

# Factly Weekly

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## UPSC Syllabus: Environment

### Discovery of the World's Largest Coral in the Solomon Islands

#### Why in news?

Recently, a massive coral structure has been discovered in the Solomon Islands, South Pacific. The discovery of this colossal coral underscores the ocean's vast mysteries and the urgent need to protect such ecosystems from environmental challenges.

#### About Discovery of the World's Largest Coral in the Solomon Islands



Figure 1. Source: TOI

It's the largest coral known to date. The coral is comparable in size to two basketball courts or five tennis courts.

It has been found as part of National Geographic's Pristine Seas Project, led by explorer Enric Sala.

#### Physical Characteristics:

1. It is lying at a depth of 40 feet below the surface. Its height (16 feet) indicates an estimated age of over 300 years. It is visible from space due to its sheer size and

striking colors.

2. It measures approximately 111 feet wide, 104 feet long, and 18 feet high.

3. It belongs to the *Pavona clavus* species. It is predominantly brown but includes vibrant hues of yellow, blue, and red.

4. It provides habitat, shelter, and breeding grounds for various marine species, including shrimp, crabs, and fish. It has been compared to finding the world's tallest tree due to its ecological importance.

### African Elephant

#### Why in news?

A recent study reveals drastic declines in African elephant populations, with data spanning surveys from 475 sites across 37 African countries between 1964 and 2016.

Savanna elephant populations have declined by approximately 70% on average, and forest elephants by about 90% at the surveyed sites.

#### About African Elephant



Source:African Safaris Tours

Aspects	Description
About	<ol style="list-style-type: none"><li>1. The African elephant (<i>Loxodonta africana</i>) is the largest land animal on Earth.</li><li>2. It is renowned for its impressive size, intelligence, and social structure.</li></ol>
Location	<ol style="list-style-type: none"><li>1. African elephants are primarily found across sub-Saharan Africa, living in varied habitats, from savannas and deserts to forests and marshes.</li><li>2. There are two subspecies of African elephants: the African bush elephant and the smaller African forest elephant, each adapted to different ecosystems.</li></ol>
Physical Characteristics	<ol style="list-style-type: none"><li>1. African elephants are massive, with males reaching heights of up to 4 meters (13 feet) at the shoulder and weighing up to 12,000 pounds.</li><li>2. Females are generally smaller but are still formidable in size.</li><li>3. One of their most distinctive features is their large, fan-shaped ears, which help regulate body temperature by dissipating heat.</li><li>4. Unlike Asian elephants, African elephants have two “fingers” on the tips of their trunks, which allow them to grasp small objects with great dexterity.</li><li>5. Both males and females have tusks, although males tend to have larger, more prominent ones.</li></ol>
Diet	<p>As herbivores, African elephants spend a significant part of their day feeding, consuming up to 300 pounds of vegetation daily.</p> <p>Their diet includes grasses, fruits, leaves, and bark, which they can strip from trees using their trunks and tusks.</p>
Ecological Role	<ol style="list-style-type: none"><li>1. Elephants play a crucial role in shaping their environment, often referred to as a “keystone species.”</li><li>2. By breaking trees, digging water holes, and dispersing seeds through their dung,</li></ol>

	elephants help maintain biodiversity in their ecosystems.
Conservation Status	African elephants are classified as vulnerable to endangered due to threats from habitat loss, human-wildlife conflict, and poaching for their ivory tusks.
Conservation efforts	Conservation efforts include anti-poaching initiatives, habitat restoration, and community engagement programs aimed at fostering coexistence between humans and elephants.

**Key differences between African and Asian elephants:**



Figure 2. Source: Thoughtco

1. African elephants have larger, fan-shaped ears that resemble the African continent, while Asian elephants have smaller, rounded ears.

2. **Body Size:** African elephants are generally larger and heavier, with males standing up to 13 feet at the shoulder, while Asian elephants are slightly smaller.

3. **Head Shape:** African elephants have a fuller, more rounded head, while Asian elephants have a twin-domed head with an indent in the middle.

4. **Trunk:** African elephants have two finger-like projections at the tip of their trunk, while Asian elephants have only one.

5. **Back Shape:** African elephants have a concave or saddle-shaped back, while Asian elephants have a more convex or humped back.

6. **Location:** African elephants are found in various parts of Africa (savannas, forests, and deserts), while Asian elephants are native to Southeast Asia, including India, Sri Lanka, and parts of Indonesia.

**Agrivoltaic farming**

Source: This post on Agrivoltaic farming has been created based on the article [“Agrivoltaic farming focuses on simultaneous use of land for agriculture & solar energy”](#) published in DD News on 9th November 2024.

**Why in news?**

The Seventh Session of the International Solar Alliance (ISA) concluded today in New Delhi, featuring a visit to a farm site in Najafgarh on the final day. During this visit, delegates from various countries observed the practical application of agrivoltaic systems in action.

**About Agrivoltaic farming**

1. Agrivoltaic farming, also known as agrophotovoltaics, combines agriculture with solar energy production by placing solar panels over crops or farmland.
2. This dual-use system leverages sunlight not only to grow plants but also to generate clean, renewable energy, enhancing land productivity.

**Benefits of Agrivoltaics**

1. Agrivoltaics addresses the issue of land competition between agriculture and solar farms. Instead of using land solely for solar panels or crops, it integrates both, making it especially valuable in areas with limited space.

