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FOR UPSC CIVIL SERVICE EXAMINATION

MARCH 2026

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Shaheed Diwas

Context: On 23 March 2026, Prime Minister Narendra Modi paid tribute to martyrs on Shaheed Diwas.

About Shaheed Diwas

- Observed annually on 23 March to honour the martyrdom of Bhagat Singh, Shivaram Rajguru, and Sukhdev Thapar.
- On this day in 1931, they were executed by the British in Lahore Jail.
- Linked to the Lahore Conspiracy Case, related to the assassination of British officer J.P. Saunders (1928).
- Theme (2026): "Mera Bharat Meri Zimmedari".

Bhagat Singh (1907–1931)

- A leading revolutionary socialist and symbol of India's freedom struggle.
- Influenced by the Jallianwala Bagh massacre.
  - Key Contributions:Central Legislative Assembly bombing (1929) with Batukeshwar Dutt.
  - Involved in Saunders' assassination (1928).
  - Member of Hindustan Socialist Republican Association; founded Naujawan Bharat Sabha (1926).
  - Wrote revolutionary works like "Why I Am an Atheist".
- Legacy: Executed at age 23; remembered for courage and ideological clarity.

Shivaram Rajguru (1908–1931)

- Known for his militant role in the freedom struggle.
  - Key Contributions:Played a key role in Saunders' assassination (1928) to avenge Lala Lajpat Rai.
  - Member of HSRA; known as a skilled marksman.
- Legacy: Symbol of bravery and youthful sacrifice.

Sukhdev Thapar (1907–1931)

- A key organiser and ideologue of the revolutionary movement.
  - Key Contributions:Organised HSRA networks in Punjab.
  - Played a major role in the Lahore Conspiracy Case.
  - Mobilised youth for the freedom struggle.
- Legacy: Remembered for leadership and organisational strength.

Thirumangai Alvar Bronze Sculpture

Context: In March 2026, the Ashmolean Museum, Oxford, returned a 16th-century bronze idol of Thirumangai Alvar to India after confirming its origin from a temple in Tamil Nadu.

About the Sculpture

- A 16th-century Chola-style bronze idol of Thirumangai Alvar.
- Originally worshipped at Soundararaja Perumal Temple.
- Returned to restore its religious and cultural significance.

Provenance:

- Identified using archival photos (1957) from Institut Français de Pondichéry and École française d'Extrême-Orient.
- Earlier acquired by the museum in 1967 from a private collection.

Key Features

- Material: Bronze (lost-wax / cire perdue technique).
- Posture: Standing in devotional pose.
- Iconography: Detailed ornaments, traditional attire, expressive features.
- Religious Role: Used as processional deity (utsava murti) in temple rituals.

Thirumangai Alvar

- One of the 12 Alvars (Tamil Vaishnavite poet-saints).
- Lived during 8th–9th century CE in Tamil Nadu.

Key Contributions:

- Composed hymns in Nalayira Divya Prabandham.
- Praised Vishnu temples (Divya Desams) across South India.

Significance:

- Played a major role in spreading the Bhakti movement in Tamil society.

Menstrual Leave Policy in India

Context: The Supreme Court of India recently observed that mandatory menstrual leave may harm women's career prospects, while supporting voluntary policies.

Key Highlights of SC Judgment

- Policy Domain: Issue falls under Executive & Legislature, not judiciary.
- Article 21: Menstrual health linked to dignity, bodily autonomy, and Right to Life.
- Career Impact: Mandatory leave may lead to hiring bias and fewer opportunities.
- Stereotypes: May reinforce idea that women are “less capable”.
- Balanced Approach: Need to balance equality with labour market realities.
- Preferred Model: Flexible, voluntary policies over compulsory law.

About Menstrual Leave

- A gender-sensitive workplace policy acknowledging menstrual health needs.
- Supports women facing conditions like endometriosis and severe pain.

Need in India

- Male-centric workplaces: Lack of basic facilities & flexibility.
- Low FLFPR: Female participation ~30–37%, below global levels.
- Social stigma: Taboos around menstruation persist.
- Policy push: States like Karnataka and Bihar taking steps.

Key Challenges

- Employer Bias: Women seen as costlier hires (statistical discrimination).
- Stereotypes: Risk of reinforcing “benevolent sexism”.
- One-size policy issue: Not all women need leave (only ~5–10% severe cases).
- Informal Sector: ~90% women lack job security; leave = loss of wages.
- Economic Impact: Disruptions in sectors like manufacturing, healthcare.
- Low Usage: Countries like Japan and Spain show very low uptake.

Way Forward

- Flexible Work Models: Work-from-home, flexible hours.
- Health-Centric Approach: Integrate menstrual health into workplace policies.
- Better Infrastructure: Rest rooms, sanitation, vending machines.
- Support Informal Sector: DBT, SHGs, social security schemes.
- Corporate Role: ESG-based policies (e.g., Zomato initiative).
- Awareness: Break stigma through education and workplace sensitisation.

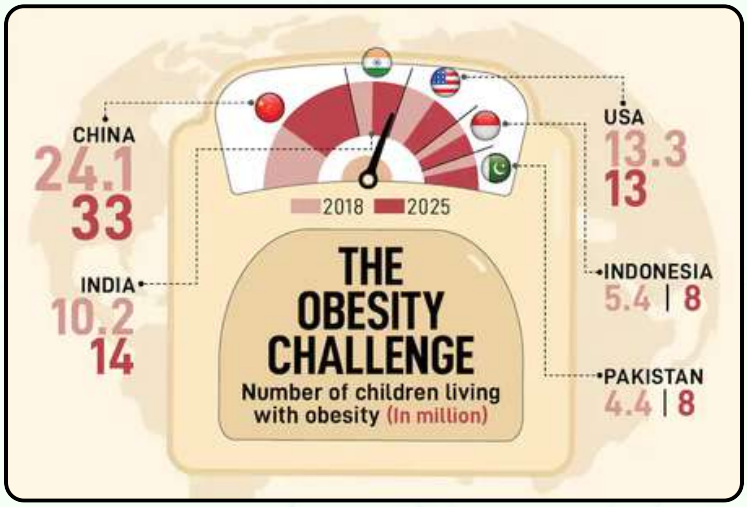
Conclusion

- The issue reflects a shift from formal to substantive equality.
- A flexible, health-focused approach can ensure dignity without harming opportunities.

World Obesity Atlas 2026

Context: As per the World Obesity Federation, India had nearly 15 million (5–9 years) and 26 million (10–19 years) overweight/obese children in 2025.

- By 2040, around 507 million children globally may be overweight or obese.
- World Obesity Day: 4 March.



About the Atlas

- Provides projections of childhood obesity (2025–2040) across countries.

Key Findings

India-Specific

- Rising BMI: India may have 41 million children with high BMI and 14 million obese.
  - Current Status (2025):14.9 million (5–9 years) overweight/obese
  - 26+ million (10–19 years) overweight/obese
  - Future (2040):20 million obese
  - 56 million overweight/obese

Health Impacts (Rising Cases)

- Hypertension: 2.99 → 4.21 million
- Hyperglycaemia: 1.39 → 1.91 million
- High triglycerides: 4.39 → 6.07 million

Global Position

- India ranks 2nd globally in childhood obesity.
- Ranks 1st in WHO South-East Asia Region (45+ million children affected).

Key Risk Factors

- Low Physical Activity: ~74% adolescents (11–17) inactive.
- Poor Nutrition Support: Only 35.5% children get school meals.
- Sugary Diet: Rising consumption of sugary drinks.
- Poor Breastfeeding: ~32.6% infants not optimally breastfed.
  - Women's Health:13.4% women (15–49) have high BMI
  - 4.2% suffer from Type 2 Diabetes

Conclusion

- Childhood obesity is a growing public health challenge in India.
- Requires focus on nutrition, physical activity, and early-life care.

UNIGME Report 2025

Context: According to the United Nations Inter-Agency Group for Child Mortality Estimation Report 2025, India has made significant progress in reducing neonatal mortality.

- In 2024, Sub-Saharan Africa accounted for 58% of global under-five deaths.

Key Concepts

Neonatal Mortality Rate (NMR)

- Deaths of infants within first 28 days per 1,000 live births.
- SDG Target (United Nations – Goal 3): Reduce NMR to ≤12 by 2030.

Child Mortality

- Refers to deaths of children below 5 years.
- Measured by Under-Five Mortality Rate (U5MR).

Key Global Findings (2024)

- 4.9 million children died before age 5, including 2.3 million newborns.
- Most deaths are preventable with basic healthcare.
  - Trend:Deaths reduced by >50% since 2000.
  - Progress slowed significantly after 2015.
- Major Cause: Malaria (17% deaths), mainly in Sub-Saharan Africa.

India-Specific Findings

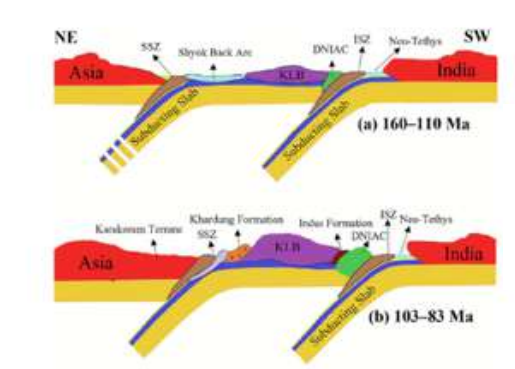
- U5MR: Reduced from 127 (1990) → 26.6 (2024) (~79% decline).
- NMR: Reduced from 57 (1990) → 17 (2024).

Conclusion

- India shows strong improvement, but further efforts are needed to meet SDG targets and address preventable deaths.

Ladakh Magmatic Arc (LMA)

Context: Scientists from the Wadia Institute of Himalayan Geology decoded the 130-million-year evolution of the Ladakh Magmatic Arc, giving insights into plate collision and subduction.



Key Findings of the Study

- Formation: Due to subduction of the Neo-Tethys Ocean beneath the Eurasian Plate.
- Method: Geochemical and isotopic analysis of rocks.
  - Magmatic Phases:160–110 Ma: Early (pre-collision)
  - 103–45 Ma: Active (during collision)
  - <45 Ma: Post-collision
- Slab Dynamics: Interaction between oceanic slab, mantle wedge, and continental crust.
- Control: Long-term evolution driven by Neo-Tethys geodynamics.

About Ladakh Magmatic Arc

- A belt of igneous rocks (granite, diorite, volcanic rocks).
- Time: Jurassic–Eocene (201–34 million years ago).
- Location: Along the Indus Suture Zone in Ladakh.
- Origin: Formed due to oceanic plate subduction.

Evolution of LMA

- Island Arc Stage: Volcanic island chain in Neo-Tethys Ocean (Dras–Nidar Complex).
- Convergence Stage: Formation of Ladakh Batholith (granite bodies).
- Pre-Collision: Increasing sediment input changed magma chemistry.
- Collision Stage: Closure of Neo-Tethys → Himalayan uplift.
- Post-Collision: Formation of mafic dykes from enriched mantle.

About Subduction

- A process where a denser oceanic plate sinks beneath another plate at a convergent boundary.

About Neo-Tethys Ocean

- An ancient ocean between Indian Plate and Eurasian Plate.
- Origin: Breakup of Gondwanaland.
- Closure: ~55–50 million years ago → led to Himalayan formation.
- Evidence: Ophiolites, marine sediments, suture zones.

Significance

- Explains Himalayan evolution and plate tectonics.
- Indicates mineral potential (copper, gold).
- Provides a complete record of subduction to collision processes.

Right to Die with Dignity

Context: The Supreme Court of India allowed withdrawal of life support for Harish Rana (in PVS), marking India's first court-approved implementation of passive euthanasia.

Key Highlights of SC Judgment

- Terminology Shift: Replaced “passive euthanasia” with Withdrawal/Withholding of Medical Treatment (WWMT).
- CANH as Treatment: Feeding tubes & IV fluids (CANH) are medical treatment, hence can be withdrawn.
- Best Interest Principle: Withdrawal allowed if:
  - It is a medical intervention
  - It is in the patient’s best interest
- Palliative Care: Ensured pain-free, dignified death with proper medical care.

