

Successful Demonstration of India's first extensive Quantum Key Distribution (QKD) network

Startup QNu Labs, supported under the **National Quantum Mission (NQM)**, successfully demonstrated **India's first extensive QKD network**, spanning over 500 kilometers.

- It involved a network deployed over existing **optical fiber** infrastructure, marking a significant milestone in **quantum-secure communication**.
- This demonstration was made under a project funded through the **I-Hub Quantum Technology Foundation**, under the **National Mission on Interdisciplinary Cyber-Physical Systems (NMICPS)**.

What is Quantum Key Distribution (QKD)?

- QKD leverages the principles of **quantum mechanics** to ensure secure distribution of the **encryption keys**, used for data communication.
 - Quantum mechanics** is the field of physics that explains how **extremely small objects** simultaneously have the characteristics of **both particles** (tiny pieces of matter) and **waves** (a disturbance or variation that transfers energy).
- QKD is an example of **quantum cryptography** (also known as **quantum encryption**).
- QKD can be deployed through different mediums: optical fiber, free space, and through satellites
- Benefits:**
 - Capable of **detecting** and **mitigating eavesdropping attacks** (sniffing or snooping attack)
 - Suitable for **Critical Infrastructure** (defence, government communications, healthcare, financial services, data centres, and telecommunication networks), etc.

Related News

The Prime Minister presented two path breaking Quantum innovations to the nation.

QSIP (Quantum Random Number Generator System in Package)

- It is India's quantum security chip.
- QSIP provides **quantum-certified randomness** (random numbers from a quantum computer) that is used in cryptographic algorithms.
- It ensures defence against cyber threats and future quantum attacks.

25-qubit QPU

- It is India's first quantum computing chip, developed by Startup QpiAI
- Earlier, QpiAI also launched QpiAI-Indus, which is the country's **first full-stack quantum computer** integrating all layers of technology, with 25 superconducting qubits.

NexCAR19 revolutionizes cancer treatment with affordable innovation & enhanced patient safety

NexCAR19 therapy was **developed for B-cell blood cancers** by **ImmunoACT** (a company incubated under IIT Bombay, and Tata Memorial Hospital), supported by DBT and BIRAC.

- NexCAR19, India's 1st indigenous CAR T-Cell therapy**, was granted market authorization by the Central Drugs Standard Control Organisation (CDSCO) in 2023.

About CAR (Chimeric Antigen Receptor) T-Cell Therapy

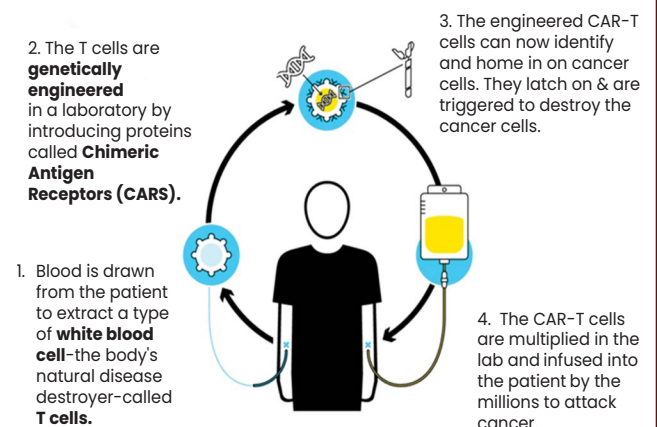
- It **modifies immune cells**, specifically T-cells, by turning them into potent cancer fighters known as CAR-T cells.
 - T-cells are **special cells (types of white blood cells)** whose primary function is cytotoxic, meaning killing other cells.
- This treatment is **designed for specific types of blood cancer** and is given to patients whose cancer has either relapsed or not responded to first-line treatment.

Benefits of CAR T-Cell therapy

- Short treatment duration:** Unlike aggressive chemotherapy or stem cell transplants, it allows for a faster recovery.
- Sustained Benefits:** CAR T-cells persist in the body, offering long-term protection against cancer relapse.
- Accessibility:** Nexcar19 cost is lower compared to imported CAR-T therapies.

Challenges: Therapy for one cancer won't work for another type of cancer, can have negative effects on the nervous system, Cytokine Release Syndrome (Over activation of immune cells), risk of infection, etc.

