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VIDHVATH IAS KAS ACADEMY & **STUDY CENTRE**

DAILY CURRENT AFFAIRS

FOR UPSC CIVIL SERVICE EXAMINATION

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 **9972258970 & 9740702455**

**#317/A SKB Arcade, D. Subbaiah Road,
Ramaswamy Circle, Mysuru-570004**



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1. Challenges of SIR Parent Mapping for Institutionalized Individuals

The Special Intensive Revision (SIR) of electoral rolls has inadvertently created a documentation bottleneck for individuals raised in state-run orphanages and charity homes. While the Election Commission of India (ECI) suggests using the institution's name in place of parental details, the absence of standardized field-level guidelines has left many "unmapped" and at risk of disenfranchisement.

- **The Documentation Gap:** Individuals like Md. Palash Shekh, who aged out of state care, possess personal ID (Aadhaar/Voter ID) but cannot fulfill the SIR requirement of "parent mapping" to the 2002 electoral rolls due to a lack of lineage proof.
- **Institutional Identity vs. Lineage:** Although ECI officials permit using an orphanage's name in the parent/guardian column, the lack of formal SOPs leads to inconsistent implementation, resulting in "hearing notices" for those in the "unmapped" category.
- **The 2002 Benchmark:** The SIR process relies heavily on tracing roots back to the 2002 rolls to verify long-term residency and citizenship, a metric that is structurally impossible for abandoned or rescued children to meet.
- **State Responsibility:** Since these individuals were wards of the State, the onus lies on the government to provide the necessary documentation or legal waivers to ensure their constitutional right to vote is not compromised.
- **Risk of Disenfranchisement:** The current "chaos on the ground" suggests that without specific guidelines for "unmapped" institutionalized persons, a significant vulnerable population could be excluded from the updated electoral rolls.



Key Definitions

- **Special Intensive Revision (SIR):** A rigorous process to clean and update electoral rolls, often involving door-to-door verification and mapping voters to historical data (e.g., the 2002 list) to ensure accuracy and prevent fraud.
- **Parent Mapping:** The process of linking a voter's entry to their parents' records in previous electoral rolls to establish lineage and residency.

Constitutional & Legal Provisions

- **Article 326:** Grants the right to be registered as a voter to every citizen of India who is not less than 18 years of age, subject to certain disqualifications.
- **Representation of the People Act, 1950:** Sections 14 to 25 govern the preparation and revision of electoral rolls.
- **Right to Identity:** Implicit under **Article 21**, ensuring that the lack of biological lineage does not strip a citizen of their legal and political identity.
- **Juvenile Justice (Care and Protection of Children) Act, 2015:** Establishes the State as the *parens patriae* (legal guardian) of children in need of care, implying the State must facilitate their transition into adult citizenship.



Additional Key Points

- **Vulnerability of "Aged-out" Youth:** Youth leaving care homes at 18 often lack the social capital and legal literacy to navigate complex bureaucratic revisions.
- **Standard Operating Procedures (SOPs):** There is an urgent need for the ECI to issue a uniform circular clarifying that for institutionalized persons, the "Head of the Institution" or the institution's name serves as a valid legal substitute for parental mapping.

Conclusion

The SIR process, while essential for electoral integrity, must be inclusive of those without traditional family structures. For individuals raised in state custody, the State cannot demand proof of lineage that it knows does not exist. Bridging this administrative gap is vital to upholding the democratic principle of "no voter left behind."

UPSC Relevance

- **GS Paper II:** Functions and responsibilities of the Election Commission, issues related to vulnerable sections of society, and the implementation of the Representation of the People Act.
- **Governance:** Challenges in digital and documentary identity (Aadhaar vs. Electoral Rolls) and the gap between policy intent and field-level execution.
- **Ethics (GS Paper IV):** The moral obligation of the State toward its former wards and the pursuit of social justice through administrative empathy.

2. Yumnam Khemchand Singh: Leadership Amidst Manipur's Ethnic Crisis

Yumnam Khemchand Singh was sworn in as the 13th Chief Minister of Manipur on February 4, 2026, marking the end of a nearly year-long period of President's Rule. A martial arts expert and two-time MLA from Singjamei, Singh faces the monumental task of restoring peace in a state deeply fractured by the Meitei-Kuki ethnic conflict that began in May 2023.

- **Transition from Central Rule:** The swearing-in occurred just days before the scheduled end of President's Rule (February 13), signifying a shift from direct Union oversight back to a democratically elected executive.
- **Ethnic Balancing in Governance:** In a bid to foster inclusivity, two Deputy Chief Ministers—Smt. Nemcha Kipgen (Kuki-Zo) and Shri Losii Dikho (Naga)—were appointed alongside Singh, reflecting the diverse 36 communities of Manipur.
- **Political Credentials:** Singh previously served as the Speaker of the Manipur Legislative Assembly (2017–2022) and held key portfolios in Rural Development and Education, providing him with necessary administrative experience.
- **Security & Reconciliation Priority:** His primary mandate involves the rehabilitation of over 60,000 displaced persons and addressing the "unmapped" status of voters in the ongoing Special Intensive Revision (SIR) of electoral rolls.
- **Humanitarian & Legal Resilience:** With nearly 260 lives lost since 2023, the new administration must navigate the legal complexities of buffer zones, arms recovery, and the withdrawal of the Armed Forces (Special Powers) Act (AFSPA) in certain pockets.





Key Definitions

- **President's Rule (Article 356):** The suspension of state government and imposition of direct Union government rule when the "constitutional machinery" of a state fails.
- **Suspended Animation:** A state where the Legislative Assembly is not dissolved but kept inactive during President's Rule, allowing it to be revived once a viable government is formed.
- **Special Intensive Revision (SIR):** A rigorous door-to-door electoral roll verification process used by the ECI to ensure roll purity, often problematic for displaced or institutionalized persons lacking lineage proof.