Implementation Mechanism (India)

  - Medical Boards:Primary Board (hospital level)
  - Secondary Board (includes external expert)
- Judicial Role: Inform Judicial Magistrate (JMFC), but no prior approval required → faster process.

Need for a Law on Euthanasia

- Legal Clarity: Protect doctors from criminal liability.
- Uniform Implementation: Ensure equal access across states.
- Prevent Misuse: Safeguards against family/financial pressure.
- Digital Living Wills: Link with health ID for easy access.
- Better Palliative Care: Reduce suffering-driven decisions.
- Public Debate: Include ethical, medical, and social perspectives.

Key Challenges

- Fear among Doctors: Risk of legal action → prolonging treatment.
- Misuse Risk: Financial or property-related pressures.
- Urban Bias: Facilities mainly in big cities.
- Poor Documentation: Living wills often unavailable in emergencies.
- Weak Palliative Care: Limited access to pain relief.
- Judicial Variations: Lack of consistency in decisions.

Way Forward

- Enact Comprehensive Law on end-of-life care.
- Digitise Living Wills (linked to health records).
- District-Level Medical Boards for accessibility.
- Strengthen Palliative Care Infrastructure.
- Awareness & Training for doctors and public.

Conclusion

- The judgment strengthens the right to die with dignity under Article 21.
- Promotes a balance between medical ethics, legal clarity, and compassion in end-of-life care.

Scheduled Caste Status & Religious Conversion

Context: The Supreme Court of India upheld that SC status is limited to Hindus, Sikhs, and Buddhists, and is lost upon conversion to Christianity or Islam.

Key Highlights of the Judgment

- Religious Restriction: As per the Constitution (Scheduled Castes) Order, 1950, SC status applies only to Hindus, Sikhs, Buddhists.
- Loss on Conversion: Conversion to other religions leads to loss of SC status and benefits.
- PoA Act Inapplicability: Non-SCs cannot claim protection under SC/ST (Prevention of Atrocities) Act, 1989.
- "Professing Religion": Must involve public practice and conduct, not just belief.
- Mutual Exclusivity: Cannot claim SC status while following a non-notified religion.

About Scheduled Castes (SC)

- Groups historically affected by untouchability and social exclusion.
- Entitled to reservation, welfare schemes, political representation, and legal protection.

Key Judicial Doctrines

- Cessation on Conversion: SC status ends after conversion.
- Reconversion: Possible restoration if:
  - Original caste proven
  - Genuine reconversion
  - Acceptance by community
- Burden of Proof: Lies on the claimant.

Arguments for Status Quo

- Untouchability Basis: SC status linked to caste discrimination in Hindu society.
- Limited Resources: Protects reservation benefits for existing groups.
- Targeted Policy: Prevents dilution of affirmative action.
- Constitutional Validity: Based on reasonable classification (Article 14).
- Parliament's Role: Changes fall under Article 341.

Arguments for Reform

- Caste Persists Across Religions: Discrimination continues even after conversion.
- Substantive Equality: Exclusion violates Articles 14, 15, 16.
- Article 17 Concern: Untouchability persists beyond religion.
- Need for Review: Suggested by commissions (e.g., Ranganath Misra, K.G. Balakrishnan).

Way Forward

- Empirical Studies on caste discrimination across religions.
- Decoupled Approach: Separate reservation from legal protection.
- Sub-categorisation within SCs to protect most vulnerable.
- Gradual Reforms with pilot models.
- Stronger Anti-Discrimination Laws beyond reservation.

Conclusion

- The ruling reinforces the current legal framework, but highlights the gap between law and social reality.
- Future reforms must balance equality, social justice, and constitutional principles.

SC Verdict on OBC Creamy Layer

Context: The Supreme Court of India ruled that parental income alone cannot determine "creamy layer" status for OBCs.

Key Highlights of the Judgment

- Status > Income: Creamy layer is primarily based on social status, not just income.
- Salary Exclusion: Income from salary and agriculture is excluded from the ₹8 lakh limit.
- Equality Principle: Unequal treatment (Govt vs PSU/private employees) is unconstitutional.

Judicial Logic

  - Hostile Discrimination (Article 14):The Court struck down arbitrary classification treating PSU/private employees differently.
  - Status-Based Test:Occupational position (Group A/B) is more important than income.
  - OBC vs EWS:OBC reservation = social justice tool
  - EWS = economic poverty-based
  - → Mixing both is flawed.

About OBC & Reservation

- OBC: Socially & educationally backward classes.
  - Reservation Basis:Article 15(4), 16(4): Special provisions for backward classes
  - Article 340: Commission for backward classes
  - Mandal Commission (1980):Estimated OBC population ~52%
  - Led to 27% reservation (1990)
- Indra Sawhney Case:
  - Upheld OBC reservation
  - Introduced creamy layer exclusion
  - Fixed 50% cap.

Creamy Layer Criteria

- Based on parental status + income (₹8 lakh limit)
- Includes:
  - Group A/B officers
  - High-ranking PSU/defence/constitutional posts
- Excludes: Salary & agricultural income (as per SC clarification)

Key Challenges

- Post Equivalence Issue: Difficulty matching PSU/private jobs with govt grades.
- Data Gap: Lack of updated caste census data.
- Outdated Income Limit: ₹8 lakh not inflation-adjusted.
- Administrative Confusion: No clear mapping → inconsistent decisions.

Way Forward

- Fix Post Equivalence across sectors.
- Reassess Affected Cases (within 6 months).
- Dynamic Income Limit (linked to inflation).
- Better Data Collection (caste census, socio-economic data).

Conclusion

- The judgment reinforces that social backwardness—not just income—defines OBC reservation.
- Ensures fairness, equality, and proper targeting of benefits.

Rajasthan Scraps Two-Child Norm for Local Body Elections

Context: The Rajasthan government has removed the two-child norm for contesting Panchayat and municipal elections.

Key Developments

- Norm introduced in 1995 for population control.
- Now, candidates with more than two children can contest elections.
- Amendments proposed in:
  - Rajasthan Panchayati Raj Act, 1994
  - Rajasthan Municipalities Act, 2009

Reasons for Removal

- Changing Context: Policy seen as outdated in current socio-political conditions.
- Greater Participation: Expands the pool of eligible candidates.
- Strengthening Democracy: Encourages wider participation in local governance.

Pros

- Promotes inclusive political participation.
- Strengthens grassroots democracy under 73rd & 74th Constitutional Amendments.

Cons

- May weaken population control efforts.
- Concerns over political timing before elections.
- Does not address candidate quality or governance issues.

Conclusion

- The move reflects a shift from population control to inclusivity in democracy, but raises concerns about long-term policy impact.

Assam's MoS with Hmar and Kuki Groups

Context: Assam signed a Memorandum of Settlement (MoS) with Hmar and Kuki insurgent groups to end militancy and promote development.

Key Highlights

- Tripartite Agreement: Signed between Assam Government, Government of India, and insurgent groups:
  - HPC-D
  - UKDA
  - KRA
  - KLO
  - Main Demands:Greater autonomy/self-governance
  - Protection of tribal identity and land rights
  - Development Councils:Creation of Hmar & Kuki Welfare Development Councils
  - Aim: Targeted development in tribal areas
  - Structure: Chairman, executive members + govt nominees
  - Headquarters: Guwahati
  - Rehabilitation:Former militants to receive financial aid & livelihood support
  - End of Militancy:Groups had signed Suspension of Operations (SoO) pact (2012) and laid down arms.

Significance

- Peace Building: Ends long-standing insurgency.
- Inclusive Development: Focus on welfare in tribal regions.

Reintegration: Helps bring ex-militants into mainstream society.

About Kuki Tribe

- A major Tibeto-Burman ethnic group in Northeast India.
- Regions: Manipur, Mizoram, Assam, Tripura.
- Features: Chieftainship system, customary laws, strong clan identity.

About Hmar Tribe

- A Scheduled Tribe of the Chin-Kuki-Mizo group.
- Regions: Manipur, Mizoram, Assam, Tripura.
- Features: Clan-based, patriarchal society; shifting cultivation.

Conclusion

- The MoS marks a step towards lasting peace and development in Northeast India, combining security, autonomy, and welfare measures.

Compulsory Voting in India

Context: The Election Commission of India announced Assembly election schedules, while the Supreme Court of India raised concerns over compulsory voting.

About Compulsory Voting
- A system where citizens are legally required to vote.
- Non-compliance may attract penalties (in some countries).
- Practised in countries like Australia and parts of Latin America.

Efforts in India
- Dinesh Goswami Committee:
  - Opposed compulsory voting due to practical difficulties.
  - Suggested awareness campaigns instead.
- Law Commission 255th Report:
  - Noted compulsory voting may increase turnout by ~7%.

Right to Vote: Constitutional Framework
- Article 325: No exclusion from electoral rolls on discriminatory grounds.
- Article 326: Universal adult suffrage (18+ citizens).
- Articles 327 & 328: Parliament & State Legislatures regulate elections.
- Article 329: Courts cannot interfere in electoral matters.

Legal Provisions:
- Representation of the People Act, 1950 (Section 19): Eligibility for voter registration.
- Representation of the People Act, 1951 (Section 62): Right to vote.
- Nature of Right: The Supreme Court of India has held that right to vote is a statutory right, not a fundamental right.

Conclusion
- While compulsory voting may increase participation, concerns remain about feasibility and individual freedom in India.

Judicial Recusal

Context: The Supreme Court of India judge Justice Surya Kant recused from hearing a case on the Election Commissioners law due to possible conflict of interest.

Doctrine of Recusal

- Meaning: Voluntary withdrawal of a judge from a case due to bias or conflict of interest.
- Basis: Principle of natural justice — nemo judex in causa sua (no one should judge their own case).
  - Nature in India:Based on judge's conscience and propriety
  - Not codified in law
  - Cannot be forced by parties

Doctrine of Necessity

- A judge must hear a case if no alternative is available, even with potential conflict.
- Ensures justice is not delayed or denied.

Judicial Evolution in India

- Manak Lal v. Dr. Prem Chand:
  - Any pecuniary interest → automatic disqualification.
- Ranjit Thakur v. Union of India:
  - Introduced "reasonable apprehension of bias" test.
- Supreme Court Advocates-on-Record Association v. Union of India:
  - Applied doctrine of necessity (refused recusal).

Conclusion

- Judicial recusal ensures fairness and impartiality, but must be balanced with the need to deliver justice without delay.

US Launches Section 301 Investigation into India

Context: The Office of the United States Trade Representative has initiated a Section 301 investigation into multiple countries, including India and China.

What is Section 301 Investigation?

- A provision under the Trade Act of 1974.
- Empowers USTR to investigate unfair trade practices by other countries.

Key Features

- Trigger: When foreign policies:
  - Violate trade agreements
  - Discriminate against US businesses
  - Objective:Protect US industries, workers, and intellectual property rights
  - Actions Possible:Imposition of tariffs
  - Import restrictions
  - Other trade sanctions

Conclusion

- Section 301 is a unilateral trade tool of the US, often impacting global trade relations, including with India.

India's New GDP Series (Base Year: 2022–23)

Context: The Ministry of Statistics and Programme Implementation released a new GDP series (base 2022–23), revising growth estimates and sectoral shares.

Key Highlights

- Stable Growth: Real GDP growth now more stable (7.1–7.6%) vs earlier volatility.
- Lower Nominal GDP: Economy size revised down by 3–4% due to better data and methods.
- Sectoral Rebalancing: Shares of agriculture, manufacturing, and services recalibrated.

Agriculture Sector

- Higher Size: Sector estimated ~5% larger than earlier.
  - Increased Share:18.2% (new series) vs 16.5% (old) in 2022–23
- Trend: Still declining structurally (16.2% by 2025–26).

Reasons for Increase

- Shift to high-value crops (fruits, vegetables).
- Lower input costs (shift to solar/electric irrigation).
- Impact of PM-KUSUM Scheme.