How CAR-T Works



G20 releases a report on Global Inequality

Findings of the report

- **Income:** 83% of countries have **high income inequality** (i.e., a **Gini coefficient above 0.4**), accounting for 90% of the world's population.
- **Wealth:** Between 2000 and 2024, the **richest 1% captured 41% of all new wealth**, in contrast to just 1% being captured by the bottom 50%.
 - ⊕ In **India**, the **top 1%** has grown their share of wealth by 62% over this period.

Drivers of Inequality

- **Neoliberal Policies:** Deregulation of financial and labor markets, the weakening of competition policies, and a shift toward less progressive taxation.
- **Growth of monopoly power:** Increases corporate owners' incomes and decreases workers' real incomes.
- **International Setting:** Greater mobility of capital across borders and new technologies used in production have lowered bargaining power of less-skilled workers.
- **Influence of economically powerful elites:** on politics and policymaking both drives and reinforces economic inequality
- **Historical legacy of high inequality** in developing countries. E.g. Distribution of land.

Recommendations

- **Establishing an International Panel on Inequality (IPI)** to provide policy-relevant assessments on inequality trends, drivers and impact.
- **Implementing more progressive taxation** through a **global minimum tax on ultra-rich individuals**.
- **Rewriting IP rules to include compulsory licenses/waivers** for critical technologies, especially related to climate change and pandemics.
- **Ensuring universal access to high-quality essential services** such as health, education, and social security.

CONSEQUENCES OF INEQUALITY



Political Impact

Inequality undermines and fuels authoritarianism



Economic Impact

Slows growth, hinders poverty reduction



Environmental Impact

Worsens climate crisis, hits poor nations hardest



Societal Impact

Reduces social mobility, worsens health and wellbeing

PRS Legislative research releases State of state Finances 2025 Report

According to report, **rising levels of committed expenditure** are constraining the fiscal space of states, thereby **squeezing their ability to undertake development-oriented spending**.

Key findings of the Report

- **High committed spending:** States spent **62% of revenue receipts** on salaries, pensions, interest, and subsidies in 2023-24.
- **Lower GST revenue share:** Revenue from GST-subsumed taxes **fell from 6.5% of GDP (2015-16) to 5.5% (2023-24)**, leaving states with weaker own-tax capacity.
 - ⊕ 15th Finance Commission had estimated a medium-term ratio of 7% revenue from GST.
- **Reduction in untied transfers:** Untied transfers **fell to 64%** under the 15th Finance Commission, reducing states' flexibility in spending priorities.
- **High debt burden:** Outstanding debt of states at **27.5% of GDP (2024-25)** is far above the FRBM target of 20%; only Gujarat, Maharashtra, and Odisha meet the benchmark.
- **Interest payments rising fast:** Interest costs grew **10% annually** (2016-17 to 2024-25), outpacing revenue growth.
- **Unconditional cash transfers for women led to fiscal pressure:** In 2025-26, the number of states providing unconditional cash transfers to women has increased to 12 states.
- **Per-capita income gaps between states have increased:** Because high-income states raise **more revenue per capita** and **spend more on development**.

Way Forward

- **Enforce fiscal discipline:** States must **cut revenue deficits**, avoid borrowing for routine expenses, and end off-budget loans.
 - ⊕ Bring debt closer to the **20% target** to reduce rising interest burdens.
- **Boost revenues smartly:** Streamline **GST slabs**, raise **non-tax revenue** through better user charges, mining royalties, asset monetization, and stronger property tax and excise systems.
- **Spend wisely:** Rationalize subsidies and cash transfers, control committed expenditure, protect capital spending, and expand untied transfers.

UN raises concerns regarding Neurotechnology

Neurotechnology encompasses both hardware and software that **directly measure, access, monitor, analyse, predict or modulate** the nervous system to understand, influence, restore or anticipate its structure, activity and function. **E.g.**, brain-computer interface (BCI)

- In recent times, the integration of AI with neuroscience can impact key aspects of the human brain, including reasoning, learning, perception, prediction, planning, and control.

