World needs peace and predictability, says Modi

Quad leaders issue joint statement opposing economic, maritime 'coercion' in Indo-Pacific; Modi proposes seafarers' safety initiative at East Asia Summit, and attends meeting with ASEAN leaders

Suhasini Haidar
NEW DELHI

Prime Minister Narendra Modi on Tuesday called for "peace, stability, and predictability" in the world as he attended three back-to-back summits, including the Quad Leaders' Summit, in Manila, the Philippines. He made a number of proposals aimed at maritime security, protecting critical minerals supply chains, and enhancing trade.

The Quad meet, which was being held for the first time in a non-member country, was hosted by U.S. President Donald Trump and was attended by Australian Prime Minister Anthony Albanese and Japanese Prime Minister Sanae Takaichi, apart from Mr. Modi. The leaders issued a joint statement opposing economic and maritime "coercion" in the Indo-Pacific, and Mr. Modi announced that India would host the first Quad Business Forum in Mumbai in 2027.



Strategic group: Prime Minister Narendra Modi with leaders of other Quad nations in Manila, the Philippines, on Tuesday. REUTERS

The events started with Mr. Modi's meeting with the leaders of the Association of Southeast Asian Nations (ASEAN) for the ASEAN-India Summit, where he said the world now needed peace, stability, and predictability more than ever. "Together, India and ASEAN represent nearly one-fourth of the world's population. That is why it is essential to ensure that our future is shaped not by competition, but by cooperation," Mr. Modi told ASEAN leaders. He also promised that India would give e-visas free of charge to ASEAN tourists. Myanmar's junta leader, President Min Aung Laing, was not invited, and the country was represented by an official.

Following this, Mr. Modi took part in the East Asia Summit, attended by the leaders of India, China, Russia, the U.S., Japan, South Korea, and the ASEAN countries, and proposed a seafarers' safety initiative. He said that "whether it is the conflict in Ukraine or West Asia, India will continue to support every effort towards peace".

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GS II – International Relations

Key Pointers

- What is the Quad, and which countries are its members?
- What are the major objectives of the Quad in the Indo-Pacific region?
- What is ASEAN, and why is it important for India's Act East Policy?
- What is the significance of ASEAN centrality in regional cooperation?
- What are the major areas of India–ASEAN cooperation in trade, technology and connectivity?
- How can India balance its engagement with the Quad, ASEAN and other Indo-Pacific partners?

U.S. blocks remote access to AI chips; China slams restrictions

Ananth Krishnan
BEIJING

The United States has announced new regulations aimed at curbing Chinese firms' remote access to advanced AI chips through data centres in third-party countries, coming amid the scandal surrounding chipmaker Nvidia. Beijing on Tuesday slammed the new restrictions, accusing Washington of "abusing export control measures".

Nvidia's provision of chips to companies running data centres in Southeast Asia has come under the spotlight amid questions surrounding founder Jensen Huang's relationship with Alice Huang, the CEO of one such Singapore-based company, Megaspeed. With Nvidia barred from selling its most advanced chips in China, many Chinese companies instead sought access to its technology through data centres in countries such as Malaysia.

Tech tussle

Nvidia's provision of chips to Southeast Asian firms is under the spotlight over a scandal involving its founder Jensen Huang

- The new U.S. rule imposes an additional license on 5 countries presenting a 'higher-than-normal risk of diversion'
- U.S. says curbs designed to ensure that restrictions on access to sensitive technology cannot be circumvented through remote arrangements



- China calls it yet another case of the U.S. 'overstretching the concept of national security' to 'go after' its high-tech industry

The U.S. Commerce Department's Bureau of Industry and Security (BIS) announced an interim final rule (IFR) "to address remote access" to advanced AI chips and servers, saying it was "designed to ensure that existing restrictions on access to sensitive American technology cannot be circumvented through remote computing arrangements involving data centres in third countries."

The rule states that in addition to the current licence requirements for advanced semiconductors, a licence will be required "to export, re-export, or transfer (in-country) advanced semiconductors to Indonesia, Malaysia, Singapore, Thailand, or Brazil", which it named as "countries which present a higher-than-normal risk of diversion."

The new rule was announced days before U.S. President Donald Trump's arrival in Shenzhen for the APEC Summit.

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GS II – International Relations | GS III – Science & Technology

Key Pointers

- Why are advanced AI chips important for artificial intelligence and high-performance computing?
- What is the role of semiconductors in modern digital technologies?
- Why has the United States imposed export controls on advanced computing chips?
- How can remote access to data centres create challenges for technology export controls?
- What is India's position in the global semiconductor industry?

Nearly 75 lakh names added in draft SSR rolls in 13 States, U.T.s; Goa sees sharpest increase

Sreeparna Chakrabarty
NEW DELHI

Months after final voter lists were published following the contentious special intensive revision (SIR) of electoral rolls, nearly 75 lakh more names have been added in draft voter lists published in 13 States and Union Territories via a special summary revision (SSR) process.