Manufacturing Sector

- Higher Growth: Avg 11.2% (new) vs 8% (old).

Reasons

- Better data via ASUSE & PLFS surveys.
- Improved methodology (no single deflator).
- Better capture of informal sector activity.

Informal Economy

- Improved Measurement: Corrects earlier underestimation.
  - Mixed Impact:Manufacturing gains
  - Services sector revised downward (~25% GVA fall)
- Suggests earlier overestimation of some services.

Conclusion

- The new GDP series offers a more realistic and data-driven picture of the economy.
- Highlights stronger manufacturing role and better understanding of the informal sector.

Variable Rate Repo (VRR) Auction

Context: The Reserve Bank of India injected ₹25,101 crore liquidity via a 3-day VRR auction.

About VRR
- An auction-based liquidity injection tool used by RBI.
- Banks bid for interest rates, unlike fixed repo (pre-determined rate).
- Cut-off rate decided by market demand and supply.

Types of VRR
- Overnight VRR: For daily liquidity mismatches.
- Term VRR: 3-day, 7-day, 14-day, etc.
- Fine-tuning VRR: To manage sudden liquidity shocks.

VRR vs Fixed Repo-

Aspect	Fixed Repo	VRR
Interest Rate	Fixed by RBI	Market-determined
Flexibility	Low	High
Role	Routine	Active liquidity
Market Link	Limited	Reflects market

Mechanism
- RBI announces amount & tenure of funds.
- Banks bid (amount + interest rate).
- RBI accepts bids from lowest rates upward.
- Cut-off rate becomes the final borrowing rate.

Conclusion
- VRR enhances flexibility and market-based liquidity management in the banking system.

Fiscal Health Index 2026

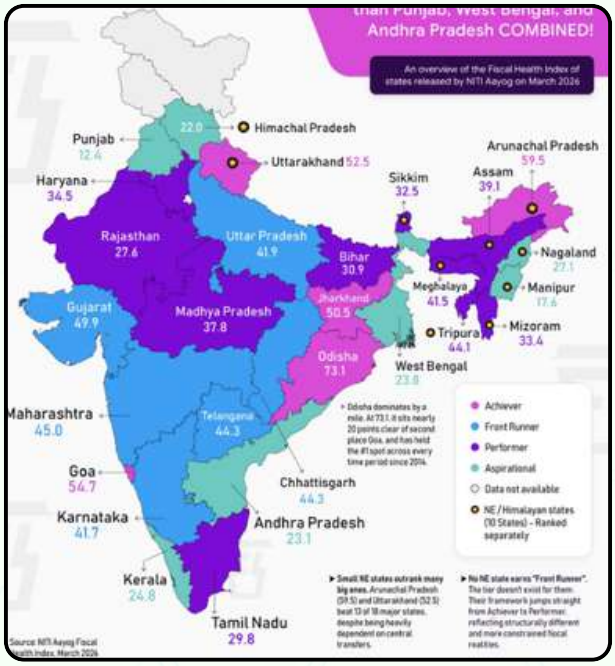
Context: The NITI Aayog released the Fiscal Health Index 2026, covering all major and NE/Himalayan states.

About the Index

- A data-driven tool to assess states' fiscal performance.
- Uses audited data from Comptroller and Auditor General of India (FY 2023–24).
- Aims to promote fiscal discipline and policy reforms.

Five Pillars

- Quality of expenditure
- Revenue mobilisation
- Fiscal prudence
- Debt levels
- Debt sustainability



State Classification

- Achievers: Strong fiscal discipline, low debt
- Front Runners: Generally sound finances
- Performers: Mixed performance
- Aspirational: High deficits, weak revenue

<u>Key Highlights</u>

Major States

  - Top Performers:Odisha (1st), Goa, Jharkhand
  - Gujarat & Maharashtra also in top ranks
- Improvement: Haryana improved significantly
- Bottom States: Punjab, West Bengal, Kerala
  - Due to high non-developmental expenditure & debt

Achievers' Features:

- High own-tax revenue (>60%)
- Capital expenditure ~4–5% of GSDP
- Fiscal deficit <3% of GSDP

NE & Himalayan States

- Top: Arunachal Pradesh, Uttarakhand
- Bottom: Himachal Pradesh, Manipur
  - Due to low revenue & fiscal stress

Conclusion

- The index highlights fiscal disparities across states and encourages better financial management and reforms.

Discontinuation of Rice Fortification

Context: The Government has temporarily halted rice fortification under Pradhan Mantri Garib Kalyan Anna Yojana based on a study by IIT Kharagpur.

- No change in foodgrain supply under PDS, ICDS, or PM POSHAN.

Rice Fortification Scheme in India

- Type: Centrally funded (100% by Centre).
- Aim: Address anaemia and micronutrient deficiencies.
- Coverage: Distributed via:
  - Targeted Public Distribution System (TPDS)
  - Integrated Child Development Services (ICDS)
  - PM POSHAN Scheme

Key Findings of IIT Study

- Factors affecting quality: Moisture, temperature, humidity, storage, packaging.
- Nutrient Loss: Micronutrients decline during storage and handling.
- Impact: Reduced shelf life limits nutritional benefits.

About Rice Fortification

- Process of adding nutrients like iron, folic acid, vitamin B12, zinc, vitamins A & B-complex.

Method (Extrusion)

- Fortified Rice Kernels (FRKs) made from rice flour + nutrients.
- Mixed in ratio 1 kg rice : 10 g FRK.

Benefits

- Reduces anaemia (especially in women & children).
- Improves maternal and child health.
- Enhances cognitive development & immunity.
- Strengthens nutrition delivery via welfare schemes.

Conclusion

- While fortification has significant nutritional benefits, the pause highlights the need for better storage and delivery mechanisms to ensure effectiveness.

LPG Crisis and Biogas

Context: LPG shortages due to disruptions in the Strait of Hormuz have renewed focus on biogas and alternative fuels in India.

Reasons for LPG Shortage

- High Dependence on Strait of Hormuz: Over 85% of imports pass through this route.
- No Strategic LPG Reserves: Unlike crude oil, India lacks long-term LPG stockpiling.
- Rising Import Dependence: Around 60% of LPG demand is imported.
- Expansion under Pradhan Mantri Ujjwala Yojana: Increased connections (≈33 crore) have raised demand.
- Longer US Supply Route: Imports from the US take ~45 days, unlike faster Gulf supplies.

About Biogas

- Definition: Renewable fuel from decomposition of organic waste (dung, food, crop residue).
- Composition: Mainly methane (50–75%) and CO_2 (25–50%).

Key Features

- Eco-friendly: Reduces emissions and waste.
- Decentralised: Can be produced at household/community level.
- Dual Benefit: Fuel + organic manure.
- Energy Security: Reduces dependence on imported fuels.

About LPG (Liquefied Petroleum Gas)

- Type: Clean fossil fuel used for cooking and industry.
- Composition: Propane and butane.
- Source: By-product of crude oil refining and natural gas processing.
  - Uses:Household cooking
  - Industrial heating
  - Auto LPG
  - Commercial use (hotels, restaurants)

Conclusion

- The crisis highlights India's energy vulnerability and the need to promote biogas and other renewable alternatives for long-term energy security.

Coconut Cultivation

Context: Union Budget 2026–27 announced a Coconut Promotion Scheme to rejuvenate old plantations and expand cultivation in coastal areas.

About Coconut

- Scientific Name: Cocos nucifera
- Major plantation crop of tropical India.
- India is the largest producer globally (~31% share) and ranks second in productivity.
- Known as “Kalpavriksha” (tree of heaven) due to multiple uses.

Agro-Climatic Requirements

- Temperature: 20–32°C (tropical climate)
- Rainfall: 1000–2500 mm
- Soil: Well-drained sandy loam, laterite, coastal alluvial
- Altitude: Sea level to 600 m
- Humidity: High humidity favourable

Major Producing Regions

- Traditional Belt: Kerala, Tamil Nadu, Karnataka
- Expanding Areas: Andhra Pradesh, Odisha, Gujarat, Assam, Maharashtra

Global Distribution

- Mainly in coastal and tropical regions like the Philippines, Indonesia, Thailand, Fiji, and Samoa.

Economic Importance

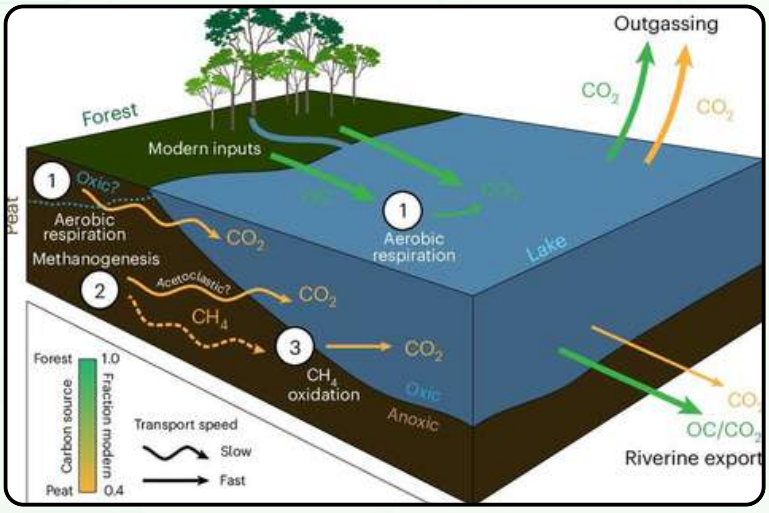
- Coconut water: Natural electrolyte, good for hydration.
- Healthy fats: Rich in medium-chain triglycerides (quick energy source).
- By-products: Shell used in handicrafts and activated carbon.
- Livelihood: Supports over 12 million people in India.

Conclusion

- Coconut is a high-value, multi-purpose crop, crucial for nutrition, rural livelihoods, and coastal economy, making its promotion strategically important.

Ancient Carbon Leak from Congo Basin Lakes

Context: Two lakes in the Democratic Republic of the Congo are releasing ancient carbon stored in peatlands for thousands of years.



About the Congo Basin

- Covers parts of Central Africa, including DRC.
- Major carbon reservoir: Peatlands occupy only 0.3% of land but store ~1/3 of tropical peat carbon.
- Plays a key role in global climate regulation.

Lakes Involved

- Lake Mai Ndombe and Lake Tumba
- Located in the Tumba–Ngiri–Mai Ndombe wetland complex.
- Type: Blackwater (humic) lakes, rich in organic matter.

Key Findings

- Up to 40% of CO_2 emissions come from ancient peat carbon (over 3,000 years old).
- Indicates release of long-stored carbon, not just recent biomass.

Drivers of Carbon Release

  - Climate Change:Warmer temperatures → increased microbial activity
  - Drier conditions → faster carbon release
  - Land-Use Change:Deforestation & agriculture reduce water retention
  - Leads to drying of peatlands and more emissions

Conclusion

- The Congo Basin is a critical carbon sink, but disturbances may turn it into a carbon source, accelerating climate change.

8.2 ka Cooling Event

Context: A cooling event around 8,200 years ago weakened the Indian Summer Monsoon, showing strong global climate linkages.

What is the 8.2 ka Cooling Event?

- A sudden, short-term global cooling phase ~8,200 years ago during the Holocene Epoch (current geological period).
- Temperature drop: ~3°C in Greenland.

Cause of the Event

- Massive freshwater release from Lake Agassiz into the North Atlantic via Hudson Bay.
- This disrupted the Atlantic Meridional Overturning Circulation.

About AMOC

- A global ocean current system acting like a “conveyor belt”.
- Transports warm water northward and cold water southward.
- Crucial for regulating global climate, especially in Europe.

Impact
- Weakened Indian monsoon system.
- Altered global climate patterns.
- Demonstrates interconnectedness of ocean-climate systems.

Scientific Evidence
- Study based on pollen analysis from lake sediments in Chhattisgarh.
- Helps reconstruct past vegetation and climate changes.

Conclusion
- The event highlights how regional changes (North Atlantic) can influence monsoon systems in India, underlining the importance of global climate systems.