Constitutional & Legal Provisions

- **Article 356:** Empowers the President to issue a proclamation if satisfied that the state government cannot be carried on in accordance with the Constitution.
- **Article 164:** Provides for the appointment of the Chief Minister by the Governor and other ministers on the advice of the CM.
- **S.R. Bommai v. Union of India (1994):** The landmark Supreme Court judgment that made the proclamation of President's Rule subject to judicial review and emphasized that the floor of the Assembly is the only place to test a government's majority.
- **Article 371C:** Special provisions for the state of Manipur regarding the administration of Hill Areas through a committee of the Legislative Assembly.

Conclusion

The appointment of Yumnam Khemchand Singh represents a cautious step toward democratic normalization in Manipur. However, the success of his tenure will be measured not by political stability alone, but by his ability to bridge the profound trust deficit between the hill and valley communities while ensuring that the State fulfills its role as the ultimate guardian of its citizens' rights.

UPSC Relevance

- **GS Paper II (Polity & Governance):** Federalism, Article 356, the role of the Governor, and the challenges of governing a multi-ethnic border state.
- **GS Paper III (Internal Security):** Management of ethnic conflicts, the role of CAPFs, and the impact of insurgent groups on state stability.
- **Current Affairs:** The transition from President's Rule to an elected government in conflict zones.

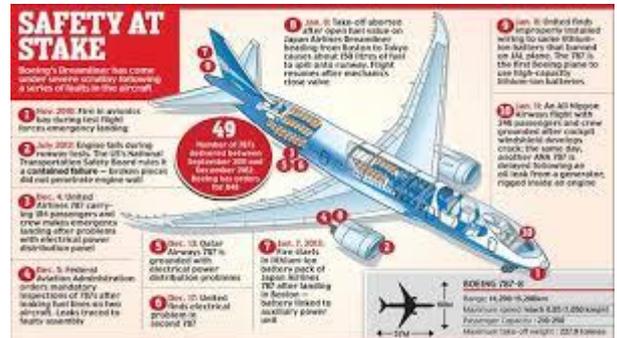
3. Boeing 787 Dreamliner: Fuel System Safety Concerns

The recent grounding of an Air India Boeing 787-8 (Dreamliner) following a fuel control switch anomaly has reignited global aviation safety debates. This technical incident is particularly significant as it mirrors the suspected cause of the catastrophic Air India Flight 171 crash in Ahmedabad in June 2025, which claimed 260 lives.

- **The Incident (Feb 1, 2026):** During pre-flight checks at London Heathrow, the crew of flight AI 132 reported that the left engine fuel control switch spontaneously moved from the 'RUN' to 'CUTOFF' position.



- **Mechanical Safeguard Failure:** The Dreamliner's fuel switches use a "pull-to-unlock" two-step mechanism designed to prevent accidental shutoff. The reported movement without deliberate lifting suggests a potential failure in the mechanical detent or locking tooth.
- **Link to 2025 Ahmedabad Crash:** Preliminary reports from the 2025 crash indicated that fuel supply to both engines was cut off seconds after takeoff. The recent London incident challenges the initial "pilot error" theory, suggesting a systemic technical flaw instead.
- **Regulatory Oversight:** India's Directorate General of Civil Aviation (DGCA) and the UK's Civil Aviation Authority (CAA) have sought a "root-cause analysis," while Air India has initiated a fleet-wide re-inspection of its 33 Dreamliners.
- **Global Precedent:** The FAA had issued a non-mandatory safety alert (SAIB NM-18-33) in 2018 regarding similar switch malfunctions, but the lack of a mandatory Airworthiness Directive (AD) meant many global operators had not replaced the suspect components.
- **The "Unmapped" Risk:** If the switches are prone to uncommanded movement due to vibration or "incorrect handling" (as suggested by DGCA), it poses a severe risk of dual-engine flameout during critical flight phases like takeoff or landing.



Key Definitions

- **Fuel Control Switch (FCS):** A cockpit toggle that regulates the flow of jet fuel to the engines; it has two primary settings: 'RUN' (fuel flows) and 'CUTOFF' (fuel stops, shutting down the engine).
- **Airworthiness Directive (AD):** A legally enforceable regulation issued by aviation authorities (like the FAA or DGCA) to correct an unsafe condition in an aircraft.
- **Ram Air Turbine (RAT):** An emergency propeller-like device that deploys automatically during total power loss to provide hydraulic pressure and basic electrical power to flight controls.

Constitutional & Legal Provisions

- **The Aircraft Act, 1934 & Aircraft Rules, 1937:** Provide the legal framework for the manufacture, possession, use, and operation of aircraft in India, empowering the DGCA to enforce safety standards.
- **Aircraft Accident Investigation Bureau (AAIB):** Established under the Ministry of Civil Aviation, it is the statutory body responsible for investigating serious aircraft accidents in India (Annex 13 of the Chicago Convention).
- **Article 21 (Right to Life):** The Supreme Court has often interpreted the State's duty to ensure public safety in transport and infrastructure as an extension of the fundamental right to life.

Conclusion

The "London Incident" serves as a critical technical data point that may exonerate flight crews and shift the focus toward Boeing's hardware design. Ensuring the integrity of the fuel control system is not just a maintenance requirement but a core necessity for maintaining public trust in civil aviation.



UPSC Relevance

- **GS Paper II (Governance):** Role of regulatory bodies (DGCA) and international cooperation in safety standards (ICAO/FAA/CAA).
- **GS Paper III (Economy & Infrastructure):** Civil aviation sector challenges, impact of safety incidents on the national carrier, and the "Make in India" context for aerospace maintenance (MRO).
- **Internal Security:** Ensuring the safety of critical infrastructure and transport against technical and systemic vulnerabilities.

4. High-Level Committee on Banking for Viksit Bharat

The Union Budget 2026-27 has proposed the establishment of a "High-Level Committee on Banking for Viksit Bharat" to overhaul India's financial architecture. The primary objective is to create "mega-lenders" with the capital depth required to fund large-scale infrastructure and developmental projects necessary for India to become a developed economy by 2047.