The combined size of the electorate in these States before the SIR was 49.61 crore, which shrunk to 45.22 crore after the SIR and has now increased to 45.96 crore in the draft SSR list. This means there has been a cumulative increase of 1.64%.

Uttar Pradesh, which published its draft SSR list on Tuesday, saw 18.84 lakh names being added to its voter lists, the largest in absolute numbers so far. Goa saw the highest rate of additions, at 3.01%.

Bihar, which was the first State to undergo the SIR process in 2025 saw 13.89 lakh names being added to the final post-SIR list. Rajasthan saw more than 11.48 lakh voters being added to the final SIR voter list, followed by Uttarakhand (1.19 lakh), Madhya Pradesh (8.9 lakh), and Tamil Nadu (10.39 lakh).

The SSR, on hold since the SIR process began last year, was first announced in 17 States and Union Territories, including poll-bound Uttarakhand, Uttar Pradesh, and Punjab, on October 15. On November 5, it was expanded to six more States where the SIR process is over, and on November 16, it was announced that the SSR would also be conducted in Karnataka and Meghalaya. Of these, the draft SSR rolls have been published for 15 States and Union Territories. The data for Punjab and Gujarat, however, was not available.

Changing rolls

The combined electorate in the **13** States and U.T.s where draft SSR rolls have been published as of Tuesday saw a cumulative increase of **1.64%**

Voters in the 13 States/U.T.s

- Before SIR: **49.61** crore
- After SIR: **45.22** crore
- Draft SSR: **45.96** crore
- Largest additions in absolute numbers: Uttar Pradesh (**18.84** lakh)



Delayed process

The SSR, an annual exercise, usually seeks to enrol eligible voters, particularly young and first-time electors, and facilitate advance applications from those who will become eligible on April 1, July 1, and October 1, 2027.

However, it had not been carried out after the SIR was launched last year, an anomaly that was recently highlighted by Election Commissioners S.S. Sandhu and Vivek Joshi.

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SIR HEARING
» PAGE 13

AMRITA IAS

GS II – Polity & Governance | Election Commission

Key Pointers

- What is the Special Summary Revision (SSR) of electoral rolls?
- How is SSR different from Special Intensive Revision (SIR)?
- What is the role of the Election Commission of India in preparing electoral rolls?
- What are the constitutional provisions governing the right to vote and electoral rolls?
- What is the significance of Articles 324, 325 and 326 of the Constitution?

Cyclone Akvan slows, likely to turn very severe by tomorrow

The cyclone may continue to drift slowly and intensify into a severe cyclonic storm over the west-central Bay of Bengal on Nov. 18, and further into a very severe one next day, IMD says

Nellore Sravani
VIJAYAWADA

Cyclonic storm Akvan, currently over the central parts of the south and west-central Bay of Bengal, is likely to intensify into a severe cyclonic storm by Wednesday morning.

Initially, the India Meteorological Department (IMD) forecast that the weather system would strengthen into a severe cyclonic storm by Tuesday evening, but the system had either remained stationary or moved slowly.

At 5.30 p.m., the weather system was centred around 590 km east of Chennai, 630 km northeast of Trincomalee in Sri Lanka, 650 km southeast of Machilipatnam and 650 km south-southeast of Visakhapatnam in Andhra Pradesh and 780 km south of Gopalpur in Odisha.

It may continue to move slowly north-northwestwards and intensify into a severe cyclonic storm over west-central Bay of Bengal on Wednesday morning, and further into a very severe cyclonic storm by Thursday morning.

The system has changed its track slightly, and the probable landfall points may remain between Visakhapatnam and Nellore. Isolated heavy rainfall is likely in the northern districts of Visakhapatnam, Alluri Sitharama Raju, Parvathipuram Manyam, Srikakulam, Vizianagaram, and strong winds with speeds of 100 kmph to 110 kmph are likely along the coastal belt from Wednesday evening.

'Rare event'

Speaking to *The Hindu*, IMD Director General of Meteorology Mrutyunjay Mohapatra said it is normal for the Bay of Bengal to see three or four tropical cyclones in a year. "What is not normal is that all of them are crossing the coast near Andhra Pradesh."

A similar event last happened in 1987. And, the reason for this can be attributed to El Nino, he said.

GS III – Disaster Management, GS I - Geography

Key Pointers

- How are tropical cyclones formed over warm ocean waters?
- What conditions are required for the formation and intensification of a cyclone?
- What is the difference between a depression, deep depression and cyclonic storm?
- How does the India Meteorological Department classify tropical cyclones?
- Why is the Bay of Bengal more prone to severe cyclones than the Arabian Sea?
- What is the role of the IMD and National Disaster Management Authority in cyclone preparedness?