2. This system is particularly advantageous for regions aiming to boost food and energy production without expanding land use.

**3. Microclimate Benefits:** The shade provided by solar panels creates a cooler microclimate beneath, which can reduce water evaporation from the soil, benefiting crops in arid regions.

4. This shade can protect certain plants from extreme heat, increasing their yield and resilience during hot, dry periods.

**5. Improved Energy Efficiency:** Solar panels tend to perform better when kept cool, and the plants beneath them create a cooling effect, improving the panels' efficiency. This synergy can lead to higher energy output than standalone solar farms in certain climates, maximizing renewable energy generation.

**6. Economic Incentives:** Agrivoltaics offers farmers an additional income stream by generating electricity, which can be sold back to the grid or used to power farm operations, reducing energy costs.

This extra revenue can be especially valuable for small-scale or struggling farms, helping them remain financially viable and resilient against market fluctuations.

#### 7. Challenges:

i) Despite its benefits, agrivoltaic farming has some challenges. Setting up dual-use systems requires higher initial costs and specialized infrastructure.

ii) The placement of panels must be optimized to avoid excessive shading for crops needing more sunlight.

iii) Additionally, the design must allow for agricultural machinery to navigate and access the land efficiently, which requires tailored engineering solutions.

#### Future Potential

Agrivoltaic farming holds substantial promise for sustainable agriculture and renewable energy production. As technology advances and costs decrease, this approach could be instrumental in meeting food and energy needs for a growing global population, particularly in regions affected by climate change.

## Black-footed ferret

### Why in news?

Recently, Smithsonian National Zoo and Conservation Biology Institute (NZCBI) researchers successfully witnessed the birth of two black-footed ferret kits by a cloned mother. This birth is significant for conservation efforts, as black-footed ferrets are one of the most endangered mammals in North America, with an estimated 370 left in the wild.

### About black-footed ferret



Source:Black-Footed Ferret

Aspects	Description
About	<ol style="list-style-type: none"> <li>1. The black-footed ferret (<i>Mustela nigripes</i>) is a rare and only native ferret species to North America's prairies.</li> <li>2. This slender, weasel-like animal is the only ferret species native to North America and is known for its distinct black face mask, black-tipped tail, and black feet, which give it its name.</li> <li>3. These ferrets are solitary by nature, coming together only for breeding or when females are raising their young.</li> </ol>
Physical Description	<ol style="list-style-type: none"> <li>1. Their fur is mostly yellow-buff with lighter areas on the belly, forehead, muzzle, and throat, while distinctive black markings cover their face, feet, and the tip of their tail.</li> <li>2. Their legs are short but strong, with large front paws and claws that are well-adapted for digging.</li> <li>3. They are equipped with large ears and eyes.</li> <li>4. Ferrets likely have acute hearing and sight; however, their sense of smell is considered their primary tool for locating prey underground in the dark.</li> </ol>
Diet	<ol style="list-style-type: none"> <li>1. About 90% of their diet consists of prairie dogs, and one ferret may consume over 100 prairie dogs each year.</li> <li>2. They also eat small mammals like mice, rats, ground squirrels, rabbits, and occasionally birds, reptiles, and insects.</li> </ol>
Communication	<p>Highly vocal animals, black-footed ferrets use distinct sounds to communicate. A loud chatter serves as an alarm, while a hiss indicates fear or agitation. Female ferrets often whimper to encourage their young to follow.</p>
Conservation Status	IUCN: Endangered



## Jeevan Pramaan: Digital Life Certificates (DLCs) for Pensioners

### Why in news?

The third annual Jeevan Pramaan campaign began on November 1, 2024, and will continue until November 30. The Department of Pension and Pensioners' Welfare (DoPPW) has organized 1,900 camps across the country to assist pensioners in generating their DLCs.

### About Jeevan Pramaan Initiative

1. The government launched Jeevan Pramaan in 2014 to simplify the life certificate submission process for pensioners.
2. This initiative allows pensioners to generate Digital Life Certificates (DLCs) online, eliminating the need for them to visit pension-disbursing authorities such as banks and post offices in person.
3. The certificates are made available directly to the relevant authorities, ensuring a smooth and hassle-free process.
4. Every November, pensioners across various sectors, including government services, Defence, Railways, PSUs, and educational institutions, are required to submit a "life certificate" to continue receiving their pensions.
5. Pensioners can either generate DLCs through Jeevan Pramaan or physically submit their life certificates at banks or post offices, depending on their preference.

### DLC Generation Process

1. To generate a DLC, pensioners must have an Aadhaar number and a mobile number linked to it. They must also register their Aadhaar with their pension-disbursing authority.
2. Pensioners can choose to generate the DLC themselves using the Jeevan Pramaan app or website, provided they have access to a biometric device, or they can visit a designated camp for assistance.
3. Biometric authentication, using either fingerprint or face recognition, is required for the process.

### Benefits of the initiative

1. The Jeevan Pramaan initiative represents a significant step forward in digitally empowering pensioners.
2. By providing the option to generate life certificates online, the government has reduced the burden on pensioners, sparing them the inconvenience of visiting pension offices every November.
3. The addition of face authentication and the extensive outreach of the campaign have further simplified the process, making it accessible to more pensioners.