- **Blueprint for Mega-Lenders:** The committee is tasked with designing a roadmap to scale up Indian banks so they can compete globally and meet the credit demands of a \$30 trillion economy.
- **Restructuring Public Sector NBFCs:** As a precursor to broader banking reforms, the government has announced the merger of Power Finance Corporation (PFC) and Rural Electrification Corporation (REC) to improve operational efficiency and capital scaling.
- **Balancing Stability and Growth:** While aiming for size, the mandate emphasizes maintaining financial stability, deepening financial inclusion, and ensuring robust consumer protection.
- **Consolidation over Mere Mergers:** The Finance Minister clarified that the goal is not just reducing the number of banks through mergers, but "priming" the sector to ensure credit reaches both large industries and the common man.
- **PFC-REC Merger Significance:** The integration of these two Navratna CPSEs (with PFC already holding a 52.63% stake in REC) aims to consolidate power-sector lending under a single, more efficient entity.
- **Focus on Credit Flow:** The committee will investigate structural barriers that prevent seamless credit flow to emerging sectors, ensuring that the banking system acts as a catalyst for the "Viksit Bharat" vision.



Key Definitions

- **Viksit Bharat:** The government's vision to transform India into a developed nation by the 100th anniversary of its independence in 2047.
- **NBFC (Non-Banking Financial Company):** A company registered under the Companies Act that provides banking services like loans and credit facilities but does not hold a full banking license or accept demand deposits.
- **Navratna CPSE:** A status granted to select Central Public Sector Enterprises giving them greater financial autonomy to invest up to Rs.1000 crore without explicit government approval.



Constitutional & Legal Provisions

- **Article 246 (Seventh Schedule):** Banking is a Union List subject (Entry 45), giving the Parliament exclusive power to legislate on matters related to the banking sector.
- **Banking Regulation Act, 1949:** Provides the legal framework for the supervision and regulation of commercial banks in India.
- **RBI Act, 1934:** Governs the functions of the Reserve Bank of India as the central monetary authority and regulator of the banking system.
- **Companies Act, 2013:** Governs the restructuring and merger processes of corporate entities, including public sector NBFCs like PFC and REC.

Additional Key Points

- **Global Benchmarking:** Currently, Indian banks are relatively small on the global stage; the reform seeks to place more Indian entities in the top 100 global banks.
- **Synergy in Power Sector:** The PFC-REC merger is expected to reduce borrowing costs and eliminate duplicate administrative roles, specifically in funding green energy transitions.

Conclusion

The constitution of this high-level panel signifies a shift from "reactive" banking reforms (addressing NPAs) to "proactive" structural scaling. By consolidating NBFCs and rethinking the banking blueprint, the government aims to ensure that the financial sector does not become a bottleneck but rather the engine for India's long-term growth trajectory.

UPSC Relevance

- **GS Paper III (Indian Economy):** Mobilization of resources, banking reforms, and the role of NBFCs in infrastructure financing.
- **GS Paper II (Governance):** Government policies and interventions for development in various sectors and issues arising out of their design and implementation.
- **Prelims Factor:** Knowledge of PFC/REC status, the difference between Banks and NBFCs, and the specific objectives of the "Viksit Bharat" initiative.

5. Linguistic and Cultural Markers in Caste Enumeration

Renowned linguist and scholar Professor G.N. Devy has proposed using linguistic and cultural markers as a scientific methodology for the upcoming 2026-27 Census to resolve the complexities of caste enumeration. He warns that failing to explicitly enumerate Denotified Tribes (DNTs) could alienate a vulnerable population of over 10 crore people who have remained statistically invisible since 1931.

- **Methodology of Layered Scrutiny:** Drawing from the "Peoples' Linguistic Survey of India," Devy suggests an open-field entry system where residents name their own caste. This "raw data" can then be refined through post-Census studies using markers like language, ancestry, lifestyle, and kinship to consolidate variants and spellings.
- **Linguistic Mapping for Caste:** A single community often carries different names across states (e.g., *Sansi* in Punjab, *Chhara* in Gujarat). Devy argues that shared unique languages (like *Bhaktu*) can serve as a definitive marker to identify and unify these groups under a single sociological category.



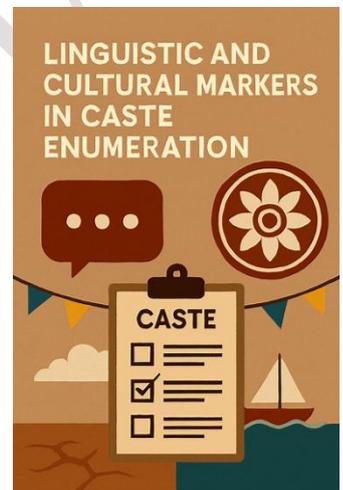
- **The DNT Crisis:** Denotified Tribes—formerly branded as "criminal" under colonial law—often fall into the "unmapped" or "misclassified" categories. Without a separate Census column and code, they remain subsumed under broader SC/ST/OBC lists, losing out on targeted welfare benefits.
- **Data Accuracy vs. Volume:** The 2011 SECC returned over 46 lakh caste names due to spelling variations and local dialects. Devy's model advocates for involving institutions like the Anthropological Survey of India (AnSI) to certify and filter this data into a manageable, credible list.
- **Social Justice and Recognition:** Explicit enumeration is viewed as a prerequisite for constitutional recognition. As these groups were wards of the colonial state's "criminal" registries, the modern state has a moral and legal obligation to provide them with a distinct political and administrative identity.

Key Definitions

- **Denotified Tribes (DNTs):** Communities that were notified as "born criminals" under the Criminal Tribes Act of 1871. Although the act was repealed in 1952 (Vimukti Divas), the social stigma persists.
- **Nomadic and Semi-Nomadic Tribes:** Communities that do not have a fixed habitation and move from one place to another for livelihood. Semi-nomadic groups settle for part of the year.
- **Socio-Economic and Caste Census (SECC):** A comprehensive door-to-door survey (last conducted in 2011) to generate data on the socio-economic status of households and their caste.

Constitutional & Legal Provisions

- **Criminal Tribes Act (1871):** A colonial-era law that allowed the state to monitor and restrict the movement of entire communities. Its repeal in 1952 led to the term "Denotified."
- **Article 341 & 342:** Empower the President to specify Scheduled Castes and Scheduled Tribes. DNTs are currently seeking a similar separate constitutional Schedule.
- **Article 340:** Relates to the appointment of a Commission to investigate the conditions of backward classes (e.g., Renke Commission and Idate Commission for DNTs).
- **Census Act, 1948:** The legal framework for conducting the decadal Census. Currently, it only provides for the separate counting of SCs and STs.