Rediscovery of Extinct Marsupials

Context: Two marsupials—the Ring-tailed Glider and Pygmy Long-fingered Possum—have been rediscovered in New Guinea, after being thought extinct for ~6,000 years.

Ring-tailed Glider (Tous ayamaruensis)
- Type: Arboreal (tree-dwelling) marsupial.
- Habitat: Dense rainforests of the Vogelkop Peninsula.

Features
- Nocturnal; feeds on leaves and tree sap.
- Has gliding ability and a ring-shaped tail for gripping.
- Distinctive hairless ears.

Concerns
- Threatened by deforestation and logging.
- Survival aided by indigenous community protection.

Pygmy Long-fingered Possum (Dactylonax kambuayai)
- Type: Small, rare marsupial.
- Habitat: Moist tropical forests, especially old-growth trees.

Features
- Palm-sized, nocturnal.
- Long finger used to extract insect larvae from wood.
- Sensitive hearing to locate prey.

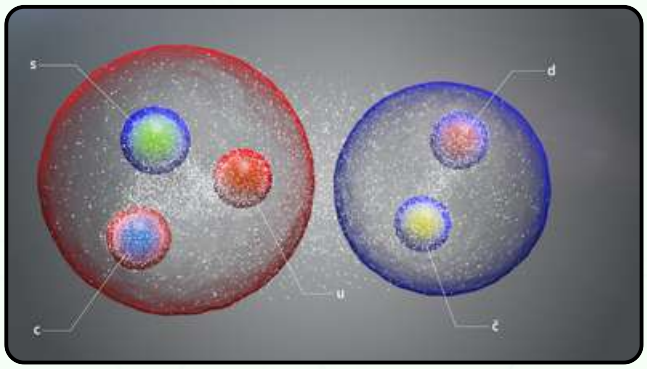
Concerns
- Very small population, habitat loss, and illegal wildlife trade.

About Marsupials
- Mammals whose young develop in a pouch (e.g., kangaroo, koala).
- Found mainly in Australia, New Guinea, and nearby regions.
- Not native to present-day India, though fossil evidence exists.

Conclusion
- Rediscovery highlights the importance of biodiversity conservation and shows that remote ecosystems may still hold unknown or “lost” species.

Large Hadron Collider Discovers a New Particle

Context: The Large Hadron Collider has discovered a new particle called Xi-cc-plus.



About Xi-cc-plus

- A heavy baryon discovered in proton–proton collisions (LHC Run 3).
- Detected by the LHCb experiment.
- Composition: Two charm quarks + one down quark.
- Mass: ~4 times heavier than a proton.
- Charge: Positive.
- Nature: Extremely unstable; lifetime ~45 femtoseconds.

Proton–Proton Collisions

- High-energy protons collide to create new particles.
- Energy converts into matter ($E = mc^2$).
- Helps test theories like Quantum Chromodynamics.

Significance of Discovery

- Explores exotic particles: Helps study tetraquarks & pentaquarks.
- Understanding strong force: Explains how quarks bind together.
- Advances particle physics: Strengthens the Standard Model.

About Hadrons

- Particles made of quarks, bound by strong nuclear force.
  - Types:Baryons: 3 quarks (proton, neutron)
  - Mesons: 1 quark + 1 antiquark

About LHC

- World's most powerful particle accelerator, operated by CERN.
- Used to study fundamental building blocks of matter.

India's Contribution

- Institutions like BARC and RRCAT contributed to key technologies.
- Participation in ALICE, CMS experiments and global data grid (WLCG).

Conclusion

- The discovery enhances understanding of subatomic particles and fundamental forces, pushing the boundaries of modern physics.

Key Budget 2026 Initiatives

1. AVGC Content Creator Labs
   - Labs for Animation, Visual Effects, Gaming and Comics (AVGC) to be set up in 15,000 schools and 500 colleges.
   - India's AVGC sector may require 2 million professionals by 2030.
2. Design Education Expansion
   - A new National Institute of Design campus to be established in eastern India.
3. Creative Technology Support
   - Financial support for the Indian Institute of Creative Technologies to boost high-tech creative exports.
4. Heritage Tourism Development
   - Archaeological sites such as Lothal, Dholavira, and Sarnath will be developed as experiential cultural destinations.
5. AI in Creative Industries
   - Integration of AI tools in animation, gaming, and immersive storytelling.
6. Youth and Women Empowerment
   - Skilling and entrepreneurship programs to promote youth and women participation in creative sectors.
7. Global Promotion
   - Continued push for the World Audio Visual and Entertainment Summit (WAVES) to position India as a global creative hub.

Key Challenges

Financial and Structural Issues
- Limited fiscal incentives compared to manufacturing or IT.
- Difficulty in obtaining loans due to lack of collateral.
- High GST on gaming and regulatory complexity.

Market Risks
- Revenue concentration among a few creators.
- Dependence on global digital platforms and algorithms.

Talent Gap
- Shortage of trained designers and technical artists.
- Regional and gender imbalance in creative education.

IP and Data Issues
- Weak copyright enforcement and digital piracy.
- Lack of reliable data on the sector's contribution to GDP.

Government Initiatives
- All India Initiative on Creative Economy to promote India's creative industry.
- National Creative Fund to finance high-risk creative startups.
- Development of immersive heritage tourism and digital cultural documentation.

Way Forward
- Single-Window Clearance for events and film production.
- Creation of AVGC-XR clusters in cities like Mumbai, Bengaluru, Hyderabad, and Pune.
- Promotion of IP-backed financing and stronger copyright protection.
- Formalisation of gig workers through platforms like e-Shram Portal.

Thorium and India's 100 GWe Nuclear Mission by 2047

Context: India plans to achieve 100 GWe nuclear capacity by 2047, exploring thorium-based energy for long-term energy security.

Nuclear Energy Target
- Target: 100 GWe by 2047.
- Challenge: Requires 18,000–20,000 tonnes of uranium annually.
- Current reliance mainly on uranium-based thermal reactors.

Limitations of Uranium-Based Power
- Low domestic reserves → high import dependence.
- Inefficient fuel use (once-through cycle).
- Radioactive waste & proliferation risks.

Thorium as a Strategic Alternative
- Abundant in India (coastal monazite sands).
- Improves energy security by reducing imports.
- Sustainable cycle: Thorium (Th-232) → Uranium-233 (fuel).
- Lower proliferation risk.
- Central to India's long-term nuclear strategy.

Challenges in Thorium Use
- Cannot directly sustain reactions → needs conversion.
- Limited commercial reactors globally.
- High R&D and infrastructure costs.
- Inadequate testing and deployment facilities.

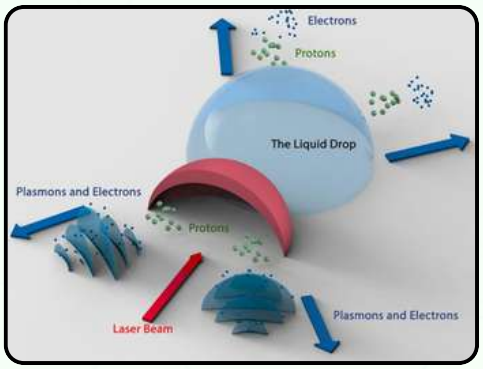
SHANTI Act, 2025
- Opens nuclear sector to private players & academia.
- Promotes research, innovation, and collaboration.
- Aims to strengthen India's nuclear ecosystem.

India's Three-Stage Nuclear Programme
(Concept by Homi Jehangir Bhabha)
  - Stage I – PHWRs:Fuel: Natural uranium
  - Output: Produces plutonium
  - Stage II – Fast Breeder Reactors:Fuel: Plutonium
  - Objective: Generate more fuel (breeding)
  - Stage III – Thorium Reactors:Fuel: Uranium-233 from thorium
  - Goal: Long-term sustainable energy

Conclusion
- Thorium offers a strategic, sustainable solution to India's energy needs, but requires technological advancement and investment for large-scale deployment.

High-Energy Proton Accelerator

Context: A high-energy proton accelerator is planned in Visakhapatnam, marking a major step in India's atomic research programme.



What is a High-Energy Proton Accelerator?

A high-energy proton accelerator is a large scientific facility that accelerates protons (positively charged particles) to very high speeds using electromagnetic fields, enabling advanced research in particle physics and nuclear science.

Types of Proton Accelerators

- Linear Accelerators (Linac): Accelerate particles in a straight line
- Cyclotrons: Use circular paths with magnetic fields
- Synchrotrons: Large circular accelerators with synchronized magnetic fields

Key Components

- Particle Source: Produces protons from hydrogen atoms
- Accelerating Structure: Uses radio-frequency fields to boost energy
- Magnetic System: Guides and focuses the proton beam
- Vacuum Chamber: Prevents collisions with air molecules
- Target & Detector System: Analyses particles produced after collisions

Global Examples

- Large Hadron Collider – World's most powerful accelerator
- CERN – Operates major particle physics facilities
- Spallation Neutron Source – Produces neutrons for material studies

Applications

- Particle Physics: Study fundamental particles and forces
- Neutron Production: Used in materials and atomic research
- Materials Science: Helps develop semiconductors and advanced materials
- Medical Use: Produces isotopes (e.g., for PET scans)
- Nuclear Research: Supports waste management and advanced reactor design

Significance for India

- Strengthens scientific research capacity
- Boosts self-reliance in nuclear and particle physics
- Supports medical, industrial, and strategic applications
- Positions India among leading nations in advanced accelerator technology

World's Smallest QR Code

Context: Researchers at TU Wien created the world's smallest QR code using ceramics, setting a new Guinness World Records benchmark.

Key Highlights
- Size: Only 2 μm² (smaller than a bacterium)
- About one-third the size of the previous record
- Created using advanced nanotechnology techniques

What is a QR Code?
- A QR (Quick Response) Code is a 2D barcode storing data both horizontally and vertically
- Developed in 1994 by Denso Wave
- Stores more information than traditional barcodes

Technology Used: Ion Beam Milling
- Ion Beam Milling is a nanofabrication technique using a focused beam of high-energy ions (usually gallium)
- Enables atom-level precision in engraving patterns
- Used in semiconductors and nano-patterning

Why Ceramics for Data Storage?
Advantages over Magnetic Storage
- Long lifespan: Can last centuries (vs 10–30 years)
- Zero-energy storage: No power needed for preservation
- No data degradation: Permanent physical engraving
- Highly durable: Resistant to heat, water, corrosion, and electromagnetic interference
- Eco-friendly: Reduces reliance on energy-intensive data centres

About Ceramics
- Definition: Inorganic, non-metallic materials made by heating and cooling substances like clay, silica, and alumina
- Can be engineered at the nanoscale for advanced applications

Applications of Ceramics
- Traditional: Pottery, tiles, bricks
- Industrial: Cutting tools, aerospace components, armor
    - Advanced Uses:Nano-scale data storage
    - Biomedical implants (e.g., hip joints)
    - Electronics (capacitors, superconductors)

Significance
- Breakthrough in long-term data storage technology
- Demonstrates the potential of nanotechnology + materials science
- Could enable ultra-durable, low-energy data preservation systems in the future

NavIC Setback: Atomic Clock Failure

Context: An atomic clock onboard one of the IRNSS satellites of NavIC has stopped functioning. However, the satellite continues to provide limited services like one-way messaging.