## UPSC Syllabus: Polity and nation

### Armed Forces (Special Powers) Act (AFSPA)

#### Why in news?

The Armed Forces (Special Powers) Act (AFSPA), which grants armed forces sweeping powers to maintain public order in “disturbed areas,” has been reimposed by the Union Ministry of Home Affairs (MHA) in six police station jurisdictions across five districts of Manipur.

#### About Armed Forces (Special Powers) Act (AFSPA)

1. The Armed Forces (Special Powers) Act (AFSPA) is a law in India that grants special powers to the armed forces in regions declared as “disturbed areas.”
2. It was enacted in 1958, initially to address insurgencies in the northeastern states, but has since been applied in other regions, including Jammu and Kashmir.
3. The Act has been a subject of significant debate, with proponents arguing for its necessity to maintain security and critics condemning it for alleged human rights violations.

#### Key Features of AFSPA

**1. Declaration of Disturbed Area:** AFSPA can only be implemented in areas declared “disturbed” by the central or state government. Factors like insurgency, terrorist activities, or communal disharmony influence such declarations.

**2. Special Powers Granted:** Security forces can use force, arrest individuals without a warrant, and even shoot to kill if they deem it necessary for maintaining public order. Forces can search premises without a warrant and seize property suspected to be used unlawfully.

The Act provides legal immunity to armed forces personnel from prosecution, unless the central government grants sanction.

**3. Duration of Validity:** Once an area is declared “disturbed,” the application of AFSPA remains until the declaration is revoked, which is reviewed periodically.

**4. Regions Under AFSPA:** It was originally enacted to address insurgency in states like Nagaland, Manipur, Assam, and others. Over time, some states like Tripura and Meghalaya have revoked AFSPA. AFSPA was extended to Jammu and Kashmir in 1990 due to the rise in militancy.

#### Judicial and Legislative Oversight

In the 1998 judgment *Naga People’s Movement of Human Rights v. Union of India*, the Supreme Court upheld the constitutionality of AFSPA and made the following observations:

1. The Central government can make a suo-motu declaration, but it is preferable to consult the state government beforehand.
2. Any declaration under AFSPA should be time-limited and reviewed periodically, especially after six months.
3. Officials exercising powers under AFSPA must use only the minimum force necessary for effective action.

Committees such as the Jeevan Reddy Committee (2005) recommended repealing AFSPA, suggesting its provisions be included in other laws. However, no concrete steps have been taken in this direction.

## 'Know Your Medicine' (KYM) App

### Why in news?

Recently, the Union Minister for Youth Affairs & Sports introduced the KYM app under the aegis of the National Anti-Doping Agency (NADA) India.

### About 'Know Your Medicine' (KYM) App

**1. Launched by:** Minister for Youth Affairs & Sports

**2. Aim:** The app aims to empower athletes with vital knowledge to prevent inadvertent doping and promote fair competition.

**3. Purpose of the KYM App:** It is designed to strengthen the fight against doping in sports. It provides athletes with an easy way to check if a medicine or its ingredients are prohibited under the World Anti-Doping Agency (WADA) regulations.

### 4. Features of the KYM App:

**i) Quick Verification:** It helps athletes confirm whether substances are permissible under anti-doping rules.

**ii) Sport-Specific Search:** It allows users to select their sport and access tailored information.

**iii) Advanced Search Options:** It includes image and audio search functionalities for convenience.

**5. Promoting a Clean Sporting Culture:** It is part of NADA India's larger mission to raise anti-doping awareness and education. It supports the vision of fostering fair, transparent, and ethical sportsmanship across all levels of competition.

## UPSC Syllabus: Schemes and programmes

### Animal Health Security Project

### Why in news?

The central government launched the 'Animal Health Security Strengthening in India for Pandemic Preparedness and Response' initiative.

### About the Initiative

**1. Launched by:** Ministry of Fisheries, Animal Husbandry and Dairying

**2. Aim:** The project aims to enhance monitoring of animal health to prevent future pandemics.

**3. Objective:** The primary goal is to strengthen animal health security in order to prepare for and respond to potential pandemics. As about two-thirds of infectious diseases affecting humans have animal origins, monitoring animal health becomes essential for pandemic preparedness.

**4. Importance:** The project emphasizes the need for greater attention to animal health as part of a broader strategy to safeguard public health from zoonotic diseases.

**5.** The project was approved by the Pandemic Fund and was created by G20 countries under Indonesian presidency in 2022.

**6. Purpose:** To support low- and middle-income countries in building their capacities to detect, report, and control potential future pandemics.

**7. Implementing agency:** Asian Development Bank (ADB), the World Bank, and the Food and Agriculture Organisation (FAO). It is expected to be completed by August 2026.

**8. Key expected outcomes for the project:**

- i) Enhancement of laboratory systems and vaccine manufacturing facilities.
- ii) Strengthening of surveillance and early warning systems.
- iii) Development of human resources with improved capacity and competencies.
- iv) Improvement of data systems, analytics, risk analysis, and risk communication.
- v) Addressing institutional capacity gaps at both national and regional levels.

### 'EV as a Service' Program

#### Why in news?

Recently, Union Minister of Power and Housing & Urban Affairs unveiled the "EV as a Service" initiative by Convergence Energy Services Limited (CESL) at the Major Dhyan Chand National Stadium, Delhi. This program is a strategic step towards promoting electric mobility in government offices across India.