Additional Key Points

- **The Renke Commission (2008):** Estimated the DNT population at approximately 10.74 crore, noting their deprivation of constitutional support compared to SCs/STs.
- **The Idate Commission (2017):** Identified 1,262 communities as DNT/Nomadic but highlighted the lack of precise population data as a barrier to implementing schemes like SEED (Scheme for Economic Empowerment of DNTs).

Conclusion

Integrating linguistic and cultural markers into the Census methodology is not merely a technical exercise but a tool for social inclusion. By adopting a scientific "mapping" approach similar to the linguistic surveys, the government can rectify historical omissions, ensuring that the most marginalized "invisible" citizens are counted, recognized, and brought into the ambit of formal development.



UPSC Relevance

- **GS Paper I:** Social Empowerment, Communalism, Regionalism & Secularism; Diversity of India and its linguistic/cultural landscape.
- **GS Paper II:** Welfare schemes for vulnerable sections; mechanisms, laws, and institutions for the protection of these sections; issues related to the Census and federalism.
- **GS Paper IV:** Ethics and Human Interface; the ethics of classification and the state's responsibility toward historically stigmatized populations.

6. Judicial Directive on Inclusivity in Temple Entry: Kerala HC

The Kerala High Court recently dismissed a petition challenging the entry of Christian priests into the Adoor Sree Parthasarathy Temple. The ruling underscores that statutes and rules should serve as instruments of social harmony rather than discord, emphasizing the primacy of parent legislation over inconsistent subordinate rules.

- **Permissive vs. Rightful Entry:** The Court distinguished between "entry as a matter of right" and "permissive entry" as invited guests. It upheld the temple *Tantri's* (chief priest) authority to invite non-Hindus, noting that respecting guests is an integral part of temple culture (*Atithi Devo Bhava*).
- **Inconsistency in Legislation:** The Bench found a conflict between the **Kerala Hindu Places of Public Worship (Authorisation of Entry) Act, 1965**, and its subordinate **Rules**. While the parent Act aims to prevent discrimination among Hindus, it contains no explicit bar on non-Hindus. However, **Rule 3(a)** introduced a prohibition not found in the Act.
- **Subordinate Legislation Limits:** The Court reaffirmed the settled legal principle that subordinate legislation (Rules) cannot exceed the scope of the parent Act. In cases of inconsistency, the provisions of the parent Act shall prevail.
- **Dynamic Nature of Law:** The judgment highlighted that law is not static but must evolve to reflect an increasingly inclusive society. It cautioned that legal frameworks must function as a unifying force fostering mutual respect and coexistence.
- **Essential Religious Practice:** Referring to the *Amicus Curiae*, the Court noted that while restricting non-Hindus might be a "religious practice," it is not an "essential religious practice" (ERP) that would alter the core of the Hindu religion if relaxed.
- **Directive to the State:** The Court urged the Kerala government to consult stakeholders—including the Devaswom Board, *tantris*, and religious scholars—to decide whether Rule 3(a) should be amended to align with constitutional values.



Key Definitions

- **Subordinate Legislation:** Laws, rules, or regulations made by an executive authority (like a government department) under the powers delegated to them by a primary piece of legislation (the Parent Act) passed by the legislature.



- **Essential Religious Practice (ERP):** A judicial doctrine used in India to determine which religious practices are central to a faith and thus protected under Article 25, versus those that are peripheral and subject to state regulation.
- **Tantri:** The high priest or the final authority on ritualistic and spiritual matters in a Kerala temple.

Constitutional & Legal Provisions

- **Article 25:** Guarantees freedom of conscience and the right to freely profess, practice, and propagate religion, subject to public order, morality, and health.
- **Article 26:** Grants religious denominations the right to manage their own affairs in matters of religion.
- **Article 13:** Mandates that all laws (including rules and notifications) inconsistent with fundamental rights shall be void to the extent of the inconsistency.
- **Kerala Hindu Places of Public Worship (Authorisation of Entry) Act, 1965:** A social reform legislation intended to ensure all classes of Hindus have access to public temples, removing caste-based disabilities.

Additional Key Points

- **Judicial Review of Rules:** The ruling reinforces the power of the Judiciary to scrutinize "delegated legislation" to ensure the Executive does not bypass the intent of the Legislature.
- **Social Cohesion:** The Bench quoted the *Taittiriya Upanishad*, emphasizing that universal values of hospitality should inform the interpretation of modern administrative rules.

Conclusion

The Kerala High Court's decision marks a significant step toward "constitutional morality" by prioritizing social harmony over rigid, inconsistent administrative rules. By directing the State to review Rule 3(a), the judiciary has opened a path for a more inclusive interpretation of religious spaces, provided such entry is ceremonial and permitted by traditional authorities.

UPSC Relevance

- **GS Paper II (Polity):** Separation of powers between the Executive and Legislature, delegated legislation, and the doctrine of *ultra vires*.
- **GS Paper II (Social Justice):** Secularism in India, protection of religious rights vs. social reform, and the role of the judiciary in fostering communal harmony.
- **GS Paper IV (Ethics):** Values of inclusivity, religious tolerance, and the ethical responsibility of the State to prevent "discord-fomenting" regulations.

7. Metabolic "Switch" in Fungal Pathogenicity: CSIR-CCMB Discovery

Scientists at the **CSIR–Centre for Cellular and Molecular Biology (CCMB)**, Hyderabad, have identified a critical metabolic trigger that transforms harmless fungi into deadly invasive pathogens. This research, led by Dr. Sriram Varahan, suggests that disrupting a fungus's "internal power supply" rather than just its genetic pathways could be the "Achilles' heel" needed to combat rising antifungal resistance.

- **The Metabolic "Short Circuit":** The study reveals a hidden link between **glycolysis** (the breakdown of sugar for energy) and the biosynthesis of specific **sulfur-containing amino acids**.



When fungi consume sugar rapidly, it triggers the production of these amino acids, which act as a switch for invasive growth.