About Atomic Clocks
- Definition: Ultra-precise timekeeping devices used in satellites for accurate navigation
- Working Principle: Measure time using the vibration frequency of atoms under electromagnetic radiation

Types:
- Cesium clocks: Standard for defining a second
- Rubidium clocks: Common in satellites
- Hydrogen maser clocks: Used in deep-space missions

Features:
- Accuracy up to nanoseconds
- Extremely stable with minimal drift
- Even microsecond errors → km-level positioning errors

Applications:
- Satellite navigation (NavIC, GPS)
- Telecommunications & banking networks
- Space missions & scientific research

About NavIC (IRNSS)
- Developed by ISRO
- Full form: Indian Regional Navigation Satellite System (IRNSS)
- Provides indigenous navigation capability

Origin:
- Conceived after the Kargil War for strategic autonomy

Constellation Details
- Core satellites: IRNSS-1A to IRNSS-1G
- Replacement satellites: IRNSS-1H, IRNSS-1I
- New generation: NVS-01, NVS-02 (latest launched in 2025)

Key Features of NavIC
- Coverage: India + ~1500 km beyond borders
- Orbit: Combination of GEO & GSO satellites
- Services:
  - SPS (Standard Positioning Service) – civilian
  - RS (Restricted Service) – military
- Frequency bands: L5, S-band (L1 added in new satellites)
- Accuracy: ~20 meters or better

Significance of Atomic Clock Failure

- May reduce navigation precision
- Highlights technical vulnerability in satellite systems
- Emphasizes need for redundancy and indigenous clock technology
- Limited impact due to backup systems and constellation support

Conclusion

The setback underlines the critical role of atomic clocks in satellite navigation. While NavIC remains operational, strengthening indigenous technological capabilities and redundancy systems is essential for long-term reliability and strategic autonomy.

Molecular Clouds

Context: Scientists from Aryabhatta Research Institute of Observational Sciences and Assam University have, for the first time, mapped the magnetic "skeleton" of small molecular clouds L1604 and L121 using advanced polarimetry.

Key Findings

- Magnetic Dominance: Both clouds are sub-critical, meaning magnetic forces dominate over gravity and turbulence
  - Star Formation Zones:Dense cores may still collapse under gravity → sites of star formation
  - Cloud Differences:L1604: Dense, massive, less ordered magnetic field
  - L121: Less dense, stronger and more ordered magnetic field
  - Role of Magnetic Fields:Act as an "invisible regulator", slowing star formation and preventing rapid gas depletion

Methodology

- Technique: R-band polarimetry
- Instrument: ARIES Imaging Polarimeter (AIMPOL)
- Location: 104-cm telescope at Nainital

What are Molecular Clouds?

- Cold, dense regions of gas and dust in space where molecules (mainly H_2) exist
- Known as "stellar nurseries" because stars are formed here

Examples:

- Orion Molecular Cloud Complex
- Taurus Molecular Cloud
- L1604 and L121

Key Features

- Temperature: 10–30 K (extremely cold)
- Density: 100 to 1,000,000 particles/cm^3
- Composition: Mainly H_2, helium, CO + dust
  - Size:Small (Bok globules): 1–5 light-years
  - Large (GMCs): 10–100 light-years
- Mass: From a few to millions of solar masses

Types of Molecular Clouds

1. Bok Globules: Small, dense → form single stars
2. Dark Clouds: Block starlight → appear as dark patches
3. Giant Molecular Clouds (GMCs): Massive → form star clusters

Significance

- Star Formation Regulation: Magnetic fields control the pace of star birth
- Galaxy Stability: Prevents all gas from collapsing at once
- Scientific Breakthrough: First direct mapping of magnetic structures in small clouds
- Future Research: Helps understand interaction of gravity, turbulence, and magnetism

Importance

- Birthplace of Stars: Core regions collapse → star formation
- Planet Formation: Leads to protoplanetary disks
- Galactic Evolution: Controls stellar population and lifecycle
- Chemical Evolution: Hosts complex and prebiotic molecules

Conclusion

The study highlights that star formation is not driven by gravity alone—magnetic fields play a decisive role in regulating cosmic structure formation, offering deeper insights into galaxy evolution and the lifecycle of matter in the universe.

Darknet Drug Network

Context: The Narcotics Control Bureau dismantled a pan-India darknet drug network named "Team Kalki", exposing the use of cryptocurrency and encrypted platforms for narcotics trafficking.

What is Darknet?

- The darknet is a hidden part of the internet accessible only through specialised tools like Tor Browser
- It enables anonymous communication and transactions, often exploited for illegal activities

Key Features:

- Anonymity: Conceals user identity and location
- Encryption: Secure communication channels
- Cryptocurrency-based transactions: Difficult to trace

Darknet Drug Syndicates

- Organized criminal networks using the darknet for drug trafficking
- Operate via:
  - Encrypted messaging platforms
  - Cryptocurrency payments
  - Anonymous marketplaces

Commonly Trafficked Drugs

- LSD (Lysergic Acid Diethylamide):Synthetic hallucinogen
- Effects: hallucinations, anxiety, altered perception
- MDMA (Ecstasy pills):Stimulant + empathogen
- Risks: dehydration, heart issues, neurotoxicity
- Liquid MDMA:Highly concentrated form
- Risk of overdose and severe toxicity
- Amphetamine:Powerful stimulant
- Risks: addiction, cardiovascular issues, paranoia
- Charas (Cannabis resin):High THC content
- Effects: impaired memory, anxiety, dependency

Significance of the Bust

- Highlights growing nexus between cybercrime and drug trafficking
- Shows increasing use of cryptocurrency in illegal trade
- Raises concerns over law enforcement challenges in cyberspace
- Emphasizes need for advanced digital surveillance and global cooperation

Challenges in Tackling Darknet Crime

- Difficulty in tracking anonymous users
- Cross-border nature of operations
- Rapid evolution of encryption technologies
- Limited regulatory control over cryptocurrencies

Way Forward

- Strengthen cyber forensic capabilities
- Enhance inter-agency and international cooperation
- Regulate cryptocurrency transactions more effectively
- Increase awareness and monitoring of darknet platforms

Conclusion: The “Team Kalki” case underlines the transformation of drug trafficking into a technology-driven, transnational crime, requiring India to strengthen its cyber policing, legal framework, and global coordination mechanisms.

Megalithic Laterite Rock-Cut Burial Chamber

Context: A 2,000-year-old megalithic laterite rock-cut burial chamber was discovered at Panayal in Kasaragod district during construction work.

About Megalithic Rock-Cut Chambers

- Definition: Subterranean burial structures carved into laterite rock, associated with the Megalithic culture (Iron Age)

Structure:

- Circular underground chamber
- Accessed via a vertical shaft
- Entrance sealed with a heavy stone slab
- Contains a small ritual aperture (for offerings/spiritual passage)

Geographical Distribution

- Found in laterite-rich regions of:
  - Kerala
  - Coastal Karnataka
- Often associated with:
  - Kudakkallu (umbrella stones)
  - Toppikallu (cap stones)

Significance

1. Funerary Practices

- Used for burial of the dead with grave goods:
  - Pottery
  - Iron tools
  - Beads
- Reflects belief in afterlife and ritual traditions

2. Technological Advancement

- Carved into hard laterite rock → indicates advanced iron tool usage
- Demonstrates architectural skill

3. Historical Insight

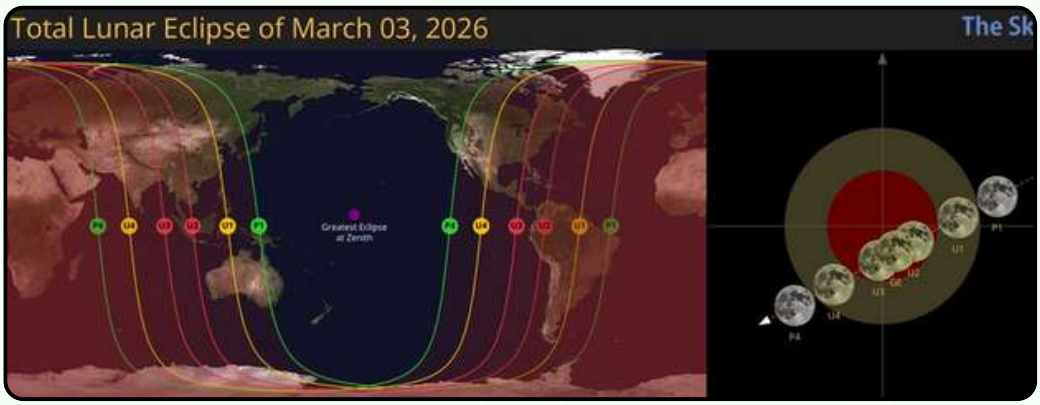
- Represents transition from Neolithic → Iron Age
- Shows:
  - Organized burial systems
  - Emerging social complexity

Conclusion

The discovery highlights the sophistication of Megalithic societies in South India, offering valuable insights into their technology, cultural practices, and belief systems.

Total Lunar Eclipse (3 March 2026)

Context: A Total Lunar Eclipse was observed on 3 March 2026 across India and several parts of the world.



What is a Lunar Eclipse?

- A lunar eclipse occurs during a full moon when the Sun, Earth, and Moon align in a straight line (syzygy)
- The Earth comes between the Sun and the Moon, casting its shadow on the Moon

Earth's Shadow Structure

- Umbra:Dark inner region
- Sunlight completely blocked
- Penumbra:Outer region
- Sunlight partially blocked

Types of Lunar Eclipses

1. Penumbral Lunar Eclipse
   - Moon passes only through the penumbra
   - Causes faint dimming, often hard to notice
2. Partial Lunar Eclipse
   - Part of the Moon enters the umbra
   - Visible dark shadow on a portion of the Moon
3. Total Lunar Eclipse
   - Entire Moon enters the umbra
   - Moon appears reddish ("Blood Moon") due to scattering of sunlight in Earth's atmosphere

Significance

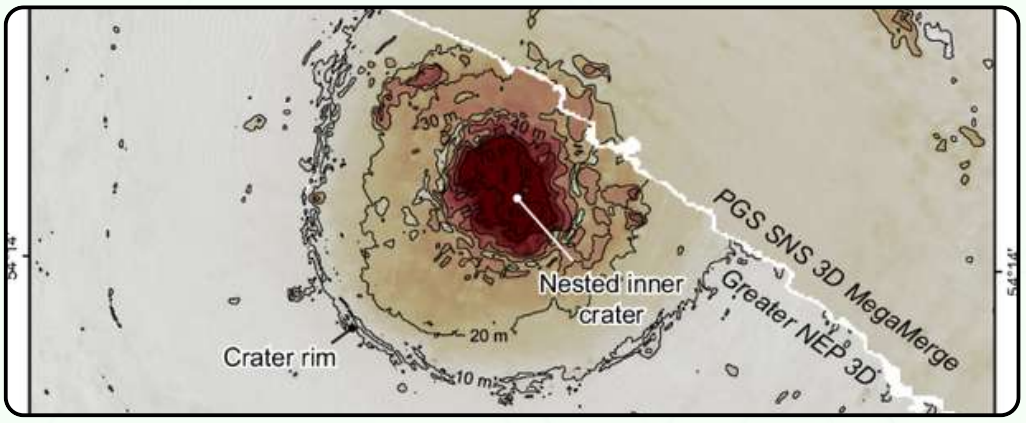
- Helps study Earth's atmosphere and light scattering
- Important for astronomical observations and public awareness
- Demonstrates celestial alignment (syzygy)

Conclusion

The 3 March 2026 event showcased a complete alignment of celestial bodies, offering both scientific insights and a visually striking astronomical phenomenon.

Silverpit Crater

Context: Recent research confirms that the Silverpit Crater beneath the North Sea was formed by an asteroid impact around 43–46 million years ago.



About Silverpit Crater

- Location: Beneath the North Sea, off the coast of the United Kingdom
- Discovery: Identified in 2002 using seismic survey data during oil exploration
- Name Origin: Named after the Silver Pit fishing ground

Key Features

- Diameter: ~20 km wide
  - Unique Structure:Surrounded by concentric rings (unusual for impact craters)
- Geological Age: ~43–46 million years old

Scientific Evidence of Impact

- Presence of:
  - Shocked quartz
  - Feldspar minerals
- These minerals form only under extreme pressure, confirming a meteorite impact

Scientific Significance

- One of the rare, well-preserved underwater impact craters
- Helps in:
  - Studying asteroid impacts
  - Understanding Earth's geological history
  - Analysing impact-related structural features

Note

- Although earlier linked to the Cretaceous–Paleogene extinction event, current age estimates suggest it formed much later, making it unrelated to that extinction event.