Elusive peace

Restoration of Statehood is essential for peace in Jammu and Kashmir

Three months of lull established by security forces in Jammu and Kashmir was rattled by the back-to-back incidents of violence in the past six days. On November 11, a terror attack on a checkpoint manned by the personnel of the Central Reserve Police Force (CRPF) in Kulgam left three jawans injured. On November 16, a local, whom the police suspected of having joined the terror ranks a few days ago, was killed after six days of a siege-like anti-terror operation in residential areas of Kulgam. In Jammu's Kishtwar, two Special Police Officers (SPOs) of the J&K Police were found dead with bullet wounds, a day after they were reported missing in a forest range on November 11. The police and the Army, however, remain tight-lipped about the circumstances around the killing of these SPOs, and there are conflicting reports on the circumstances that led to their deaths. The anti-terror operation in civilian areas of Kulgam has raised concerns. Former J&K Chief Minister and PDP president Mehbooba Mufti described the operation, spread over six days, as "collective punishment that only breeds alienation and resentment," while NC spokesman Imran Nabi Dar suggested that entire villages were put under prolonged restrictions for days. The Omar Abdullah government, because of limited powers and no jurisdiction over the police in J&K, a Union Territory since 2019, finds itself hamstrung. The iron hand policy to stamp out terrorism and separatism has been effective from a strictly security perspective – terror attacks as well as local recruitments into terror ranks have declined. According to the police, local recruits have come down to single digit or fewer than 10 in Kashmir.

That said, the decline in terrorist incidents and the silence of the streets should not be mistaken for peace. The current situation demands a political reach-out by the Centre to all the stakeholders of J&K. It has to begin with the much-promised restoration of Statehood, which will give the voters a sense that their mass participation in the 2024 Assembly elections allowed their elected leaders to hold institutions accountable, and they were able to work freely to protect the interests of the region. Though the security agencies need to be focused on Pakistan-backed terrorism, it should not come at the cost of re-inflicting psychological scars within Kashmir, which could turn into a powder keg if left unattended. Healing through both political and security processes has to be complementary rather than conflicting. Allowing the political class of J&K to establish its writ and providing room to security agencies to combat challenges are not contradictory.

GS II – Polity & Governance | Internal Security

Key Pointers

- What constitutional changes were made to Jammu and Kashmir in August 2019?
- What is the difference between a State and a Union Territory?
- What are the key provisions of Article 3 of the Constitution regarding the formation of States?
- What is the role of the Lieutenant Governor in a Union Territory with a legislature?
- What were the major findings of the Supreme Court's 2023 judgment on Article 370?
- Why is the restoration of statehood important for democratic representation?

All-too fallible

Death penalty requires a near-infallible criminal justice system

India's vote against a proposed global moratorium on the death penalty at the UN is consistent with its position at the forum; it has defended its retention of the penalty as a sovereign decision backed by judicial safeguards, including the "rarest of rare" condition and sessions courts' sentences requiring a High Court's confirmation. At the same time, the Supreme Court has increasingly restricted capital punishment and research has failed to find evidence of additional deterrence over life imprisonment. India's distinction between judicial executions and extrajudicial killings is legally valid but its further claim that due process protects people facing execution is less so. While India last executed convicts in 2020, for the Delhi gang-rape and murder, Parliament expanded the number of capital offences under the Bharatiya Nyaya Sanhita – a form of penal populism that projects the political attractiveness of the state's response to public outrage, especially in cases of sexual violence, without addressing the poor policing and low conviction rates that actually undermine deterrence. The country had 574 people on death row on December 31, 2025, the highest since 2016, thanks to trial court rulings, challenging claims about judicial safeguards in practice. The report of the 2015 Law Commission headed by Justice A.P. Shah said the death penalty "fails to achieve any constitutionally valid penological goals" and recommended abolishing it for all crimes except terrorism and waging war.

Only a small group of countries worldwide are executing more people. In India, per Project 39A, the Supreme Court released 38 persons from death row in 2016-2025 after they had spent eight years there on average. Some have endured more than two decades. The punishment requires a measure of infallibility that the criminal justice system cannot supply. The safeguards neither deter convictions in cases with flawed evidence, false testimony, and so on nor remedy unequal access to competent legal representation among those facing the penalty. India should formally suspend executions and commission a review of penalty statutes and the treatment of prisoners on death row. Second, it should spare offences that do not involve intentional killing from the penalty. Research suggests meting out excessively harsh punishments for non-fatal crimes could incentivise offenders to escalate their violence, including to kill potential witnesses. The greater goal should be to abolish the practice in law while improving investigative and prosecutorial practices and access to legal aid.

GS II – Polity & Governance

Key Pointers

- What is the constitutional position of the death penalty in India?
- What is the meaning of the Supreme Court's 'rarest of rare' doctrine?
- What safeguards must courts follow before awarding the death penalty?
- What is the role of the President and Governor in granting pardons and commutations?
- What are the major arguments for and against capital punishment?
- What did the Law Commission's 262nd Report recommend on the death penalty?