- **Shape-Shifting (Morphogenesis):** Fungi exist in two primary forms: a harmless, oval **yeast form** (approx. 5 microns) and a dangerous, thread-like **filamentous form** (20–100 microns). While the yeast form travels, the filamentous form invades tissues and is significantly harder for the human immune system and medicines to eliminate.
- **Metabolic Control over Genes:** Traditionally, shape-shifting was thought to be governed primarily by gene networks. This discovery proves that metabolism—specifically how fungi process nutrients—is the actual fuel and controller of this transformation.
- **Experimental Validation:** By slowing down sugar breakdown in the lab, researchers kept fungi trapped in the harmless yeast form. Conversely, providing sulfur-containing amino acids externally "rescued" the fungi, allowing them to resume invasive growth even with low sugar metabolism.
- **Disease Relevance (Candida albicans):** Using *Candida albicans*, a leading global fungal pathogen, the team showed that "metabolically crippled" strains struggled to survive immune attacks from **macrophages** and caused significantly milder disease in animal models.
- **Agricultural & Health Impact:** Beyond human health, these findings apply to plant pathogens, offering potential solutions for crop-devastating fungal diseases that threaten global food security.



Key Definitions

- **Glycolysis:** The metabolic pathway that converts glucose ($C_6H_{12}O_6$) into pyruvate (CH_3COCOO^-), releasing energy used to form high-energy compounds like ATP.
- **Morphogenesis:** The biological process that causes an organism to develop its shape. In fungi, this refers to the transition between yeast and hyphae (filaments).
- **Macrophage:** A type of white blood cell of the immune system that engulfs and digests cellular debris, foreign substances, and pathogens through a process called phagocytosis.
- **Antimicrobial Resistance (AMR):** The ability of microorganisms (like fungi) to evolve and withstand the effects of drugs that were once effective against them.

Constitutional & Legal Provisions

- **Article 51A(h):** Part of the Fundamental Duties, it mandates Indian citizens to develop the **scientific temper**, humanism, and the spirit of inquiry and reform.
- **CSIR (Council of Scientific & Industrial Research):** Established as an autonomous body in 1942, it operates under the **Registration of Societies Act, 1860**, and is the premier S&T organization in India.
- **Drugs and Cosmetics Act, 1940:** Governs the import, manufacture, distribution, and sale of drugs (including antifungals) in India to ensure safety and efficacy.



Additional Key Points

- **Antifungal Pipeline:** Unlike antibiotics, the development of new antifungal drugs has been stagnant for decades, making this metabolic targeting a high-priority "New Frontline."
- **Conserved Pathway:** The identified metabolic switch is highly "conserved," meaning it exists across many different fungal species, potentially allowing for "broad-spectrum" antifungal treatments.

Conclusion

The CCMB discovery shifts the paradigm from "gene-centric" to "metabolism-centric" pathology. By identifying sulfur-containing amino acids as the molecular switch for virulence, scientists have found a way to "disarm" fungi without necessarily killing them, which reduces the evolutionary pressure that leads to drug resistance. This "Achilles' heel" offers a dual-purpose solution for both clinical medicine and resilient agriculture.

UPSC Relevance

- **GS Paper III (Science & Technology):** Recent developments and their applications; indigenization of technology; issues relating to intellectual property rights and health.
- **GS Paper III (Internal Security):** Threats to food security and public health as non-traditional security challenges.
- **Prelims:** Concepts like CSIR, CCMB, Glycolysis, and the distinction between Yeast and Filamentous fungi.

8. Centre-State Friction: Kerala's Halt on National Population Register (NPR)

The Kerala government has reaffirmed its decision to block the implementation of the National Population Register (NPR) within the state. This move follows the Union Budget 2026-27 allocation of ₹6,000 crore for Census 2027 and NPR, signaling a renewed intent by the Centre to proceed with the population database alongside the decadal census.

- **Reiteration of 2019 Stance:** Through an extraordinary gazette on February 5, 2026, the Kerala government declared that all NPR activities remain suspended, a policy in effect since December 20, 2019.
- **Budgetary Trigger:** The state's move is a direct response to the Union Budget 2026-27, which earmarked ₹6,000 crore for the "Registrar General of India" specifically mentioning Census 2027 and NPR.
- **Federal Discord over CAA-NRC:** Kerala's opposition is rooted in the "chronology" concerns where the NPR is viewed as a precursor to the National Register of Citizens (NRC). The state was the first to pass an Assembly resolution against the Citizenship (Amendment) Act (CAA).
- **Census vs. NPR Separation:** While the state supports the decennial Census—essential for planning and resource allocation—it seeks to decouple it from the NPR to prevent the collection of specific demographic data that could be used for citizenship verification.
- **Judicial Challenge:** Kerala has previously filed an original suit in the Supreme Court under Article 131, challenging the constitutionality of the CAA/NPR framework, asserting that it violates the secular fabric of the Constitution.



- **Administrative Impact:** As the Census 2027 house-listing phase is slated to begin in mid-2026, the refusal of a state to cooperate in the NPR component creates a significant data gap and a potential constitutional stalemate regarding the Centre's power to issue directions.

Key Definitions

- **National Population Register (NPR):** A database of "usual residents" of the country (residing for 6+ months). It is prepared under the Citizenship Act 1955 and Citizenship Rules 2003. It contains both demographic and biometric data.
- **Usual Resident:** For NPR, a person who has resided in a local area for the past 6 months or more or a person who intends to reside in that area for the next 6 months or more.
- **Census:** A statutory exercise conducted every 10 years under the **Census Act, 1948** to collect statistical data on demography, economy, and literacy. Unlike NPR, Census data is strictly confidential.

Constitutional & Legal Provisions

- **Article 131:** Grants the Supreme Court original jurisdiction in disputes between the Government of India and one or more States. Kerala utilized this to challenge the CAA.
- **Seventh Schedule (Entry 69, Union List):** "Census" is a subject exclusively under the Union List, meaning the Central Government has the primary power to legislate and conduct it.
- **Article 256:** Mandates that the executive power of every State shall be so exercised as to ensure compliance with the laws made by Parliament. This is the core of the potential "Constitutional Crisis" if a state refuses to implement a Central law.
- **Citizenship Rules, 2003:** Rule 3(4) allows the Central Government to decide the date for preparing the Population Register.