#### About the Programme



**1. Initiative by:** Convergence Energy Services Limited (CESL), a subsidiary of Energy Efficiency Services Limited (EESL).

**2.** This program is a major step in promoting electric vehicle (EV) adoption across government sectors, including central and state government ministries, Central Public Sector Enterprises (CPSEs), and institutions.

**3. Objective:** To facilitate the adoption of electric vehicles (EVs)

in Central and State Government ministries, departments, Central Public Sector Enterprises (CPSEs), and government institutions.

**4. Goal:** Aiming to deploy 5,000 electric cars in government sectors within the next two years.

**5.** It is designed to meet the increasing demand for EVs in the government sector, the 'EV as a Service' program aims to deploy 5,000 electric cars over the next two years.

**6.** The program's flexible procurement model enables government offices to select various makes and models of EVs that best suit their operational needs, aligning with India's long-term goal of net zero emissions by 2070.

7. This initiative supports environmental sustainability and also helps reduce reliance on fossil fuels, enhances India's energy security, and reduces carbon emissions.

## Department of Government Efficiency (DOGE)

### Why in news?

Recently, US President-elect Donald Trump has introduced a new initiative called the Department of Government Efficiency (DOGE), led by Elon Musk and Indian-origin entrepreneur Vivek Ramaswamy. This unconventional team is set to overhaul government operations and streamline expenses.

The acronym "DOGE" appears to be a nod to Dogecoin, a cryptocurrency often promoted by Musk.

### Purpose of DOGE

The primary goal of DOGE is to create a leaner, more efficient government by:

1. Reducing Bureaucracy: The department aims to eliminate unnecessary layers of bureaucracy, making processes quicker and more transparent.
2. Cutting Regulations: DOGE will identify and eliminate what it views as excessive regulations that hinder efficiency.
3. Minimizing Wasteful Spending: The initiative seeks to reduce government spending, directing funds to essential services and minimizing waste.
4. Restructuring Federal Agencies: DOGE will evaluate and restructure various government departments to maximize efficiency and reduce costs.

### How DOGE Will Operate

1. Advisory Role: DOGE will not be a formal government department; instead, it will act as an advisory body, partnering with the White House and the Office of Management & Budget.
2. Transparency and Public Involvement: DOGE's activities will be posted publicly online, allowing citizens to provide feedback on areas for potential cuts or concerns.
3. Leaderboard for Wasteful Spending: DOGE plans to highlight the most frivolous government expenses to entertain and inform the public.

## UPSC Syllabus: International relations

### Adaptive Defence

#### Why in news?

The government is adopting an "adaptive defence" approach to address new and evolving global threats, emphasizing that it is essential in today's fast-paced world.

#### About Adaptive Defence

1. Adaptive defence is a strategic approach where a nation's military and defence systems evolve continuously to counter emerging and unpredictable threats.
2. **Proactive Preparedness:** Unlike traditional reactive measures, it focuses on foreseeing potential challenges and preparing for them in advance.
3. **Innovation-Driven:** This strategy emphasizes innovation and flexibility, enabling forces to adapt swiftly to new types of threats.

#### Key Features of Adaptive Defence

1. **Continuous Evolution:** Defence mechanisms and military strategies are consistently updated to keep up with rapid global changes and new forms of warfare.
2. **Transnational Solutions:** Recognizes that threats today are often not limited to national boundaries; solutions, therefore, need international collaboration.
3. **Mindset Shift:** Encourages a proactive approach to defence that goes beyond immediate threats, fostering a culture of anticipation and preparedness.

#### Why is it Important

1. **Unpredictable Global Threats:** With the nature of threats evolving—be it cyber threats, transnational terrorism, or biosecurity, it is crucial for keeping pace.
2. **Technological Advancements:** Technological developments enable adversaries to utilize unconventional methods; adaptive defence ensures preparedness against these advancements.
3. **Strategic Necessity:** Given the fast-changing global landscape, adaptive defence is not just strategic but essential for national security.

#### Goals of Adaptive Defence

1. **Enhance Resilience:** Strengthen defence capabilities to remain resilient even in volatile and uncertain conditions.
2. **Promote Innovation in Defence:** Continuously incorporate cutting-edge technologies and strategies to ensure security systems are up-to-date.
3. **Ensure Agility:** Maintain a defence system that can quickly adjust to emerging threats and shifting geopolitical landscapes.

#### Implementation of Adaptive Defence in India

**Strategic Collaboration:** Collaboration with international allies to share intelligence and strategies.

**Upgrading Technology:** Investment in modern defence technologies, including AI, cyber defence, and space capabilities.

**Enhanced Training:** Military personnel are trained to be flexible, anticipating various scenarios and equipping them with adaptive thinking skills.

## UPSC Syllabus: Exercise in news

### Exercise 'Sea Vigil-24'

**Why in news?**

Recently, the Indian Navy is to Conduct the Fourth Edition of the Coastal Defence Exercise 'Sea Vigil-24'.