Transgender rights, healthcare should not be compromised

Anand Zachariah

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Parliament passed the Transgender Persons (Protection of Rights) Amendment Act, 2026 earlier this year. The new Act represents a significant shift from the Transgender Persons (Protection of Rights) Act, 2019. The 2026 amendment removes the principle of self-identification and demands a medical board's recommendation; a selection from prescribed categories; and certification by a District Magistrate. It fundamentally changes legal recognition for transgender persons from self-identification to medical assessment. While the 2026 Act does increase protection, it changes the philosophical foundation of transgender rights – from recognition based substantially on autonomy and self-identification towards recognition mediated by medical and administrative authorities.

Creating medico-legal hurdles

The definition of "transgender" as introduced in the Amendment Act is in contradiction to established international evidence and guidelines laid down in the World Health Organization ICD-11 and the World Professional Association for Transgender Health Standards of Care Version 8.

The new Act conflates two different issues: whether a person's gender identity is legally valid and a person's eligibility for social welfare benefits. It also makes a medical authority the gatekeeper of gender identity. The Supreme Court had held that gender identity is part of one's personal autonomy and dignity under Article 21, and had rejected the idea that gender identity should be dependent on medical intervention. This new definition resurrects the discredited psychiatric model in which a deeply felt internal and social identity becomes a matter for professional certification.

It raises the broader question of whether the law is protecting transgender persons or deciding which transgender identities are sufficiently medically recognisable to deserve protection. The new amendment defines 'transgender' very narrowly – it removes trans men, trans women and genderqueer persons from its statutory definition and introduces a restricted set of categories, which include certain socio-cultural identities and persons with specified variations in sex characteristics. For transgender persons excluded from this definition, it would create a mismatch between the gender incongruence experienced by the individual and that recognised administratively. It also excludes people who previously fell within the protection of the 2019 Act by medicalising some identities and culturally recognising some others (identities such as *kinner*, *hijra*, *aravani*, *jogta*, eunuch). It mandates medical certification of even such cultural categories. While the medical board can recognise biological characteristics (which may or may not co-occur with a transgender identity), how will it determine membership within a socio-cultural community? The new Act does not provide an effective appeal mechanism nor independent review.

The *NALSA* judgment strongly articulated a rights and autonomy approach while the 2026 Act supports a paternalistic model with reduced autonomy. Should the state protect a marginalised group by introducing medico-legal hurdles or by maximising individual autonomy while providing strong protections against exploitation? The Act creates potential tensions with the constitutional reasoning of *NALSA*, risks excluding many gender-diverse people, and leaves important procedural questions about certification and appeal unresolved.

The consequences

The new Act has many negative public health consequences. The lack of an appeal process is particularly important as the certificate has implications for access to statutory rights and entitlements. It introduces multiple barriers to gender affirming care, documentation, employment, education, social-security schemes, insurance and mental health services. The ambiguity regarding the legality of gender-affirming and supportive care has resulted in uncertainty among care providers and has led some of them to delay, suspend, or withdraw services. This is likely to drive individuals toward unregulated and informal sources of care, including private, unqualified providers operating outside established medical systems. The shift towards the "grey market" for hormones and surgical interventions may increase the risk of self-medication, post-operative complications, infections, side-effects and morbidity. The bureaucratic requirements may lead to significant out-of-pocket expenditures and delays in accessing care. There is also emerging field-level evidence from helplines, community consultations, and hearing sessions indicating an increase in distress calls from transgender individuals, including reports of suicidal ideation, depression, sleep disturbance, and anxiety following the introduction of the amendment.

India has come a long way in recognising the rights of transgender persons. The 2014 *NALSA* judgment recognised transgender persons' right to identity and dignity, and the Government has since introduced laws, welfare schemes, identity certificates, shelter homes, insurance and healthcare initiatives for the community. And yet, transgender people and communities face massive discrimination in nearly all sectors. The National Human Rights Commission's (NHRC) 2026 advisory identifies continuing concerns involving education, healthcare, property and inheritance, employment, documentation, and policing and grievance redressal. The Act goes against the NHRC's recommendations particularly with respect to self-identification, independent grievance mechanisms and reducing documentation barriers.

Transgender healthcare

Many transgender persons hesitate to enter hospitals because of previous experiences, fear of being judged, lack of understanding among healthcare workers, concerns about privacy, cost, or dignified care. These become powerful barriers to seeking healthcare for people who have faced discrimination in environments that cater to cisgender people.

Some hospitals have dedicated transgender clinics that provide specialised care, counselling, hormone therapy, and gender-affirming services. Nevertheless, transgender persons can develop other illnesses such as diabetes or hypertension and may need the full range of care – primary, preventative, emergency, specialist, surgery, dental etc. They should not have to search for a "transgender-inclusive hospital" every time they fall sick. Transgender healthcare should become part of general healthcare.