Concerns related to Neurotechnology

- **Mental Integrity:** Unlike many other frontier technologies, it can directly access, manipulate and emulate the structure of the brain.
- **Personal Identity & Psychological Continuity:** Protection of one's sense of self (compromises freedom of thought) and memory including autonomy and privacy from Memory modification or manipulation changing "who a person is".
- **Use of Neural Data:** Corporations might exploit neural data collected through neurotech devices for **targeted marketing or commercial gain**.
- **Social Inequalities:** Unequal deployment of neurotechnology could intensify existing social divides, potentially leading to greater social tension and conflict.

Way Forward (Recommendations by UNESCO)

- **Legal Protection and Regulation:** Enact laws to control neurotechnology use, especially beyond scientific, medical, or judicial purposes.
- **Data Policy:** Develop robust, fair and agile regulatory and legal frameworks to govern the collection, processing, sharing and all other uses of neural data.
- **Equitable Access:** Promote equitable access to science- and evidence-based, safe and reliable neurotechnology.

Ministry of Electronics and Information Technology (MeitY) unveils India AI Governance Guidelines

India AI Governance Guidelines are a comprehensive framework to ensure safe, inclusive, and responsible AI adoption across sectors.

- Guidelines have been unveiled under the **IndiaAI Mission**.

Key Aspects of Guidelines

- **Six pillars of AI governance (across three domains):**
 - ⊕ **Enablement** (Infrastructure, Capacity building)
 - ⊕ **Regulation** (Policy & regulation, Risk mitigation)
 - ⊕ **Oversight** (accountability, Institutions).

- **Timelines for Action Plan:**

- ⊕ **Short** (e.g., developing India-specific risk frameworks, developing clear liability regimes, etc.),
- ⊕ **Medium** (e.g., expanding integration of DPI with AI, publishing common standards, etc.),
- ⊕ **Long-term** (e.g., drafting new laws based on emerging risks and capabilities, etc.)

- **Institutional framework to implement the guidelines:**

- ⊕ **High-level body** (AI Governance Group)
- ⊕ **Government agencies** (MeitY, MHA, etc.)
- ⊕ **Sectoral regulators** (RBI, SEBI, TRAI, CCI, etc.)
- ⊕ **Advisory bodies** (NITI Aayog, Office of PSA, etc.)
- ⊕ **Standards bodies** (Bureau of Indian Standards (BIS), Telecommunication Engineering Centre (TEC), etc.)

- **Practical Guidelines for Industry actors & Regulators:**

- ⊕ **Industry:** E.g., Create a **grievance redressal mechanism** to enable reporting of AI-related harms
- ⊕ **Regulators:** Governance frameworks should be flexible and agile, such that it enable periodic reviews, monitoring, and recalibration based on stakeholder feedback.

Seven guiding principles (Sutras) for ethical and responsible AI

- Trust is the Foundation
- People First
- Innovation over Restraint
- Fairness & Equity
- Accountability
- Understandable by Design
- Safety, Resilience & Sustainability

Also In News



Doha Declaration

Doha declaration adopted at the **Second World Summit for Social Development**.

- The 1st summit took place in **Copenhagen, Denmark** in 1995.
- Summit was convened by the **United Nations General Assembly**.

About Doha Declaration

- It renews and updates the 1995 **Copenhagen commitments**, calls for:
 - ⊕ Treating **poverty eradication, decent work and social inclusion** as interconnected priorities.
 - ⊕ Expanding universal, gender-responsive social protection, and equitable access to health and education, etc.



Water Convention

Bangladesh became the first country in South Asia to join the U.N.'s Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention).

About Water Convention

- **Adopted in Helsinki in 1992** and **entered into force** in 1996.
- **Legally binding convention** for sustainable management of shared water resources.
- Requires parties to **prevent, control, and reduce** transboundary impacts:
 - ⊕ Ensures reasonable, equitable, and sustainable use of shared waters.
 - ⊕ Mandates cooperation through agreements and joint bodies among riparian states.



Enforcement Directorate (ED)

Cases investigated by ED have been cited as models of effective asset recovery practice by Financial Action Task Force in 'Asset Recovery Guidance and Best Practices' guidelines.