**About Exercise 'Sea Vigil-24'**



Source: PIB

Aspects	Description
About	<ol style="list-style-type: none"><li>1. It is a Pan-India Coastal Defence Exercise from 20–21 November 2024.</li><li>2. It is the fourth edition following the initial exercise held in 2018.</li><li>3. It is the largest edition yet, covering India's entire 11,098 km coastline and a vast EEZ of 2.4 million sq km. It has involvement of six Ministries and 21 different organisations and agencies.</li><li>4. Participation from fishing communities, coastal populations, NCC cadets, and Bharat Scouts and Guides which aims to raise awareness about maritime security and engage local stakeholders.</li></ol>
Objective	To validate and strengthen India's coastal defence and security mechanisms
Focus areas	<ol style="list-style-type: none"><li>1. Security of critical coastal assets like ports, oil rigs, Single Point Moorings, and Cable Landing Points.</li><li>2. Enhanced awareness about maritime security among coastal communities, including fishing populations and students.</li></ol>
Feature	It emphasis on securing strategic locations, including ports, oil rigs, Single Point Moorings, Cable Landing Points, and other vital infrastructure. It focuses on coastal population security alongside critical infrastructure

Significance	<ol style="list-style-type: none"><li>1. It provides a holistic assessment of India's maritime defence capabilities.</li><li>2. It helps identify strengths and weaknesses in the current preparedness of maritime security agencies.</li><li>3. It serves as a precursor to the Indian Navy's biennial Theatre Level Readiness Operational Exercise (TROPEX).</li></ol>
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## UPSC Syllabus: Science and technology(Defence)

### Antariksha Abhyas - 2024

#### Why in news?

The Defence Space Agency of India, under the Headquarters Integrated Defence Staff has launched "Antariksha Abhyas - 2024."

#### About Antariksha Abhyas - 2024



Figure 3. Source: PIB

1. It is India's first space-focused military exercise. It is dedicated to assessing and addressing the growing threats to space-based assets and services.

2. This three-day event, conducted in New Delhi from November 11 to November 13, 2024.

**3. Aim:** The exercise aims to strengthen India's defense capabilities in space and secure national strategic objectives.

**4. Purpose:** It will help the

defense forces understand the dependency on space-based services and assets in military operations.

**5. Focus:** Identifying potential vulnerabilities in space assets, especially in situations where space-based services may be denied or disrupted

**6. Collaborating Organizations:** The Indian Space Research Organisation (ISRO) and the Defence Research & Development Organisation (DRDO) will play key roles in contributing their expertise and resources.

**7. Key Outcomes Expected:** The exercise is expected to:

i) Enhance coordination among defense, intelligence, and space research entities.

ii) Improve operational preparedness against potential threats to India's space assets.

iii) Lay the groundwork for future innovation in space defense technologies and strategic resilience in space operations.



## Bio-derived foam

### Why in news?

Researchers at the Indian Institute of Science (IISc), Bengaluru, have developed an Bio-derived foam derived from biological sources. It is designed to specifically reduce plastic pollution.

### About Bio-derived foam



1. This recyclable, bio-derived foam supports a circular economy, reducing landfill waste. This biodegradable foam is a sustainable alternative to EPS and PU foams.

2. Unlike

traditional plastic foams, it degrades naturally in landfills without contaminating groundwater.

3. It offers a sustainable packaging option for FMCG, replacing conventional plastic foams.

4. It is made from FDA-approved, non-edible oils and natural hardeners and thus it is eco friendly. Epoxidized fatty acids and tea-sourced polyphenol hardeners ensure the foam remains fully biodegradable.

5. Switching to this bio-foam could cut greenhouse gas emissions, as producing 10,000 plastic foam cups emits 680 pounds of CO<sub>2</sub>. It is also highly durable and withstands 10,000 cycles of use, making it ideal for FMCG packaging.

### Need for Sustainable Packaging

With the Indian foam market valued at \$7.9 billion and projected to grow to \$11.1 billion by 2032, there is a pressing need for environmentally conscious solutions.

Presently, less than 1% of the 2.3 million tonnes of plastic foam produced each year is recycled, creating significant waste.

## UPSC Syllabus: Science and technology

### PyPIM Platform

#### Why in news?

Recently, Israeli researchers from the Israel Institute of Technology have created software enabling computers to process data directly within memory, bypassing the need for a central processing unit (CPU).

#### About PyPIM Platform

**1. About:** PyPIM Platform is a platform combining Python programming with digital processing-in-memory (PIM) technology, to facilitate in-memory computing.

**2. Functionality and Compatibility:** PyPIM includes new instructions that allow certain computations to be executed directly in memory, enabling developers to use familiar programming languages, such as Python, for PIM-based computing systems.

3. It tackles the “memory wall” issue, where CPU and memory speeds surpass the data transfer rates, creating energy and time bottlenecks in modern computing.

**4. Performance Simulation:** A simulation tool is also provided within the platform to help developers assess potential performance gains from using in-memory processing.

5. By performing computations directly in memory, the technology minimizes the energy-intensive and time-consuming data transfers between the memory and CPU, achieving significant time and energy savings.