Clinical understanding of the care needs of a transgender person remains rudimentary in India. Doctors, nurses, receptionists, security staff and hospital administrators need to be trained in basic transgender health. While the Madras High Court's *Sushma* (2021) verdict mandates such education, curriculum changes proposed by the National Medical Commission have failed to incorporate such training. Hospital forms and records should allow appropriate recording of a patient's preferred name and gender identity while retaining clinically relevant information. A mandate of the 2019 Act to designate a Complaints Officer in every establishment has not been complied with in most hospitals. There is an urgent need for inclusive mainstream healthcare, supported by specialised services when necessary.

The passage of the 2026 Act is contributing to a public health emergency. India should focus on the humanity of all people rather than divide them on the basis of bigotry and prejudice. One's humanity should be judged by the people we include rather than by those we exclude.

Clinical understanding of the care needs of a transgender person remains rudimentary in India. Doctors, nurses, receptionists, security staff and hospital administrators need to be trained in basic transgender health

GS II – Polity & Governance | Social Justice | Health

Key Pointers

- What are the key provisions of the Transgender Persons (Protection of Rights) Act, 2019?
- How did the Supreme Court's NALSA judgment of 2014 recognise transgender rights?
- What is the constitutional basis for the rights of transgender persons under Articles 14, 15, 16, 19 and 21?
- How can mandatory medical certification affect the right to self-identification?
- What are the major barriers transgender persons face in accessing healthcare?

India needs a comprehensive doctrine on space security



Aditya Madan

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Space has transformed from a specialised domain of scientific exploration into an area which hosts essential infrastructure underpinning everyday life, economic activity and national security. Communications, navigation, weather forecasting, disaster management, agriculture, banking, logistics and critical infrastructure are increasingly dependent on satellites and space-enabled services. In India, space capabilities support the armed forces through communications, positioning, surveillance, timing and situational awareness. Space is therefore no longer a separate technological sector but an essential component of national resilience and strategic autonomy. As dependence expands, disruption can have consequences for markets, governance, security and society at large.

The character of threats in space is changing. Competition extends beyond the destruction of satellites to the disruption of the services they provide. Space systems can now be affected by jamming and spoofing that interfere with communications and navigation. Cyber interference can target satellite networks, ground stations and supporting infrastructure, while electronic warfare can degrade signals and reduce the reliability of space-enabled systems. Such methods can produce effects without physically damaging a spacecraft, making attribution and response more complex. The vulnerability lies not only in the satellite itself, but in the wider architecture connecting space assets to users on Earth. This shift from destruction to disruption has made space security a more complex challenge for states.

Changing threat landscape

This changing threat environment matters particularly for India, whose dependence on space-based services is expanding across military and civilian domains. The interconnected nature of these systems also means that disruption in one part of the space architecture can have consequences elsewhere on the ground. Therefore, resilience becomes essential.

As India's dependence on space grows, greater clarity is needed about how different forms of interference should be understood and assessed. What constitutes an attack on a space system? Is physical destruction of a satellite fundamentally different from jamming, spoofing or cyber interference that degrades or temporarily disables a system? How should responsibility be attributed when interference originates through complex networks or involves multiple actors? What if disruption is temporary but has significant effects on military operations, critical infrastructure or essential services? How should decision-makers distinguish accidental interference from deliberate attack? And, when attribution remains uncertain, how should a response be determined without inadvertently escalating a crisis?

India is not starting from a policy vacuum. The Indian Space Policy 2023 provides an overarching framework for space activities, while ISRO's Indian Space Situational Awareness Report for 2025 (ISSAR-2025) documents India's efforts in space situational awareness, collision avoidance and space-debris mitigation. The strategic question is how the existing policy framework and space situational awareness can better inform decision-making on hostile disruption, attribution and crisis response. India needs a clearer framework establishing thresholds, attribution standards and response principles for different forms of space disruption.

Interconnected network

Space security cannot be treated solely as a military or government responsibility. An increasing part of the space ecosystem is operated and serviced by commercial entities. Private satellite operators and service providers support communications, navigation, and other activities underpinning civilian infrastructure and economic functions. Disruption affecting a commercial system can therefore have consequences for public services, businesses and national security. Security depends on the resilience of the wider ecosystem, not simply on protecting government-owned assets. Sustained government-industry coordination is important for information sharing, identifying vulnerabilities, responding to disruptions and maintaining essential services.

A comprehensive Indian space-security doctrine should begin with resilience: multiple systems, redundancy, and sufficient flexibility to sustain essential functions when individual components are disrupted. Equally important is space-domain awareness – the ability to understand activity around Indian assets, identify anomalies and strengthen the basis for attribution. A credible framework must also address reconstitution and recovery, ensuring that essential capabilities can be restored rapidly. This requires partnerships among government agencies, the armed forces, ISRO, commercial operators and other stakeholders. A space-security doctrine need not mean an unrestricted push towards weaponisation. Its purpose should be to ensure that India can deter, withstand, attribute and recover from disruption while preserving the peaceful use of outer space.