Additional Key Points

- **Digital Census 2027:** The upcoming census will be India's first fully digital census, utilizing mobile apps and offering a self-enumeration option.
- **Financial Stakes:** The ₹6,000 crore budget allocation represents a six-fold increase over previous revised estimates, indicating the massive scale of the upcoming 16th Census.

Conclusion

The friction between Kerala and the Centre highlights a growing trend of "competitive federalism" turning into "confrontational federalism" over identity-based data collection. While the Centre maintains that NPR is a "normal administrative activity" for better targeting of welfare, the lack of trust at the state level poses a challenge to the integrity of national databases.

UPSC Relevance

- **GS Paper II:** Federal structure, Centre-State relations (Article 256, 131), and the tension between Union subjects and State cooperation.
- **GS Paper II:** Governance and the use of technology/databases (NPR/Census) in policy formulation and welfare delivery.
- **Prelims Factor:** Differences between the Census Act 1948 and Citizenship Act 1955; the role of the Registrar General of India (RGI).



9. Launch of 2 nm Semiconductor Chip: A Leap for India's Chip Mission

In a landmark event for India's high-tech landscape, Union Minister Shri Ashwini Vaishnaw launched Qualcomm's 2 nm (nanometre) semiconductor chip design in Bengaluru on February 7, 2026. This achievement marks India's transition from a "back-office" service provider to a global leader in advanced semiconductor engineering, housing tens of billions of transistors on a single die for next-generation AI, compute, and system-level technologies.

- **Technological Milestone:** The 2 nm chip design, featuring integrated CPU and GPU architectures, represents the cutting edge of global semiconductor technology, offering up to 30% improved energy efficiency and nearly 45% faster processing speeds compared to 5 nm nodes.
- **Shift to "Design in India":** The tape-out of this chip was led by Qualcomm's largest engineering workforce outside the US, located in Bengaluru, Chennai, and Hyderabad. It signifies India's capability to handle the "end-to-end" process—from product definition to final silicon validation.
- **Launch of ISM 2.0:** Building on the foundations of India Semiconductor Mission (ISM) 1.0, the government announced ISM 2.0 with a refined focus on three pillars: nurturing local design startups, establishing a complete ecosystem (equipment, chemicals, and gases), and deepening the talent pool with high-end capabilities.
- **Strategic Talent Pipeline:** Under ISM 1.0, 67,000 engineers have already been trained across 315 universities. Students now use advanced EDA (Electronic Design Automation) tools to design and tape out chips, positioning India to bridge the global gap of 1 million semiconductor professionals.
- **Ecosystem Maturity:** With 10 units currently under construction and 4 in pilot production, India is moving beyond legacy 28 nm nodes. The roadmap aims to reach 7 nm and eventually sub-5 nm fabrication to ensure technological sovereignty.
- **Fifth Industrial Revolution (Industry 5.0):** The Minister emphasized a "co-creating and co-developing" model where industry-academia synergy drives deep-tech innovation, ensuring India provides high-value solutions to the global community rather than just assembly services.



Key Definitions

- **Nanometre (nm) Node:** Refers to the size of transistors on a chip; smaller nodes (like 2 nm) allow more transistors to be packed together, leading to higher performance and lower power consumption.
- **Tape-out:** The final stage of the semiconductor design process where the artwork for the integrated circuit is sent to the fabrication facility (foundry) for manufacturing.
- **EDA Tools:** Software used for designing and simulating complex electronic systems like integrated circuits and printed circuit boards.
- **ATMP (Assembly, Testing, Marking, and Packaging):** The "backend" of semiconductor manufacturing where wafers are cut into individual chips, tested, and packaged for use in devices.

Constitutional & Legal Provisions

- **Article 51A(h):** Fundamental Duty to develop "scientific temper, humanism and the spirit of inquiry and reform," which underpins the push for indigenous deep-tech.



- **National Policy on Electronics (NPE 2019):** Aims to position India as a global hub for Electronics System Design and Manufacturing (ESDM) by encouraging domestic value addition.
- **Production Linked Incentive (PLI) Scheme:** Legal framework providing financial incentives for large-scale electronics manufacturing and semiconductor fabs in India.
- **Design Linked Incentive (DLI) Scheme:** Provides financial and infrastructure support to domestic startups for semiconductor design.

Additional Key Points

- **Investment Surge:** Projections suggest that committed and proposed investments in AI data centers alone could exceed \$200 billion in the coming months, anchored by the semiconductor push.
- **Sovereign IP Repository:** ISM 2.0 proposes creating a repository for Indian Intellectual Property (IP) in sectors like networking, RF (Radio Frequency), and power management to reduce licensing dependencies.

Conclusion

The 2 nm chip milestone is a testament to India's maturing "deep-tech" ecosystem. By moving from legacy manufacturing to cutting-edge design under ISM 2.0, India is not just participating in the global supply chain but is actively shaping its future. The fusion of a massive talent pool with strategic government policy is transforming the "Viksit Bharat" vision into a tangible reality in the semiconductor domain.

UPSC Relevance

- **GS Paper III (Economy):** Industrial policy, indigenization of technology, and the role of the semiconductor industry in achieving a \$5 trillion economy.
- **GS Paper III (Science & Technology):** Awareness in the fields of IT, Space, Computers, and Robotics; the significance of nanotechnology in modern electronics.
- **GS Paper II (Governance):** Government policies and interventions for development in the Electronics and IT sectors.

10. Breakthrough in Indigenous Kyasanur Forest Disease (KFD) Vaccine

The Indian Council of Medical Research (ICMR) has achieved a major milestone in public health by initiating Phase I human clinical trials for an improved, indigenous vaccine against Kyasanur Forest Disease (KFD). Developed in collaboration with the National Institute of Virology (NIV), Pune, and Indian Immunologicals Limited (IIL), this vaccine represents a strategic effort to combat a neglected zoonotic disease endemic to India's Western Ghats.