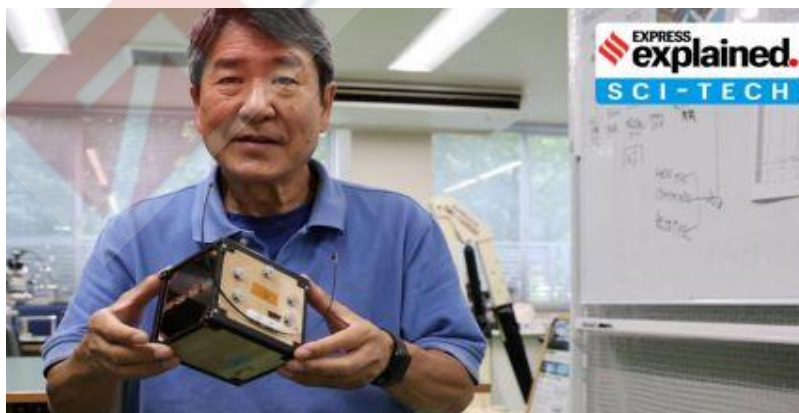
**Demonstrated Benefits:** Studies showed that tasks performed using PyPIM achieved faster processing with minimal changes in code, demonstrating the platform’s ease of use and performance advantage in mathematical and algorithmic applications.

### LignoSat and its significance

#### Why in news?

Recently, LignoSat is the world’s first wood-panelled satellite launched into space.

#### About LignoSat



1. LignoSat is the world’s first wood-panelled satellite launched into space. This satellite marks a unique step toward renewable materials in space exploration.

2. It has been developed by Kyoto University and Sumitomo Forestry. It will orbit the Earth for six months, beginning one month after arrival at the ISS.

**3. Design & Structure:** The satellite is a small, cube-shaped device, measuring just 10 centimeters on each side and weighing 900 grams.

It features panels made from magnolia wood, crafted using traditional Japanese woodworking techniques without screws or glue.

**4. Objectives:** LignoSat will monitor wood's endurance in space, where temperatures range from -100 to 100 degrees Celsius every 45 minutes. Researchers are examining wood's resistance to space radiation and its potential to shield delicate semiconductors.

**5. Goal:** The goal is to explore sustainable building options, potentially for future habitats on the moon and Mars. It is also with the goal of testing timber as a sustainable alternative to metals in spacecraft.

#### 6. Broader Implications and Goals

**i) Reducing Metal Use in Space:** Aluminium and other metals commonly used in satellites contribute to pollution upon re-entry. Wood, as a renewable material, could mitigate these environmental impacts.

**ii) Future Possibilities:** Kyoto University researchers aim to establish timber-based technologies to construct habitats and plant trees on the moon or Mars in the next 50 years.

#### Advantages of Wooden Satellites

**i) Lower Environmental Impact:** As a renewable material, wood could offer a greener solution for satellite design, reducing the space debris pollution problem.

**ii) Potential Applications:** LignoSat's success could encourage further exploration into wood and other sustainable materials for satellites, particularly as the number of active satellites continues to grow.

### India's Pinaka Rocket System

Source: This post on **India's Pinaka Rocket System** has been created based on the article ["India's Pinaka rocket system interests French Army, being evaluated for use"](#) published in Hindustan Times on 11th November 2024.

#### Why in news?

The French Army is evaluating India's indigenous Pinaka multi-barrel rocket launcher (MBRL) system for potential use, underscoring India's growing prominence in defense manufacturing. The evaluation aligns with the ongoing strategic and defense partnership between India and France.

#### About Pinaka rocket system



Figure 4. Source: HT

1. The Pinaka rocket system is a multi-barrel rocket launcher system developed by India. It was designed by the Defence Research and Development Organisation (DRDO) and produced primarily by Indian defense manufacturers.

2. It is named after the bow of Lord Shiva. Pinaka is a versatile, high-precision system known for its mobility, quick response time,

and ability to deliver a concentrated volume of firepower on enemy targets.

### Key features

1. Pinaka is designed as an Multiple Launch Rocket System (MLRS), capable of launching a salvo of 12 rockets in 44 seconds. The system is usually mounted on a 8×8 or 6×6 truck for high mobility.

### 2. Range and Firepower:

i) Pinaka Mk-I has a range of around 40 km.

ii) Pinaka Mk-II and Pinaka Enhanced versions extend the range to 60-75 km.

3. The Pinaka Guided variant, with guidance improvements, can reach around 90 km, providing better accuracy and extended reach.

**4. Guidance and Precision:** The guided version incorporates satellite guidance to enhance accuracy. This variant ensures more effective targeting with reduced collateral damage.

**5. Payload Options:** Pinaka rockets can carry a variety of warheads, including high explosives, incendiary, anti-personnel, and anti-tank bomblets, allowing it to engage various types of targets.

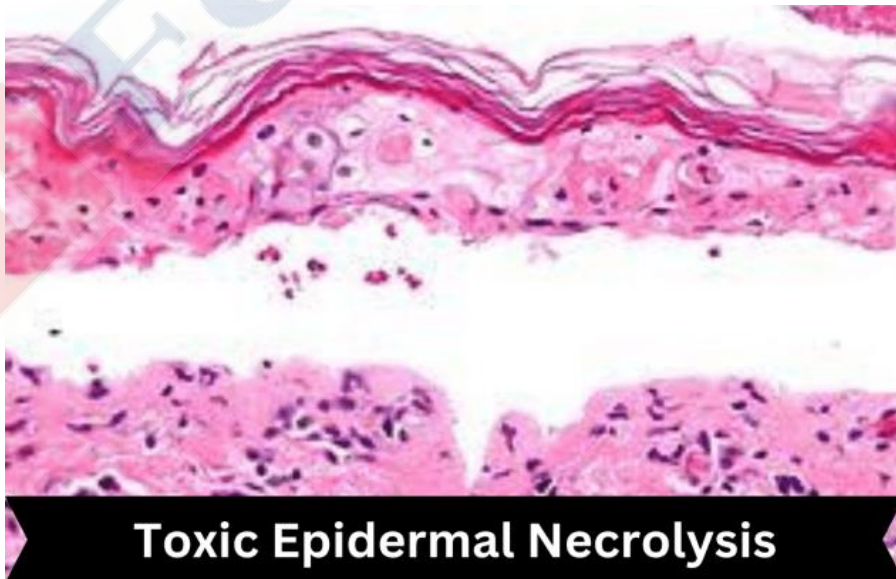
**6. Quick Deployment and Reloading:** The system can be rapidly deployed and reloaded within a short time frame, making it suitable for intense battlefield conditions and quick counter-strikes.