India's objective should not be to turn outer space into another arena of conflict, but to ensure that disruption in space does not translate into vulnerability on Earth. As space-enabled services become embedded in defence and economic activity, their continuity is inseparable from protecting national interests. The measure of space security should not be the accumulation of capabilities alone, but the capacity to preserve functions, withstand shocks and recover quickly.

India's objective should not be to turn outer space into another arena of conflict, but to ensure that disruption in space does not translate into vulnerability on Earth

GS III – Science & Technology | Internal Security | National Security

Key Pointers

- Why has outer space become important for national security?
- How are satellites used in communication, navigation, defence and disaster management?
- What are the major threats to space assets, including jamming, spoofing and cyberattacks?
- What is space situational awareness, and why is it important?
- What is the difference between kinetic and non-kinetic attacks on satellites?
- What are the objectives of the Indian Space Policy 2023?

Increase in population of black-necked crane in Ladakh

25 in per cent. The population of the 'near threatened' black-necked crane, the State bird of Ladakh, has increased to 108 in 2026, a nearly 25 per cent rise from the 87 recorded last year, marking a significant achievement in wildlife conservation. The 2026 breeding-season survey recorded 86 adult cranes and 22 juveniles. PTI

Prelims Pointers

- What are the habitat requirements of the black-necked crane?
- Why is the black-necked crane important for the high-altitude ecosystem?
- What is its conservation status under the IUCN Red List?
- Why is Ladakh an important breeding ground for this species?
- What threats does the black-necked crane face from habitat loss and human activities?
- What are the major international conventions for protecting migratory birds?

The battle for responsible microfinance

Is the RBI drawing a necessary line between financial inclusion and reckless lending? Is the microfinance industry prioritising loan growth over borrower protection? Are existing credit checks enough to assess a household's actual repayment capacity? Is pseudo-consent becoming a wider banking-sector concern?

EXPLAINER

Santosh V. Perumal

The story so far:

The firm stand of the Reserve Bank of India (RBI) on the microfinance industry has sent out strong messages that financial inclusion cannot be at the cost of household over-indebtedness, and responsible lending begins even before a loan is sanctioned. After two years of contraction, stability appears to have returned in the country's microfinance sector – which primarily targets unbanked or under-banked individuals, informal workers, and rural households living below or near the poverty line – but recovery remains fragile.

Industry-wide early-stage delinquency (30-179 days past due) fell to 1.9% in June 2026 from 6.1% a year earlier. However, loans overdue by more than 180 days were high at 17.4%, implying the extent of legacy stress.

What is microfinance's footprint?

The SIDBI-Equifax Microfinance Pulse Report, covering June 2026, shows that the outstanding microfinance portfolio fell 12% year-on-year (YoY) to ₹2.69 lakh crore. The sector had 7.15 crore active loan accounts. Disbursements during April-June 2026 however grew 17% YoY to ₹62,302 crore.

The Sa-Dhan Quarterly Microfinance report gives a somewhat broader picture, with the industry's outstanding portfolio at ₹3.26 lakh crore in June 2026, down 7.6% YoY. Banks' direct microfinance portfolio was about ₹83,080 crore in June 2026, accounting for one-fouth of the industry's portfolio, according to Microfinance Institutions Network (MFIN) data, it represented less than 0.4% of total scheduled commercial bank credit.

Direct financial footprint is relatively small, but microfinance's influence on rural consumption, women's entrepreneurship, informal businesses and household livelihoods is substantial. The sector's cumulative contribution to India's Gross Value Added (GVA) was 2.03% in 2018-19, projected to rise to 2.7% by 2025-26.



RBI Deputy Governor emphasised that lenders must provide the Key Facts Statement regarding loans and obtain an acknowledgement that the borrower understands the commitment. GETTY IMAGES

What are the industry demands?

One of the key demands is an upward revision of the ₹3 lakh annual household income threshold, which was introduced in 2022. According to the MFIN, the threshold does not adequately reflect increases in wages, household incomes and inflation. Consequently, borrowers whose incomes improved marginally may be out of the regulatory definition, although they may continue to require small-ticket credit.

Another demand is on the 50% fixed-obligation-to-income ratio (FOIR) as the industry seeks a rational review from the banking regulator as they view that a uniform 50% repayment ceiling may not adequately capture regional differences in household income, consumption expenditure, cost of living and repayment capacity.

Divergence over FOIR, income eligibility and lending practices could create uncertainty and discourage fresh capital in the sector. It could also push financially vulnerable households towards informal moneylenders, potentially exposing them to higher interest rates. The microfinance industry wants certain repayment obligations to be assessed more flexibly, including proposals to consider only the interest component of some loans rather than the entire principal and interest repayment.

What did the RBI say?

On FOIR, the RBI instead viewed excluding principal repayments as understating actual household indebtedness. In this regard, it cites a study that showed an average microfinance borrower spends just 18.7% of her monthly household income on loan repayment, while about two-thirds goes towards consumption.