- **Indigenous Development:** The new vaccine is a "two-dose adjuvanted inactivated vaccine" administered 28 days apart. Unlike the older formalin-inactivated versions which faced efficacy and production issues, this version utilizes Good Laboratory Practice (GLP)-grade material designed for higher immunogenicity.
- **Pre-clinical Success:** Comprehensive animal challenge and toxicity studies have already been completed, demonstrating the vaccine's safety and ability to trigger a protective immune response before moving to human subjects.





- **Regional Strategic Importance:** KFD, often called "Monkey Fever," primarily affects five states—Karnataka, Kerala, Tamil Nadu, Goa, and Maharashtra. The development was fast-tracked following a specific request from the Karnataka government due to rising cases in the Malnad region.
- **Clinical Trial Roadmap:** Following approval from the Central Drugs Standard Control Organization (CDSCO), Phase I trials will evaluate safety in healthy volunteers. Success here will lead to Phase II and III trials to confirm efficacy in endemic populations.
- **Addressing One Health Challenges:** As a tick-borne zoonotic disease, KFD exemplifies the "One Health" approach, where human health is inextricably linked to animal health (monkeys/ticks) and the environment (Western Ghats forests).

Key Definitions

- **Kyasanur Forest Disease (KFD):** A tick-borne viral hemorrhagic fever caused by the KFD virus (KFDV), a member of the *Flaviviridae* family. It was first identified in 1957 in the Kyasanur Forest of Karnataka.
- **Adjuvanted Inactivated Vaccine:** A vaccine containing a "killed" version of the pathogen (inactivated) combined with a substance (adjuvant) that enhances the body's immune response to the antigen.
- **GLP (Good Laboratory Practice):** A quality system of management controls for research laboratories to ensure the uniformity, consistency, and reliability of non-clinical safety tests.

Constitutional & Legal Provisions

- **Article 47:** A Directive Principle of State Policy (DPSP) that mandates the State to regard the improvement of public health as among its primary duties.
- **The Epidemic Diseases Act, 1897:** Often invoked by states like Karnataka to manage KFD outbreaks through mandatory surveillance and vaccination drives.
- **Seventh Schedule (Entry 6, State List & Entry 29, Concurrent List):** While "Public health and sanitation" is a State subject, the "Prevention of the extension from one State to another of infectious or contagious diseases" falls under the Concurrent List, allowing Central intervention through ICMR.

Additional Key Points

- **The Transmission Cycle:** The disease spreads via the bite of infected ticks (*Haemaphysalis spinigera*). Monkeys are the primary amplifying hosts; their sudden deaths in forests often serve as early warning signs for human outbreaks.
- **Clinical Presentation:** KFD is often biphasic. The first phase involves sudden high fever, prostration, and severe muscle pain. A smaller percentage of patients enter a second phase characterized by neurological symptoms like mental confusion and tremors.

Conclusion

The advancement of the KFD vaccine is a testament to India's growing self-reliance in "niche" medical research. By targeting a disease that is geographically localized but high in mortality (3-10%), the ICMR-NIV-IIL partnership is filling a critical gap left by global pharmaceutical entities who often overlook regional neglected diseases.



UPSC Relevance

- **GS Paper II (Social Justice/Health):** Issues relating to development and management of Social Sector/Services relating to Health; role of statutory bodies like ICMR and CDSCO.
- **GS Paper III (S&T):** Indigenous technology and developing new technology; awareness in the fields of Bio-technology and health issues.
- **Prelims Factor:** Location-specific endemic diseases (Western Ghats), viral family of KFD (Flavivirus), and the difference between various types of vaccines (inactivated vs. mRNA).

11. India's Blue Economy Mission and Andhra Pradesh's Strategic Role

Union Minister Dr. Jitendra Singh has highlighted that the **Union Budget 2026-27** serves as a strategic roadmap for the "Blue Economy," with Andhra Pradesh and other coastal states acting as the primary drivers. The budget integrates fisheries, marine exports, and critical mineral corridors into a cohesive framework aimed at achieving the vision of **Viksit Bharat 2047**.

- **National Priority Status:** The Blue Economy has been elevated to a "National Priority Mission," focusing on the sustainable exploitation, preservation, and regeneration of marine resources to boost India's GDP.
- **Deep-Sea Fishing Reforms:** In a major policy shift, the budget allows duty-free fishing by Indian-flagged vessels in the **Exclusive Economic Zone (EEZ)** and high seas. Furthermore, fish landings at foreign ports are now officially recognized as "exports," enhancing global competitiveness.
- **Marine Infrastructure Integration:** The mission emphasizes the modernization of reservoirs, the creation of cold-chain networks, and the development of 34 designated production and processing clusters to reduce post-harvest losses.
- **Rare Earth and Critical Minerals Corridor:** Andhra Pradesh is set to host a specialized corridor for rare earth elements. This links maritime logistics with next-generation manufacturing, focusing on minerals essential for green energy and high-tech sectors.
- **Strategic Industrial Corridors:** The budget advances the integration of ports with high-speed rail and industrial clusters on the eastern coast, creating a seamless logistics architecture for global supply chain participation.
- **Three Pillars of Budget 2026-27:** The roadmap is built on **Productivity, Resilience, and Inclusivity**, ensuring that growth in the blue ocean sector also empowers coastal communities, women-led SHGs, and MSMEs.



Key Definitions

- **Blue Economy:** The sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of the ocean ecosystem.
- **Exclusive Economic Zone (EEZ):** A sea zone prescribed by the UNCLOS over which a state has special rights regarding the exploration and use of marine resources, extending 200 nautical miles from the coast.
- **Deep Ocean Mission (DOM):** A multi-ministerial mission to explore the deep ocean for resources (like polymetallic nodules) and develop deep-sea technologies like the **MATSYA-6000** submersible.



Constitutional & Legal Provisions

- **Article 297:** Specifies that all lands, minerals, and other things of value underlying the ocean within the territorial waters, the contiguous zone, or the EEZ of India vest in the Union.
- **The Territorial Waters, Continental Shelf, Exclusive Economic Zone and Other Maritime Zones Act, 1976:** Provides the legal framework for India's maritime rights and jurisdiction.
- **Customs Act, 1962 (Proposed Amendment 2026):** To be amended (specifically Section 1 and adding Section 56A) to extend jurisdiction for fishing activities and allow duty-free treatment of catch from the EEZ.
- **United Nations Convention on the Law of the Sea (UNCLOS):** The international "Constitution for the Oceans" that defines the rights and responsibilities of nations with respect to their use of the world's oceans.