**7. Modular and Expandable:** The modular structure allows for compatibility with other advanced technologies and systems, which can potentially make Pinaka more effective in network-centric warfare scenarios.

**8. Operational Use:** Pinaka has been used by the Indian Army in operations, particularly in mountainous and rugged terrains, providing a significant boost to India's artillery capabilities.

## UPSC Syllabus: Science and technology, International relations

### Toxic epidermal necrolysis (TEN)



### Why in news?

Researchers from Australia and Germany have achieved a groundbreaking medical milestone, developing the first cure for toxic epidermal necrolysis (TEN).

### About the cure

1. Experts identified that the JAK-STAT signalling pathway is a cellular process integral to immune response, cell death, and tumour formation and is hyperactivated in TEN patients.
2. By employing JAK inhibitors, a drug class typically used to treat inflammatory diseases, researchers successfully treated seven patients with TEN.

### About toxic epidermal necrolysis (TEN)

1. Toxic epidermal necrolysis (TEN) is a severe, life-threatening skin reaction characterized by widespread skin necrosis and detachment of the epidermis.
2. **Cause:** Most commonly caused by reactions to medications, including antibiotics (e.g., sulfonamides), anticonvulsants, nonsteroidal anti-inflammatory drugs (NSAIDs), and allopurinol. Less frequently, infections or other factors may trigger TEN.
3. **Symptoms:** High fever and flu-like symptoms often precede skin lesions, Rapid development of red, painful skin areas that evolve into large blisters and peeling, extensive skin detachment, often covering more than 30% of body surface area and mucous membrane involvement, such as in the mouth, eyes, and genitals.
4. **Diagnosis:** Based on clinical appearance and patient history of recent medication use. Skin biopsy can confirm the diagnosis, showing characteristic necrosis of the epidermis.
5. **Complications:**
  - i) Severe fluid loss and electrolyte imbalance due to extensive skin loss.
  - ii) Increased risk of infections (especially sepsis) due to loss of the skin barrier.
  - iii) Long-term complications can include scarring, pigmentation changes, and eye damage (such as blindness).
6. **Treatment:** Immediate hospitalization, often in an intensive care unit or burn unit, Discontinuation of the suspected drug(s) and supportive care for skin lesions, including fluid replacement, pain management, and wound care.  
Immunosuppressive therapies (e.g., intravenous immunoglobulins or corticosteroids) may be considered, though their efficacy is debated.
7. **Prognosis:** The mortality rate for TEN can be high, especially if diagnosis and treatment are delayed. The SCORTEN score is often used to predict prognosis based on several clinical factors.
8. **Prevention:** Genetic testing (such as for HLA-B\*1502 allele) may help prevent TEN in susceptible populations when prescribing certain drugs (e.g., carbamazepine in Asian populations).

## WIPO 2024 Report



### Why in news?

The **World Intellectual Property Organization** (WIPO) highlights India's advances in the 2024 World Intellectual Property Indicators (WIPI) report.

India has entered the top 10 globally for patents, trademarks, and industrial designs, reflecting its growing influence in intellectual property (IP).

### Highlights of the report

1. India led the top 20 origins in 2023 with a 15.7% growth in patent applications, marking five consecutive years of double-digit increases.
2. India ranks sixth worldwide with 64,480 patent applications, over half of which (55.2%) were resident filings—a first for the nation.
3. Patent grants surged by 149.4% compared to 2022, showcasing rapid evolution in India's IP ecosystem.
4. Industrial design applications increased by 36.4%, highlighting growth in manufacturing, product design, and creative industries. Textiles and Accessories, Tools and Machines, and Health and Cosmetics sectors contributed to nearly half of these filings.
5. **Long-Term Growth in IP Filings:** From 2018 to 2023, India's patent and industrial design applications more than doubled, and trademark filings grew by 60%. India's patent-to-GDP ratio increased from 144 to 381 over the last decade, illustrating IP growth alongside economic expansion.
6. **Top Rankings in Trademarks:** India ranked fourth globally in trademark filings, achieving a 6.1% increase in 2023, with nearly 90% from resident applicants.

**Key sectors:** Health (21.9%), Agriculture (15.3%), and Clothing (12.8%).

7. India's trademark office holds the second-largest number of active registrations globally, with over 3.2 million trademarks in force.

6. **Global IP Trends:** Worldwide, 3.55 million patent applications were filed in 2023, marking a 2.7% increase from 2022, with strong contributions from Asia. China, the U.S., Japan, South Korea, and India were major contributors, with a notable rise in resident filings, indicating a focus on local innovation.