On the threshold, the RBI's sights are on industry developments, hinting that regulatory flexibility will depend on demonstrable improvements in household income assessment, credit reporting and responsible lending. "It is imperative for the industry to strengthen its lending practices, uphold responsible credit standards and build greater resilience to withstand emerging challenges," RBI Deputy Governor Shirish Chandra Murmu had said.

For the RBI, it is a tight-rope walk, balancing the financial inclusion and due diligence. It has to ensure that tighter credit discipline does not become a barrier to financial inclusion. At the same time, it shouldn't undermine the purpose of microfinance.

What is pseudo-consent?

Highlighting possible instances in which borrowers sign documents without adequate information about what they contain, Mr Murmu distinguished between mindful consent and pseudo-consent. He emphasised that lenders must provide the Key Facts Statement (KFS), explain its contents in a language understood by the borrower and obtain an acknowledgement that the borrower understands the commitment.

With expanding digital lending, instant personal loans, credit cards and other retail products, pseudo-consent could become a wider banking-sector problem.

Elevated crude oil prices, costlier transportation and high inflation in essential commodities, can squeeze household disposable incomes, which translate into additional borrowings. In such a scenario, financial inclusion could inadvertently deepen household indebtedness, turning credit into a source of financial distress.

Is there a conflict of interest?

The two RBI-recognised SROs or Self-Regulatory Organisations – MFIN and Sa-Dhan – are industry associations whose members are also the institutions they are expected to monitor. MFIs may market additional financial products such as insurance, savings-linked products and other services alongside microcredit, creating a potential conflict between the borrower's actual financial needs and the institution's revenue-generating interests.

What is the underlying ethos?

The RBI's June 2026 directions on advertising, marketing and sale of financial products seek to prohibit deceptive practices and ensure explicit customer consent. These requirements are scheduled to take effect from January 1, 2027.

THE GIST

- The RBI's firm stand on the microfinance industry sends a message that financial inclusion cannot come at the cost of household over-indebtedness
- The microfinance industry wants certain repayment obligations to be assessed more flexibly, including by considering only the interest component of some loans
- Elevated crude oil prices and inflation in essential commodities can squeeze household incomes, leading to additional borrowings. In such a scenario, financial inclusion could inadvertently deepen household indebtedness

GS III – Indian Economy

Key Pointers

- What is microfinance, and how does it support low-income households?
- What is the role of the Reserve Bank of India in regulating microfinance institutions?
- What is the difference between financial inclusion and over-indebtedness?
- What is the Fixed Obligation to Income Ratio (FOIR), and why is it important in lending?
- What is pseudo-consent, and why is it a concern in digital lending?

Making learning more inclusive for tribal students

Keralam's Community Study Centres help tribal students navigate a competitive education system

Amruth G. Kumar
Binesh Narayanan

Samoohya Patana Muri or Community Study Centres (CSC) is an initiative of the Keralam government started in 2018 to support the learning needs of children from tribal communities. In a tribal hamlet in Kasaragod district, CSC can be inventoried quite easily: a few computers, learning materials, a room open even after school hours, and light refreshments for ₹20 per student per day. What cannot be inventoried is: whether a tribal student who has failed an exam feels confident to walk in the next day and ask for help or are they pushed away?

Our education policies speak the fluent language of inventories. It counts enrolment, sq ft. of buildings, equipment, and pass percentages, among other things, and these are not trivial. But access alone does not ensure achievement without students' active participation in learning. Policies usually consider only access, not participation. A child can be enrolled in school and given basic learning resources, yet remain unable to use what is on offer. Persisting after failure and believing that school wants us to progress are not merely individual acts of will, but social acts.

Beyond infrastructure

Keralam's CSCs are an ideal site to test this argument. Run by the Scheduled Tribes Development Department, CSCs serve Scheduled Tribe and Scheduled Caste students from Classes V to XII with tutoring, learning materials, and refreshments. Every CSC employs an educated young person from the local community. There are currently 364 CSCs, as per the 'Economic Review' 2023, published by the Kerala Planning Board.

It is easy to understand this as a tuition-and-hardware scheme of the government. But this understanding misses its most powerful feature: the staff belong to the same community as the students, which formal schooling so often misses. Results of a study published in the Taylor and Francis QI Journal, *Diaspora, Indigenous, and Minority Education*, has insightful findings in this direction.

The study was conducted on 462 tribal school students in Kasaragod district. Findings show that students who viewed their CSC positively had stronger achievement motivation: they demonstrated better social skills, the capacity to express, read, and manage emotions in social situations as well. This means that the value of the CSC cannot be judged only by the number of tabletop computers, internet bandwidth, learning resources, and other facilities. The social skills these students develop through interactions with the facilitator and other peers also deserves serious attention.

