- **Judicial Directions:** Supreme Court in **L. Chandra Kumar (1997)** & **Madras Bar Association (2020)** cases emphasized the need for a **central oversight body**.

### About Tribunals

- Tribunals are **judicial or quasi-judicial institutions** established by law.
- **Constitutional Provisions:** In 1976, **Articles 323A & 323B** were inserted in the Indian Constitution through the **42<sup>nd</sup> Amendment**.
  - ⊕ **Article 323A:** Empowered Parliament to constitute **administrative Tribunals** (both at central & state level) for adjudication of matters related to public service.
  - ⊕ **Article 323B:** Specified certain subjects like **taxation & land reforms** for which **Parliament/ state legislatures** may constitute tribunals by enacting a law.
- **Significance:** Platform for faster adjudication as compared to traditional courts, as well as expertise on certain subject matters.



### Also In News



#### Kilauea Volcano

Hawaii's Kilauea volcano erupted again after December, 2024 unleashing lava fountains.

- The eruption released a large plume of volcanic material including ash, gas, and **Pele's hair, a glass-like volcanic fiber**.
- Primary hazards **include** high levels of volcanic gas which can interact with the atmosphere to form **vog [volcanic smog]**, which may affect people, animals, etc.

#### About Kilauea Volcano

- **Location:** Southeastern part of the island of Hawaii, U.S.
- It is **one of the world's most active** volcanoes.
- It is situated in the **Hawaii Volcanoes National Park** with its larger but **less active Mauna Loa** (the biggest volcano on Earth).
- Both are **shield** volcanoes.
  - ⊕ **Shield volcanoes** do not form soaring mountains with **conical peaks** like composite volcanoes.



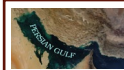
#### Indian National Centre for Ocean Information Services (INCOIS)

INCOIS has sounded a high wave alert along the coasts of Goa, Karnataka, Maharashtra and Kerala.

#### About INCOIS

- **Genesis:** Established as an autonomous body in 1999 under the **Ministry of Earth Sciences (MoES)**.
  - ⊕ It is a unit of the **Earth System Science Organization (ESSO)**.
- **Located in** Hyderabad.
- **Mandate:** To provide ocean information and advisory services to society, industry, government agencies and the scientific community through sustained ocean observations and constant improvements through systematic and focused research.
- **Other INCOIS Services:** Potential Fishing Zone (PFZ) Advisory, Tsunami Early Warning System, Ocean State Forecast (OSF), Coral Bleaching Alerts System etc.





## Persian Gulf

USA President aborted move to rename the Persian Gulf as the 'Arabian Gulf' or 'Gulf of Arabia'.

### About Persian Gulf

- It is a **shallow marginal sea** of the **Indian Ocean** that lies between the Arabian Peninsula and southwestern Iran.
- ⊕ **Strait of Hormuz** link the **Persian Gulf** (west) with the **Gulf of Oman** and the **Arabian Sea** (southeast).
- It is bordered by **Iran, Oman, UAE, Qatar, Bahrain, Saudi Arabia, Kuwait and Iraq**.
- The small freshwater inflow into the gulf is mostly from the **Tigris, Euphrates, and Karun rivers**.
- It is an **important waterway for marine transport**, particularly for oil.



## Panchayat Advancement Index

**Panchayati Raj Ministry** launches **Panchayat Advancement Index 2.0 portal**.

- PAI Portal** has been designed and developed by **National Informatics Centre (NIC)**.
- PAI 2.0 rationalizes indicators from 516 to 147**, ensuring higher data quality, ease of reporting, and actionable insights.

### About Panchayat Advancement Index

- It is a **Multi-domain and multi-sectoral index** that is intended to be used to assess the overall holistic **development, performance & progress of panchayats**.
- It is based on **nine LSDG-aligned themes** such as Women-Friendly Panchayat, Water-Sufficient Panchayat, etc.



## Regenerative braking

India **unveils first 9000 HP locomotive (D-9 engine)** with regenerative braking.

### About Regenerative Braking

- A conventional **electric train braking system** uses **dynamic braking**, where the kinetic energy of the train is **dissipated as waste**, mainly in the form of heat.
- While in **regenerative braking**, the **current** in the **electric motors** is reversed. This generates electricity that can be returned to the power distribution system.
- Benefits:** reducing overall energy consumption etc.



## Honey Production In India

The prime Minister highlighted that **60 % increase** in honey production in the country over a last decade.

### About Honey Production In India

- Production:** In the last 11 years honey production in India increased from 70,000–75,000 metric tonnes per year, to around **1.25 lakh metric tonnes** (60% increase).
- ⊕ India is the **7<sup>th</sup> largest honey producer**. (China is the leading producer and exporter).
- Major Honey Producing States (2022-23):** Uttar Pradesh (17%), West Bengal (16%), Punjab, Bihar, Rajasthan etc.
- Export: More than 50% of the honey production** in India is exported.
- Major Export Destinations (2023-24):** U.S.A, UAE, Saudi Arabia, Qatar and Libya.



## National Apprenticeship Promotion Scheme

The Ministry of Skill Development and Entrepreneurship (MSDE), recommended a **36% increase** in stipend provided under the NAPS.

### About NAPS

- It was launched in August 2016. The scheme was extended to continue as NAPS-2 from FY 2022-23.
- Ministry:** Ministry of Skill Development and Entrepreneurship.
- Aim:** To provide financial incentives to the establishments engaging apprentices under the **Apprentices Act, 1961**.
- NAPS-2 is a **Central Sector Scheme** (100% funded by the Central Government) and is one of the sub-components under the umbrella scheme of **"Skill India Programme"**.



## Sugar Boards

Central Board of Secondary Education (CBSE) has directed all affiliated schools to establish 'Sugar Boards' on their campuses.

- This step follows a **recommendation from National Commission for Protection of Child Rights (NCPCR)**, which has raised concerns over rising cases of **Type 2 diabetes**, obesity, etc.
- ⊕ **Type 2** is caused when body becomes resistant to insulin or doesn't make enough insulin.
- ⊕ **Type 1** is autoimmune disorder in which insulin producing cells are destroyed by the immune system.

### About Sugar Boards

- They **provide essential information**, such as recommended daily sugar intake, sugar content in commonly consumed foods (unhealthy meals such as junk food, cold drinks, etc.), health risks associated with high sugar consumption.
- It will **educate students** about informed food choices.

## Place in News



## Mozambique (Capital: Maputo)

Over 25000 have fled North Mozambique due to the **triple crisis** of armed conflict, recurring extreme weather events, and post-electoral unrest.

### Political Features

- Location:** South-east African country with a **long coastline** bordering the Indian Ocean.
- ⊕ **Mozambique Channel** separates it from the island of **Madagascar**.
- Bordering Countries:** Tanzania (North), Malawi & Zambia (North West), Zimbabwe (West), South Africa and Eswatini (South West)

### Geographical Features

- Major rivers:** Zambezi and Limpopo (both empty into Indian Ocean), Ruvuma etc.
- Highest Peak:** **Mount Binga** (part of the Chimoio highlands)



AHMEDABAD



BENGALURU



BHOPAL



CHANDIGARH



DELHI



GUWAHATI



HYDERABAD



JAIPUR



JODHPUR



LUCKNOW



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