Additional Key Points

- **Polavaram Project:** The budget allocated ₹3,320 crore for the completion of the Polavaram Irrigation Project, which is vital for the water security and agricultural productivity of Andhra Pradesh.
- **Rare Earth Potential:** India possesses roughly 11 million tonnes of monazite (a rare earth source), with Andhra Pradesh holding a significant share (approx. 3.69 million tonnes).
- **Digital Integration:** The use of the **ReALCRaft portal** and the **Nabhmitra app** is being scaled up to ensure the safety of fishermen and the sustainable management of deep-sea resources.

Conclusion

The Union Budget 2026-27 marks a decisive shift from coastal-only thinking to a "Blue Ocean" strategy. By leveraging Andhra Pradesh's long coastline and integrating it with advanced mineral corridors and irrigation projects, the government aims to transform coastal states from mere geographical boundaries into vibrant economic engines.

UPSC Relevance

- **GS Paper III (Economy):** Blue Economy, infrastructure (Ports, Logistics), and the role of the primary sector (Fisheries) in economic growth.
- **GS Paper III (Science & Technology):** Deep Ocean Mission, extraction of rare earth and critical minerals for the energy transition.
- **GS Paper II (Governance):** Centre-State relations in the context of specific state-based projects (Polavaram, Amaravati) and the implementation of national missions.

12. Strategic Evolution: India Semiconductor Mission (ISM) 2.0

The Union Budget 2026–27 launched **India Semiconductor Mission (ISM) 2.0**, marking a transition from foundational infrastructure to ecosystem consolidation. With a specialized allocation of **₹1,000 crore** for FY 2026–27 (under a broader ₹8,000 crore modified incentive outlay), ISM 2.0 targets advanced manufacturing nodes, indigenous intellectual property (IP), and the domestic production of semiconductor equipment and chemicals.

- **Broadened Ecosystem Scope:** Unlike the fabrication-centric focus of ISM 1.0, the 2.0 phase prioritizes the "entire value chain," including semiconductor-grade chemicals, gases, and specialized machinery—critical bottlenecks that are currently heavily import-dependent.



- **Technological Leap to Advanced Nodes:** The mission sets a clear roadmap to move beyond legacy 28 nm nodes to cutting-edge **3 nm and 2 nm technology** by 2035. This is essential for high-performance computing, AI, and advanced defense systems.
- **Sovereign Intellectual Property (IP):** A major pillar of ISM 2.0 is the creation of a "Full-Stack Indian IP" repository. By fostering domestic "fabless" startups through the **Design Linked Incentive (DLI)** scheme, India aims to own the architectural designs of the chips it consumes.
- **Indigenous Processor Success:** The development of the **DHRUV64** (a 64-bit indigenous microprocessor) under the DIR-V (Digital India RISC-V) program illustrates the mission's success in building secure, homegrown alternatives to foreign proprietary architectures.
- **Industry-Led R&D and Talent:** ISM 2.0 emphasizes industry-academia synergy. Programs like **Chips to Startup (C2S)** and partnerships with firms like **Lam Research** aim to create a pipeline of 1 lakh industry-ready engineers over the next decade.
- **Global Supply Chain Resilience:** By localizing key stages of production, India is positioning itself as a "trusted partner" in the global "China Plus One" strategy, aiming to meet nearly **70–75% of domestic chip demand** indigenously by 2029.



Key Definitions

- **RISC-V (Reduced Instruction Set Computer - V):** An open-standard instruction set architecture (ISA) that allows companies to design processors without paying high licensing fees to proprietary firms like ARM or Intel.
- **Semiconductor IP (Intellectual Property):** Pre-designed and verified logic blocks (like a CPU core) that can be licensed and integrated into a larger System-on-Chip (SoC) design.
- **Nanometre (nm) Node:** A term used to describe the size of transistors on a chip. Smaller nodes (e.g., 2 nm) represent more advanced technology with higher transistor density and better power efficiency.
- **Tape-out:** The final stage of the design cycle before the chip's "mask" is sent to the foundry for actual physical fabrication on silicon wafers.

Constitutional & Legal Provisions

- **Article 51A(h):** Mandates the development of scientific temper and the spirit of inquiry, providing the philosophical basis for national R&D missions.
- **Semiconductor Integrated Circuits Layout-Design Act (SICLDA), 2000:** The primary legal framework in India that protects the intellectual property of original layout-designs of integrated circuits for a period of 10 years.
- **National Policy on Electronics (NPE) 2019:** The overarching policy that aims to position India as a global hub for Electronics System Design and Manufacturing (ESDM).
- **Foreign Direct Investment (FDI) Policy:** Under the current regime, 100% FDI is allowed under the automatic route in the electronics and semiconductor sector, facilitating global partnerships.



Additional Key Points

- **Market Projection:** The Indian semiconductor market is expected to grow from \$38 billion in 2023 to **\$100–110 billion by 2030**, driven by the 5G, EV, and AI revolutions.
- **Investment Milestones:** Under ISM 1.0, 10 major projects with a cumulative investment of **₹1.60 lakh crore** have already been approved across states like Gujarat, Assam, and Odisha.
- **EDA Tools Access:** The government provides national access to **Electronic Design Automation (EDA)** tools from global leaders like Synopsys and Cadence, drastically lowering the entry barrier for Indian startups.

Conclusion

ISM 2.0 represents India's transition from an "aspirational" player to a "functional" leader in the global semiconductor landscape. By focusing on "Deep Tech" and indigenous IP, the mission ensures that India's digital sovereignty is not just about manufacturing chips, but about designing the future of global technology.

UPSC Relevance

- **GS Paper III (Economy):** Industrial policy, indigenization of technology, and the role of the manufacturing sector in achieving a "Viksit Bharat."
 - **GS Paper III (S&T):** Nanotechnology, computer hardware, and the strategic importance of semiconductors in defense and communication.
 - **GS Paper II (Governance):** Policy interventions for the development of the electronics sector and the impact of the "Digital India" vision.
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