Conclusion

The Silverpit Crater provides crucial insights into impact geology and Earth's past, especially in marine environments, enhancing our understanding of planetary processes.

Bug Bounty Programme

Context: The Unique Identification Authority of India has launched its first structured Bug Bounty Programme to strengthen the security of the Aadhaar ecosystem.

About Bug Bounty Programme

- A cybersecurity initiative where ethical hackers and researchers are invited to identify vulnerabilities in digital systems
- Participants report bugs responsibly instead of exploiting them

Key Features

- Aim:Detect and fix security weaknesses in UIDAI's digital platforms
- Participants:Panel of 20 experienced security researchers and ethical hackers
- Scope of Testing:UIDAI official website
- myAadhaar portal
- Secure QR Code application

Significance

- Enhances cybersecurity and data protection of Aadhaar
- Promotes ethical hacking and responsible disclosure
- Strengthens public trust in digital governance systems
- Helps prevent data breaches and cyber threats

Conclusion: The initiative marks a proactive shift towards collaborative cybersecurity, ensuring that critical digital infrastructure like Aadhaar remains secure, resilient, and trustworthy.

Raisina Dialogue 2026

Context: The 11th edition of the Raisina Dialogue was inaugurated in New Delhi by Narendra Modi, with Alexander Stubb delivering the keynote address.

About Raisina Dialogue

- India's premier multilateral conference on geopolitics and geo-economics
- Brings together:
  - Global leaders
  - Policymakers
  - Military officials
  - Scholars & industry experts

Origin & Organisation

- Launched: 2016
  - Organised by:Observer Research Foundation
  - In partnership with Ministry of External Affairs
- Named after Raisina Hill
- First Theme (2016):
- “Asia: Regional and Global Connectivity”

Theme 2026

“Saṁskāra – Assertion, Accommodation, Advancement”

- Assertion: Pursuit of national interests
- Accommodation: Respect for diverse global perspectives
- Advancement: Collective progress in global governance

Significance

- Enhances India’s role in global strategic discourse
- Strengthens diplomatic engagement and soft power
- Provides a platform for dialogue on global challenges (security, economy, technology, climate)

Conclusion- The Raisina Dialogue has emerged as a key forum shaping global conversations, reflecting India’s growing influence in international relations and policy leadership.

Three Seas Initiative (3SI)

Context: India engaged with Croatia’s envoy on the Three Seas Initiative (3SI) during the Raisina Dialogue 2026.

About 3SI

- A regional economic and strategic forum of 13 European Union countries.
- Countries lie between three seas:
  - Baltic Sea
  - Adriatic Sea
  - Black Sea

Origin - Launched in 2015.

Member Countries (13) - Austria, Bulgaria, Croatia, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia.

Objectives

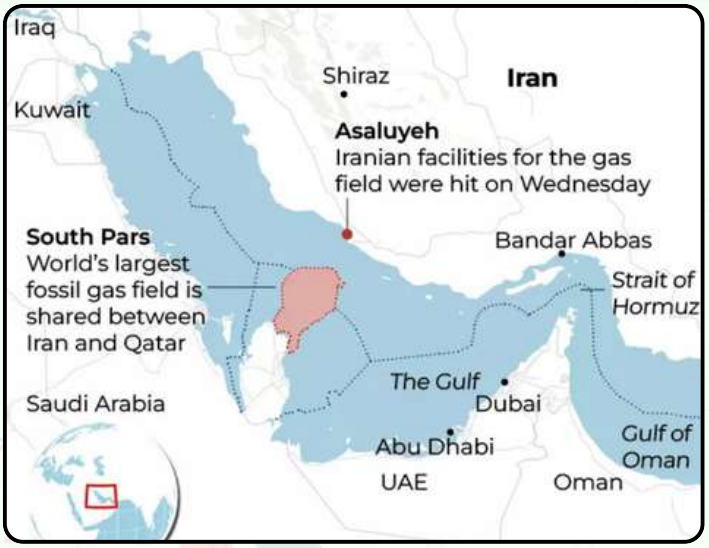
- Enhance North–South connectivity in Central & Eastern Europe.
- Focus areas:
  - Energy infrastructure (reducing dependence on single suppliers)
  - Transport networks
  - Digital connectivity

Significance

- Bridges infrastructure gaps between Western and Eastern Europe.
- Strengthens energy security and diversification.
- Creates opportunities for external partners like India in infrastructure and investment.

South Pars & Ras Laffan Industrial City

Context: Recent strikes on South Pars (Iran) and Ras Laffan (Qatar) have escalated tensions in West Asia, raising concerns over global energy security and LNG supply disruptions.



South Pars

Introduction

- One of the largest natural gas fields in the world.
- Shared between:
  - Iran (South Pars)
  - Qatar (North Dome)

Location

- Located in the Persian Gulf, off Iran's Bushehr Province.

Key Features

- Holds about 1,800 trillion cubic feet (TCF) of natural gas.
- Provides nearly 80% of Iran's domestic gas supply.
- Iran's share is about 33% of the total field.
- Contains significant condensate reserves.

Significance

- Backbone of Iran's energy security.
- Crucial for domestic consumption and export potential.

Ras Laffan Industrial City

Introduction

- World's largest LNG export hub.
- Central to Qatar's hydrocarbon economy.

Location

- Situated on Qatar's northeast coast along the Persian Gulf.

Key Features

- Processes gas from the North Dome field (Qatar's share of South Pars).
- Hosts:
  - LNG liquefaction plants
  - Export terminals
  - Refineries & petrochemical units
- Key supplier of LNG to Asia and Europe.

Significance
- Critical node in global LNG supply chains.
- Any disruption impacts:
  - Global gas prices
  - Energy-importing countries (like India)

Exam Insight
- Together, South Pars–North Dome + Ras Laffan form the core of global gas geopolitics.
- Instability here → Energy crisis + supply shocks + price volatility.

Banana Cluster Initiative

Context: The government approved a ₹200-crore Banana Cluster in Jalgaon to boost productivity, value addition, and farmer income.

About Banana Cluster
- A cluster-based agricultural development model focused on:
  - Production
  - Processing
  - Export of bananas

Funding Support
- Total outlay: ₹200 crore
- Backed by:
  - Mission for Integrated Development of Horticulture
  - Agriculture Infrastructure Fund

Key Infrastructure
- Cold storage facilities
- Ripening chambers
- Refrigerated transport
- Processing units
- Export-oriented infrastructure

Objectives
- Enhance value addition
- Reduce post-harvest losses
- Improve farmer income through better market linkages

About Banana
General Features
- Tropical fruit crop and staple food with year-round availability
- Rich in nutrients and widely consumed globally

Agro-Climatic Requirements

- Temperature: 20–30°C
- High humidity
- Well-drained fertile soil
- Adequate irrigation

Global Scenario

- India: Largest producer (~19% global share)
- Followed by: China, Indonesia, Brazil, Ecuador

India Scenario

- Major producing states:
  - Andhra Pradesh
  - Maharashtra
  - Gujarat
- Gujarat has the highest productivity (~65.9 tonnes/hectare) due to advanced farming practices

Exam Insight

- Cluster approach = farm-to-market integration
- Important for:
  - Doubling farmer income
  - Reducing wastage
  - Boosting agri-exports

India's First Amorphous Metal Manufacturing Unit

Context: Japan-based Proterial will invest USD 80 million to set up India's first amorphous metal manufacturing unit at Sri City.

- Aims to eliminate 100% import dependence
- Current demand: 60,000–70,000 tonnes annually

<u>About Amorphous Metal</u>

Definition

- A non-crystalline (disordered structure) electrical-grade metal, mainly used in power transformers for higher efficiency.

Key Features

- Disordered atomic structure (unlike crystalline steel)
- Very low core losses compared to silicon steel
- Improves transformer efficiency by up to 60%
- Reduces standby power losses by ~30%

Applications
- Power distribution transformers
- Energy-efficient electrical equipment
- Smart grids & renewable energy integration

Significance
- Boosts energy efficiency and reduces transmission losses
- Supports grid modernisation & green energy transition
- Promotes Make in India & import substitution

Exam Insight
- Important for GS3 (Energy + Infrastructure + Manufacturing)
- Link with:
  - Energy efficiency
  - Power sector reforms
  - Renewable integration

25 Years of Bureau of Energy Efficiency (BEE)

Context: The Bureau of Energy Efficiency celebrated its 25th Foundation Day (March 1, 2026), marking a milestone in India's energy conservation journey.
- Launches:
  - BEE@25 Logo
  - RCO Portal
  - BEE Star Label Mobile App

About BEE

Origin
- Established in 2002 under the Energy Conservation Act, 2001
- Functions as a statutory body

Nodal Ministry
- Ministry of Power

Objective
- Reduce energy intensity of the Indian economy through policies and strategies

Key Functions

1. Regulatory Role
- Sets energy efficiency standards for appliances
- Identifies & monitors energy-intensive industries (Designated Consumers)

2. Promotional Role
- Awareness campaigns
- Training of energy auditors
- Support for R&D in energy efficiency

Flagship Programmes

1. Star Labelling Programme (2006)
   - 1–5 star rating system for appliances
   - Helps consumers choose energy-efficient products
2. PAT Scheme (Perform, Achieve & Trade)
   - Market-based mechanism under NMEEE
   - Targets energy-intensive industries
   - Allows trading of energy-saving certificates
3. RCO Portal
   - Tracks compliance with Renewable Consumption Obligation
   - Supports transition to non-fossil energy
4. Carbon Credit Trading Scheme (CCTS)
   - Framework for India's domestic carbon market
   - Incentivizes emission reductions

Achievements
- 36% reduction in emission intensity of GDP (from 2005 levels)
- 52% non-fossil fuel capacity achieved ahead of 2030 targets

Project HANUMAN

Context: Launched by the Andhra Pradesh government on World Wildlife Day 2026 to tackle rising Human-Wildlife Conflict (HWC).

About Project HANUMAN
- Full Form: Healing and Nurturing Units for Monitoring, Aid and Nursing of Wildlife
- A scientific and technology-driven programme for:
  - Rescue
  - Treatment
  - Rehabilitation
  - Monitoring of wildlife

Key Features

1. Infrastructure
   - Deployment of 100 vehicles:
     - 93 Rapid Response Units
     - 7 Ambulances
   - Rescue Centres at:
     - Visakhapatnam
     - Rajamahendravaram
     - Tirupati
     - Birlut

2. Technology Integration
- Use of Artificial Intelligence for real-time wildlife tracking
- HANUMAN Digital App:
  - Early warning system
  - Improved response coordination

3. Compensation Mechanism
- Death compensation: ₹5 lakh → ₹10 lakh
- Injury compensation: Up to ₹2 lakh

4. Community Participation
- 'Vajra' (Wildlife Rakshak) Teams:
  - Village-level trained volunteers
  - Handle snake rescues & minor wildlife incidents
  - Reduce burden on forest officials

5. Wildlife Management
- Use of Kumki Elephants (trained elephants)
  - Sourced from Karnataka
  - To manage wild elephant movement in:
    - Chittoor
    - Srikakulam

Significance
- Reduces human-wildlife conflict incidents
- Promotes community-based conservation
- Strengthens rapid response & wildlife healthcare systems
- Supports technology-driven conservation governance

Ningol Van Initiative

Context: The Manipur government launched the Ningol Van Initiative on International Day of Forests 2026 to promote forest conservation and curb deforestation.

About the Initiative
- Focuses on community participation in forest protection
- Special emphasis on involvement of women (Ningols)
- Aims to protect forests and biodiversity and reduce illegal activities

Who are Ningols?

- Ningols are married women in Manipuri society
- Considered important for:
  - Community leadership
  - Cultural preservation
  - Environmental protection

International Day of Forests

- Observed on 21 March (declared by UNGA in 2012)
- Theme 2026: "Forests and Economies"
- Highlights role of forests in:
  - Livelihoods
  - Economic growth

Gitchak nakana: First Aquifer Fish in Northeast India

Context: Scientists discovered a new fish species Gitchak nakana in Assam, marking the first aquifer-dwelling fish reported from Northeast India.