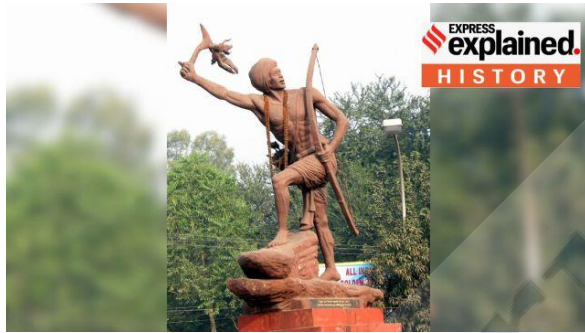
## UPSC Syllabus: Report and index

### Birsa Munda

#### Why in news?

Recently, Prime Minister Narendra Modi honored Bhagwan Birsa Munda on his birth anniversary, celebrated as Janjatiya Gaurav Divas.

#### About Birsa Munda



1. Birsa Munda (1875–1900) was a prominent tribal leader, freedom fighter, and folk hero from India.
2. He was born on November 15, 1875, in Ulihatu village, Ranch, Jharkhand.
3. He belonged to the Munda tribe, a prominent tribal community in the Chotanagpur plateau.
4. He attended missionary schools; learned about Western education and Christianity but later rejected colonial influences.

#### Struggles Against British Colonial Rule

**Opposition to Exploitation:** He fought against the oppressive British policies and the exploitation of tribal lands by landlords (dikus) and the colonial government.

**Land Rights Movement:** He advocated for tribal autonomy and protection of land through the “Ulgulan” (The Great Rebellion).

#### Religious and Social Reforms

**Spiritual Leadership:** He declared himself a prophet and began preaching the message of monotheism, unity, and social reform.

**Cultural Revival:** He encouraged tribal people to return to their indigenous culture and reject superstitions, alcohol consumption, and missionary conversions.

**Religious Movement:** He founded a new faith combining tribal beliefs with elements of his revolutionary ideology.

#### About the Ulgulan Movement

1. He led the Ulgulan (Revolt) in the late 1890s to reclaim tribal lands from British control.
2. It was aimed to establish a self-governing tribal system and abolish feudal landlordism.

3. He organized the Mundas and other tribal communities to resist through guerrilla warfare.
4. He was arrested by British authorities in 1900 and imprisoned in Ranchi Jail, where he died on June 9, 1900 under mysterious circumstances.

### Legacy

1. He played a pivotal role in inspiring the tribal identity and movements that led to the formation of Jharkhand state in 2000.
2. He was honored as “Bhagwan” n(God) by his followers and remembered as a symbol of tribal pride and resistance.
3. **Tributes:** His birth anniversary, November 15 is celebrated as Jharkhand Foundation Day and Birsa Munda Jayanti.

Read more: [124th Death Anniversary of Birsa Munda](#)

## UPSC Syllabus: Art and culture

### Shree Swaminarayan Mandir

**Source:** This post on **Shree Swaminarayan Mandir** has been created based on the article [“Prime Minister Shri Narendra Modi participates in 200th year celebrations of Shree Swaminarayan Mandir in Vadtal, Gujarat”](#) published in PIB on 12th November 2024.

### Why in news?

Prime Minister Narendra Modi recently celebrates 200th Anniversary of Shree Swaminarayan Mandir, Vadtal.

### About Shree Swaminarayan Mandir

1. Shree Swaminarayan Mandir in located in Vadtal, Gujarat. It was established on November 3, 1824 under the guidance of Bhagwan Swaminarayan.
2. The temple serves as the headquarters for the Laxmi Narayan Dev Gadi.
3. **Design:** The temple features a lotus-shaped plinth and nine domes, showcasing intricate stone carvings on its pillars.
4. **Shrines:** The central shrine houses idols of Lakshmi Narayan and RanchhodRaiji. The right shrine contains images of Radha Krishna alongside Swaminarayan in the form of Hari Krishna, while the left shrine features Vasudev, Dharma, and Bhakti.
5. **Historical Significance:** The temple’s construction was supervised by Sadguru Shree Brahmanand Swami and completed in just fifteen months. It stands as a testament to the devotion and architectural prowess of the era.
6. **Significance of the Swaminarayan Movement:** Lord Swaminarayan restored spiritual and national pride. He emphasized the importance of the ShikshaPatri and Vachanamrit texts and encouraged people to carry forward their teachings.
7. **Vadtal Dham’s Contributions:** Vadtal Dham actively supports social services, providing education, food, and shelter, especially in remote tribal areas. The organization also promotes initiatives like female



education, environmental campaigns, and cultural preservation, embodying a blend of modernity and spirituality.

## UPSC Syllabus: Miscellaneous

### Booker Prize 2024

#### Why in news?

The 2024 Booker Prize was awarded to British author Samantha Harvey for her novel *Orbital*. It is the first Booker Prize-winning book set in space.

#### About the Booker Prize

1. The 2024 Booker Prize is one of the most prestigious awards in literature. It was established in 1969.
2. It honors the best novel written in English and published in the United Kingdom or Ireland.
3. Each year, the prize is given to what the judges consider the finest sustained work of fiction written in English and published in the UK and Ireland.
4. The winner receives £50,000, in addition to the £2,500 granted to each of the six shortlisted authors.
5. Both the winner and the shortlisted authors gain worldwide recognition and can anticipate a significant boost in book sales.