About ED (HQ: Delhi)

- **Genesis:** 1956.
- **Administrative Control:** Department of Revenue, Ministry of Finance.
- It is a **multi-disciplinary organization** mandated with investigation of the offence of money laundering and violations of foreign exchange laws.
- **Key Laws Enforced:**
 - ⊕ **The Prevention of Money Laundering Act, 2002 (PMLA)**
 - ⊕ **The Foreign Exchange Management Act, 1999 (FEMA)**
 - ⊕ **The Fugitive Economic Offenders Act, 2018 (FEOA)**
- **Powers:** Searches and seizures, summon any person, arrest and prosecute, etc.



Gogabeel Lake

Bihar's Gogabeel Lake has been designated a Ramsar site, marking India's 94th wetland of international importance.

About Gogabeel Lake

- **Overview:** It is an **oxbow wetland** situated in **katihar district, bihar**.
 - ⊕ Gogabeel is formed from the flow of the rivers Mahananda and Kankhar in the north and the Ganga in the south and east.
- **Significance:** It is the **first community reserve** of Bihar.
 - ⊕ It is a habitat for a wide variety of birds some of which are even migratory birds.
- **Other Recent Additions to Ramsar Site:** Gokul Jalashay (92nd) of Buxar district and Udaipur Jheel (93rd) of West Champaran in Bihar.



Tidal Disruption Event

Astronauts have observed the biggest and most distant Flare from black hole which originated due to **tidal disruption event (TDE)**.

About Tidal Disruption Event (TDE)

- **Meaning:** Tidal disruption events occur when a star approaches a supermassive black hole and gets violently ripped apart, causing outflows of radiation.
- **Significance:** TDEs help researchers understand how black holes change their surroundings.



Project Suncatcher

Google launches **Project Suncatcher** to test AI data centres in space.

About Project

- **Objective:** Explore **AI computing in space** using solar-powered satellites in low-Earth orbit.
 - ⊕ The initiative envisions a **constellation of compact satellites**, each carrying Google's custom-built **Tensor Processing Unit (TPU) chips**—processors designed specifically for machine learning and AI applications.
- **Two prototype satellites will launch by 2027** to test power generation, chip performance, and data transmission.



The Baku to Belém Roadmap to 1.3T Report

The **Baku to Belém Roadmap to 1.3T report** released ahead of COP-30 underscores the need for enhanced and predictable financial commitments from developed countries.

- Report identifies five action fronts on finance - **Replenishing, Rebalancing, Rechanneling, Revamping, and Reshaping (5R)** to deliver the 1.3 T by 2035 with USD 300 billion being a part of the overall goal.

5R Mechanism

- **Replenishment:** Developed countries need to increase delivery of grants and concessional climate finance.
- **Rebalancing:** Creditor countries, the International Monetary Fund and multilateral development banks shall work together to alleviate **onerous debt burdens** faced by developing.
- **Rechanneling:** Multilateral development banks, development finance institutions, public development banks and multilateral climate funds need to significantly scale the availability and quality of **catalytic financial and risk mitigation instruments** such as foreign exchange hedging, etc.
- **Revamping:** Governments should mainstream climate, nature and just transition objectives into planning, budgeting and investment frameworks, etc.
- **Reshape financial structures:** for enhanced capital flows.



Satellite-based internet

Elon Musk-owned Starlink has signed an agreement with Maharashtra government to deliver satellite-based connectivity to remote and underserved regions.

Satellite-based internet

- **Definition:** Satellite internet is **wireless broadband delivered via communication satellites** orbiting the Earth.
- **Difference:** Unlike fibre, cable, or DSL, it **does not depend on physical ground-based wiring**.
- **How does it work?** Data is transmitted from a user's dish to a satellite and then to ground stations connected to the global internet.
 - ⊕ Low Earth Orbit (LEO) satellites, like Starlink, offer faster speeds and lower latency than traditional geostationary ones.
- **Significance:** Helps bridge the digital divide by connecting remote and underserved regions.



Baliyatra Festival

President Extends Greetings On Baliyatra Festival.

About Baliyatra Festival

- Baliyatra festival is generally celebrated in coastal **Odisha** on the **day of "Kartika Purnima"**.
- It commemorates the **past association of the people of Odisha with Bali** and the glorious maritime tradition of transoceanic voyages they undertook to South East Asian Countries.
- It is also associated with legend '**Taapoi**' and rituals like '**Bhalukuni Osha**' or '**Khudurukuni Osha**' and '**Bada Osha**'.



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