About Gitchak nakana

- A blind groundwater fish (loach) belonging to the Cobitidae family
- Represents a new genus
- Discovered in a dug-out well in Assam

Habitat

- Lives in underground aquifers (phreatic zones)
- Rare ecosystem, different from cave habitats

Key Features

- No eyes (adaptation to complete darkness)
- Unique skull: No skull roof; brain covered only by skin
- Tiny & translucent body (~2 cm), lacks pigmentation

Significance

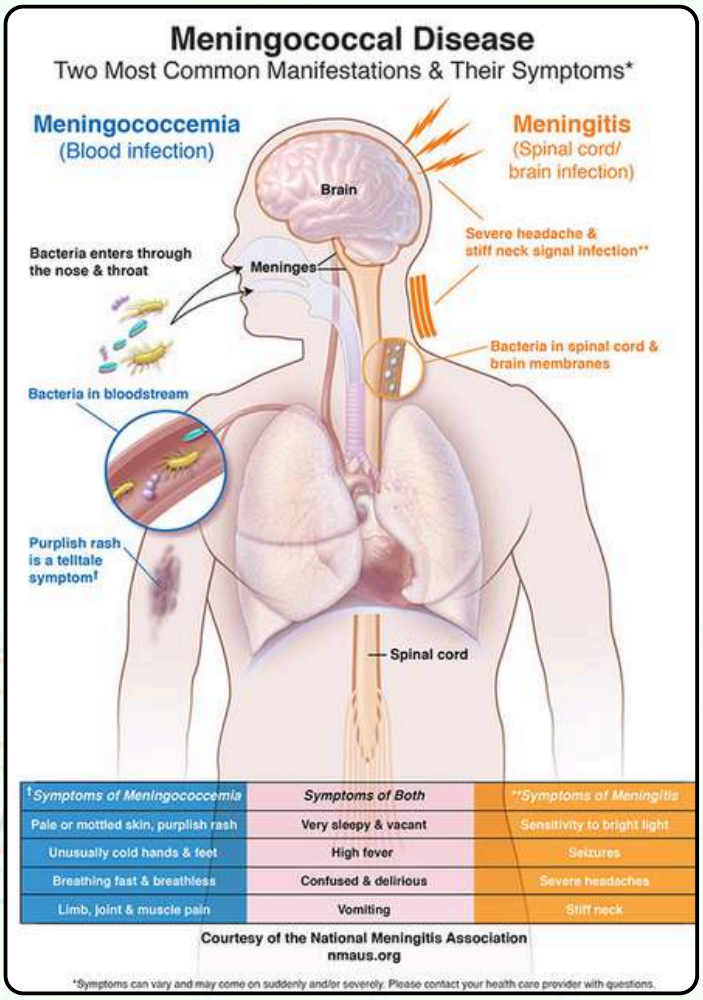
- First record of an aquifer fish in Northeast India
- Highlights hidden groundwater biodiversity
- Shows Northeast India as a biodiversity hotspot

Meningococcal Disease

Context: Meghalaya issued a health advisory after suspected deaths due to meningococcal infection in Shillong.

About the Disease

- A serious bacterial infection caused by Neisseria meningitidis
- Can lead to:
  - Meningitis (brain & spinal cord infection)
  - Meningococcemia (bloodstream infection)
- Known for rapid onset and high fatality



Transmission

- Spreads through respiratory droplets
- Via close contact (coughing, sneezing, sharing utensils)
- Common in crowded places (hostels, barracks, training centres)

Symptoms

- High fever, severe headache
- Stiff neck, vomiting
- Skin rash (non-blanching)
- Severe cases: shock, organ failure

Fatality & Impact

- Can cause death within hours if untreated
- Survivors may face:
  - Neurological damage
  - Limb loss

Prevention

- Vaccination (key preventive measure)
- Early diagnosis & immediate antibiotics
- Contact tracing & preventive treatment
- Hygiene & avoiding crowding during outbreaks

Moonshot Project (AI-based Brain Co-processors)

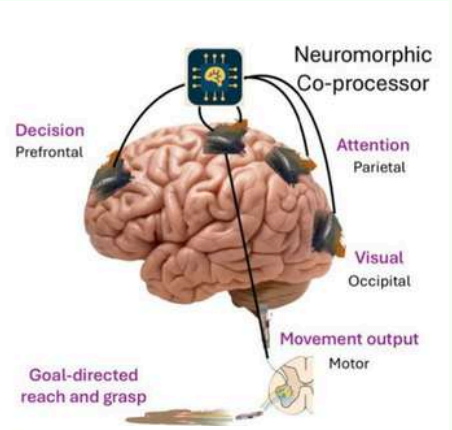
Context: The Indian Institute of Science (IISc) and Pratiksha Trust launched a Moonshot Project for stroke rehabilitation.

About the Project

- Aims to develop AI-based brain co-processors
- Focus: Restoring brain functions lost due to neurological disorders

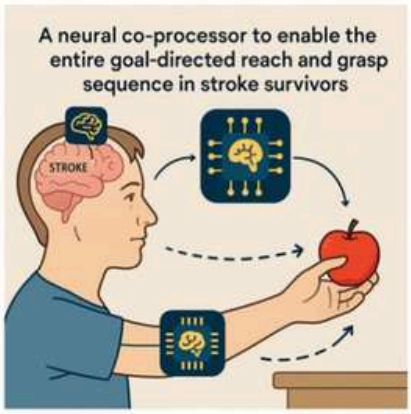
Objective

- Help stroke patients regain:
  - Movement
  - Coordination (e.g., reaching, grasping)



Key Technology

- Uses:
  - Artificial Intelligence (AI)
  - Neuroscience
  - Neuromorphic hardware
  - Bioelectronics
- Develops closed-loop neural devices:
  - Decode brain signals
  - Send corrective feedback to the brain



Phases

- Phase I: Non-invasive devices
- Phase II: Minimally invasive implantable devices

Funding & Collaboration

- Funded by Pratiksha Trust
- Involves experts from:
  - Science
  - Engineering
  - Neurology
  - Rehabilitation

Definition

- AI-powered neural interfaces that:
  - Read brain signals
  - Process them
  - Send corrective stimulation

Brain Co-processors

Key Features

- Closed-loop system (continuous feedback)
- Go beyond traditional BCIs by targeting:
  - Perception
  - Decision-making
  - Motor control

Applications

- Stroke rehabilitation
- Treatment of brain injuries & neurological disorders
- Future use in cognitive enhancement

Dark Oxygen

Context: Scientists discovered "dark oxygen" in the deep Pacific Ocean, challenging the idea that oxygen is produced only through photosynthesis.

About Dark Oxygen
- Oxygen produced without sunlight
- Found at depths of ~4,000 metres

Discovery Location
- Clarion–Clipperton Zone (between Hawaii and Mexico)

Source & Process
- Produced by polymetallic (manganese) nodules on the seabed
- Likely involves electrochemical reactions (similar to electrolysis)
- Nodules generate currents that split water into hydrogen and oxygen

Significance
- Challenges belief that photosynthesis is the only natural oxygen source
- May change understanding of:
  - Earth's oxygen cycle
  - Deep-sea ecosystems

Implications
- Could support marine life in oxygen-poor environments
- Important for studying deep ocean biodiversity

Clarion–Clipperton Zone (CCZ)
- A mineral-rich deep-sea region in the Pacific Ocean
- Rich in:
  - Nickel
  - Cobalt
  - Copper
  - Manganese
- Regulated by:
  - International Seabed Authority

White Phosphorus

Context: Human Rights Watch alleged use of white phosphorus munitions in southern Lebanon.

About White Phosphorus
- A waxy chemical substance (pale yellow/white) with a garlic-like smell
- Highly reactive and ignites on contact with oxygen (~30°C)

Key Properties
- Burns with intense heat and produces dense white smoke
- Can be dispersed via:
  - Artillery shells
  - Bombs (airburst spreading burning fragments)

Military Uses
- Creating smoke screens
- Marking targets
- Signalling
- Offensive use against enemy personnel/equipment

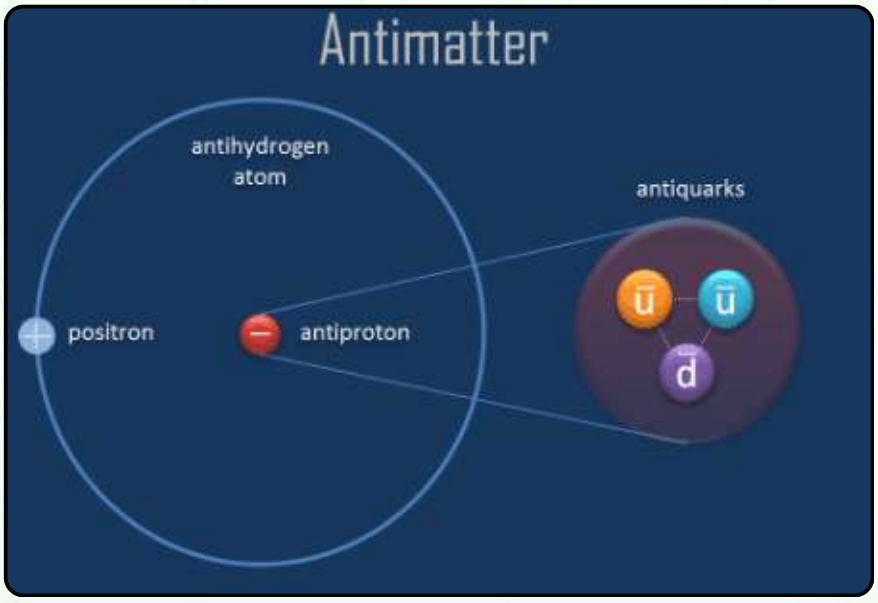
Health & Environmental Hazards
- Severe burns (continue until oxygen is cut off)
- Deep tissue damage, may reach bones
- Toxic smoke affects eyes, lungs, skin
- Reignition risk on exposure to air

Legal Status
- Not fully banned under international law
- Use is restricted, especially in civilian areas

Antiprotons

Context: Scientists at CERN successfully carried out the first-ever road transport of antiprotons (March 2026), marking a major step in antimatter research.

What are Antiprotons?
- Antiprotons are the antiparticles of protons.
- They have the same mass as protons but carry a negative charge (opposite of positively charged protons).



Key Features
- Mass: Same as proton
- Charge: Negative
- Properties: Same magnitude as protons, but opposite in nature

Scientific Background
- Predicted by: Paul Dirac through quantum theory
- Discovered by: Emilio Segrè and Owen Chamberlain (1955)

How are they Produced?
- Occur naturally in cosmic rays
- Artificially created in particle accelerators (like CERN) by colliding high-energy protons with metal targets

Why are they Important?
- Fundamental Physics: Help test theories like the Standard Model and matter-antimatter symmetry
- Cosmology: Provide clues about why the universe is dominated by matter
- Medical Use: Potential application in cancer treatment (antiproton therapy)

Gravity Bomb

Context: The United States has indicated a shift towards using gravity bombs in operations against Iran after weakening its air-defence systems.

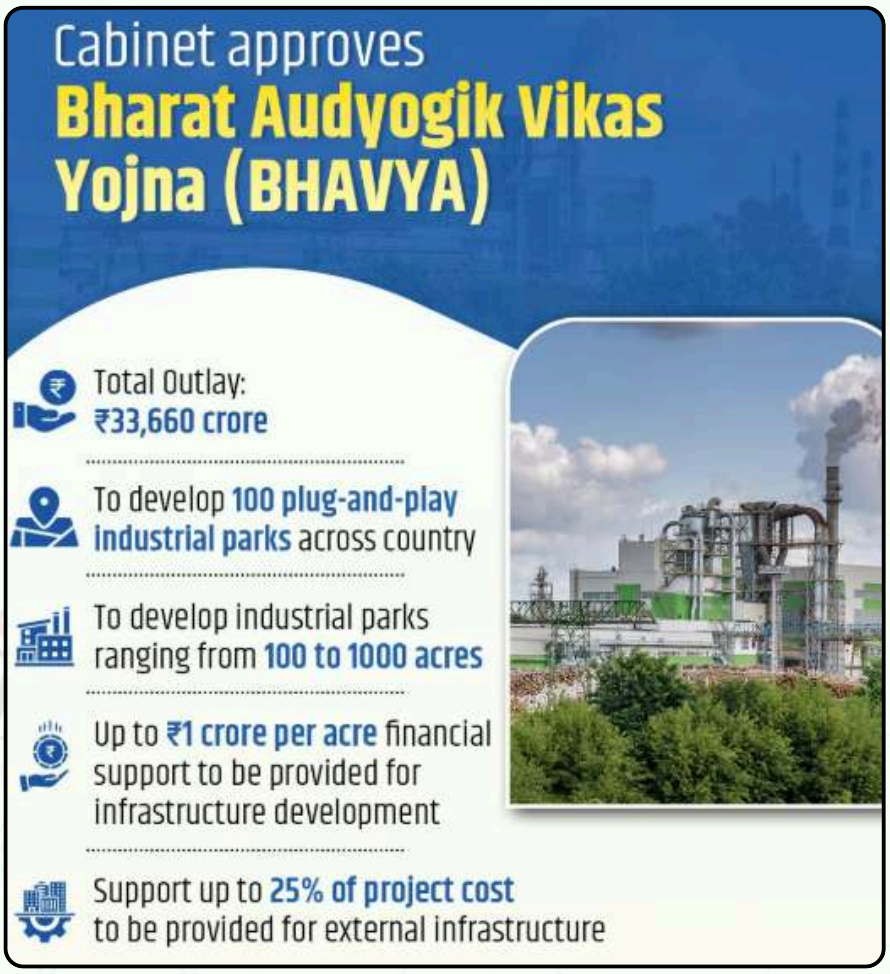
What is a Gravity Bomb?
- A gravity bomb (or "free-fall/dumb bomb") is an unguided aerial weapon dropped from an aircraft.
- Its path is mainly determined by gravity, air resistance, and the aircraft's speed & altitude.

Working Mechanism (Nuclear Gravity Bomb)
- The bomb is released from an aircraft and falls freely toward the target.
- Some variants may include tail-kit guidance systems for better accuracy.
- Detonation: Triggered either:
  - At a pre-set altitude, or
  - On impact with the ground
- The nuclear reaction (fission/fusion) releases:
  - Massive blast energy
  - Intense heat
  - Radiation

Key Points
- Called "dumb bombs" because they lack propulsion and advanced guidance (in basic form).
- Modern variants can be upgraded into precision-guided munitions.
- Widely used due to simplicity, reliability, and cost-effectiveness.

BHAVYA Scheme (Bharat Audyogik Vikas Yojna)

Context: The Union Cabinet, chaired by the Prime Minister, has approved the BHAVYA Scheme to boost industrial infrastructure in India.



What is BHAVYA Scheme?

- A national initiative to develop 100 plug-and-play industrial parks across the country.
- Plug-and-Play Infrastructure: Ready-to-use industrial facilities with land, utilities, and approvals, allowing industries to start operations quickly.

Key Features

- Funding: ₹33,660 crore
- Coverage: All States and Union Territories
- Implementation: In partnership with states and private sector, building on the National Industrial Corridor Development Programme

Industrial Parks Development

- Parks of 100–1,000 acres will be developed
- Financial support of up to ₹1 crore per acre

Areas of Financial Support

- Core Infrastructure: Roads, drainage, underground utilities, ICT systems
- Value-added Infrastructure: Factory sheds, customised units, testing labs, warehouses
- Social Infrastructure: Worker housing and basic amenities

Significance

- Promotes ease of doing business by reducing setup delays
- Boosts manufacturing and industrial growth
- Encourages public-private partnerships and balanced regional development

Khelo India Tribal Games (KITG) 2026

Context: The first-ever Khelo India Tribal Games (KITG) will be held in Chhattisgarh from 25 March to 6 April 2026.

About KITG

- A part of the Khelo India Scheme, aimed at promoting grassroots sports and tribal talent.
- The Khelo India Games were declared an 'Event of National Importance' (2020) under the Sports Broadcasting Signals Act, 2007.

Key Features

- 7 Medal Sports: Athletics, Football, Hockey, Weightlifting, Archery, Swimming, Wrestling
- 2 Demonstration Sports: Mallakhamb, Kabaddi

Organisation

- Conducted under the Khelo India Scheme by the Ministry of Youth Affairs & Sports

Other Highlights

- Mascot: Morveer (symbol of tribal pride and courage)
- Host State: Chhattisgarh (first edition)
- Focus: Promoting tribal empowerment and identifying grassroots sporting talent

Significance

- Encourages sports participation among tribal communities
- Helps in talent identification at the grassroots level
- Strengthens inclusive sports development in India

Sahitya Akademi Awards 2025

Context: The Sahitya Akademi announced the 2025 awards across 24 languages, recognising outstanding literary works.

About Sahitya Akademi Award

- India's highest literary honour for books of literary merit.
- Started in: 1954
- Organised by: Sahitya Akademi under the Ministry of Culture
- Objective: Promote Indian literature and cultural unity through linguistic diversity

Eligibility & Categories

  - Given to Indian authors for works in 24 languages22 languages of the 8th Schedule + English & Rajasthani
- Covers genres like:
  - Poetry, Novel, Short Stories
  - Essays, Literary Criticism
  - Autobiography, Memoir

Sahitya Akademi Awards 2025 – Highlights

- Total Awardees: 24 authors
  - Categories:8 Poetry
  - 6 Short Stories
  - 4 Novels
  - 2 Essays
  - 1 Literary Criticism
  - 1 Autobiography
  - 2 Memoirs

Prominent Winners

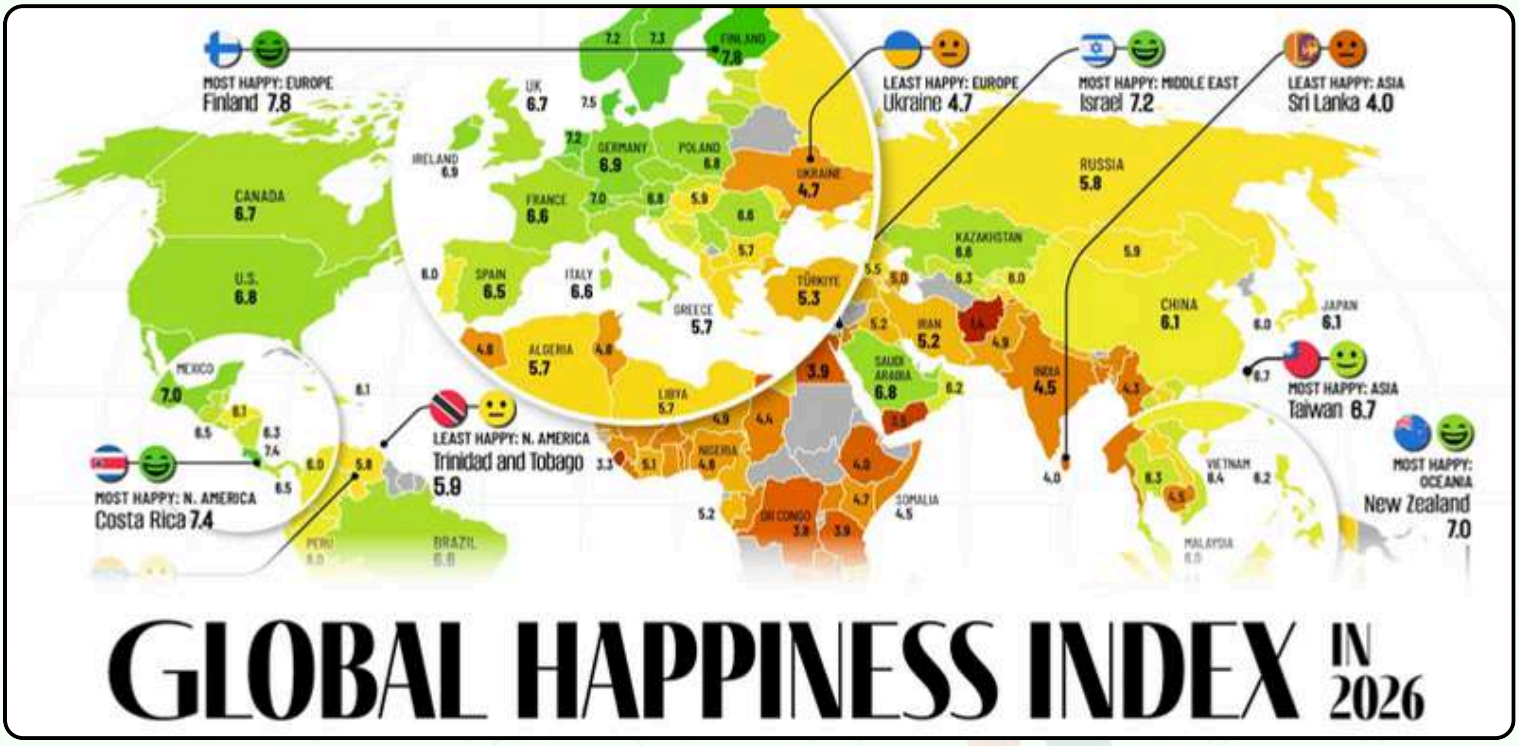
- Navtej Sarna – Crimson Spring (English, Novel)
- Mamta Kalia – Jeete Jee Allahabad (Hindi, Memoir)
- Sa. Tamilselvan – Literary Criticism

Significance

- Encourages literary excellence across languages
- Promotes India's cultural and linguistic diversity
- Recognises writers contributing to national literary heritage

World Happiness Report 2026

Context: The World Happiness Report 2026 was released by the Wellbeing Research Centre.



About World Happiness Index

- A global ranking of happiness based on self-reported life evaluations from Gallup surveys.
- First published: 2012
- Published by: Wellbeing Research Centre in partnership with Gallup and the UN Sustainable Development Solutions Network

<u>Ranking Criteria</u>

Countries are ranked on six factors:

- GDP per capita (economic well-being)
- Social support
- Healthy life expectancy
- Freedom to make life choices
- Generosity
- Perception of corruption

Global Highlights

- Finland ranked happiest country for the 9th consecutive year
- Rising concern: Excessive social media use is negatively affecting youth well-being

India's Position

- Rank: 116 out of 147 (improved from 118 in 2025)
- Challenges include:
  - Lower social support
  - Higher perceived corruption
  - Lower overall life satisfaction

Significance

- Helps governments design well-being-oriented policies
- Highlights the importance of social and psychological factors beyond economic growth
- Provides a comparative global perspective on quality of life

Naxal-Free Bihar

Context: With the surrender of the last armed Maoist in Munger, Bihar has been officially declared Naxal-free, marking a major success against Left-Wing Extremism.

Key Developments

- Last Surrender: Suresh Koda's surrender ended organised Maoist presence in the state.
- He will receive benefits under the government's surrender & rehabilitation policy.
- Zero Incidents: From 23 affected districts (2012) to zero Naxal incidents in 2025.
- Security Success: Around 220 arrests in 2025 helped dismantle remaining networks.

About Left-Wing Extremism (LWE)

- Refers to armed insurgency led by Communist Party of India (Maoist) aiming to overthrow the state through violence.
- Origin: Naxalbari Uprising
- Strengthened after the 2004 merger of Maoist groups.

Government Response

- Nodal Ministry: Ministry of Home Affairs (LWE Division, 2006)
- Focus on:
  - Security operations
  - Development programmes
  - Rehabilitation of surrendered cadres

National Progress Against LWE

- 81% decline in violent incidents since 2010
- Incidents reduced from 1,936 (2010) → 374 (2024)
- Security force casualties down by 73%
- Over 8,000 cadres surrendered in a decade
- Affected districts reduced from 126 to 11 (2025)

Significance

- Marks the collapse of Naxal influence in Bihar
- Reflects success of a security + development approach
- Supports the government's goal of eliminating LWE by 2026