Scheduled Tribe (ST) students gaining 'social skills' through CSC can be misunderstood. It does not imply that tribal children lack social skills and the CSC delivers it to them. The better reading is the reverse. Tribal students hail from communities that value cooperation and interdependence. On the other hand, schools reward competitive individualism. This appears to be a juxtaposed reality for the tribal students.

CSC plays a critical role in equipping the tribal students to navigate this demanding situation. The local facilitator at the CSC supports them in reaching the school and sustaining them at school. But this raises a more serious question: What role do schools play in helping these students adjust to school practices? A CSC that helps tribal students cope with a school that does not understand them is doing work the school should share. The more efficiently the CSC functions, the easier it becomes for the system to leave the school unchanged.

The path forward

At the national level, the lesson is not to copy Keralam's CSC equipped with computers and other resources. Some key points are proposed based on the evidence emerging from the study:

While evaluating such welfare schemes, the system must look beyond quantified outcomes. It should assess whether students freely seek help, feel comfortable at the CSC, progress to higher levels confidently (without liberal moderation and grace marks), and feel respected there, alongside learning outcomes. At the national level, such schemes should continuously observe the interests, attitudes and motivation that lead students to attendance, retention and higher achievements.

The facilitator appointed at such centres should be treated as an educator, not merely a custodian of equipment or a disciplinarian. They should be trained in adolescent development, learning strategies, academic and personal guidance, and counselling skills, and receive regular pay commensurate with their work.

Peer tutoring opportunities can be organised in CSCs, with senior students supporting younger ones and engaging them in mixed-age-group projects. None of this is an argument against computers, learning resources, and refreshments available for the students in CSC, and they must continue. The argument is against mistaking the inventoried items for real educational support for tribal students.

(Amrut G. Kumar is a Professor at School of Education, Central University of Kerala [CUK]. Binesh Narayanan is a Senior Research Fellow of UGC at CUK)

GS II – Social Justice | Education

Key Pointers

- What are Community Study Centres (CSCs), and how do they support tribal students?
- What are the major educational challenges faced by Scheduled Tribe students?
- Why is access to education not enough to ensure better learning outcomes?
- How can local community participation improve the quality of education?
- What role can trained facilitators play in supporting tribal students?

Gen Z is the torchbearer for global change: Prince William

At the 2026 Earthshot Prize ceremony, Britain's prince reflects on achievements of the finalists and the global movement behind environmental innovation; Bhutan, Mahindra Last Mile Mobility were among the five winners of this year's awards

Vinaya Deshpande Pandit
Yohaan Varghese
MUMBAI

Young people from around the world are not waiting for someone else to find the solution, they are the torchbearers of the global movement for change, Britain's Prince William said here on Tuesday.

He was speaking at the 2026 Earthshot Prize awards ceremony, which was held in India for the first time.

Winners of the Earthshot Prize were declared under five categories in a glittering ceremony. The awardees include the Himalayan Kingdom of Bhutan and Mahindra Last Mile Mobility.



Prince Williams and Princess Catherine with the winners of the 2026 Earthshot Prize in Mumbai on Tuesday. EMMANUAL YOGINI

'Shaping the future'

"They (Gen Z) are bringing fresh ideas and showing what is possible when optimism is matched with action. Their ideas, their energy, and their determination are helping to shape the future," he said.

"India is a nation of extraordinary innovation, ambition, facing immense environmental pressures, yet moving ahead with determination. Not because the challenge is simple, not because the path is easy. But because millions of people have decided that progress simply cannot wait," he said.

During his address, Prince William reflected on the achievements of this year's finalists and the growing global movement behind environmental innovation.

The ceremony was attended by environmental innovators, philanthropists, business leaders, government representatives and global figures from sport, entertainment and culture.

Mahindra Last Mile Mobility won the Earthshot Prize in the 'Clean Our Air' category. Accepting the award, the company's CEO, Suman Mishra, said it showed how urgent optimism worked. The company has won £1 million for its efforts, which have resulted in more electric three-wheelers plying on India's roads.

In the 'Revive Our Oceans' category, Niue Ocean Wide Trust was chosen for protecting the oceans, especially the vast Pacific region.

Coral Pasisi, vice chair and co-architect of Ocean Conservation Commitments, expressed gratitude for indigenous, people-led sustainability efforts being honoured.

"It is collective responsibility in action. We want to protect the oceans that protect us all," she said while accepting the award.

The Earthshot Prize to Protect and Restore Nature was awarded to Bhutan for the country's work in protecting the Himalayan forests, which help the water systems that sustain 1.6 billion people downstream across South Asia.

While accepting the award, Bhutan's Princess Chimi Yangzom Wangchuck said: "Long before environmentalism become a global priority, Bhutan made a national commitment. 60% of our land must remain under forest cover at all times. A duty enshrined in our Constitution. Deeply honoured to accept this prize."

The Earthshot Prize in the 'Build a Waste-free World' category was declared for PFAS - Free France. The initiative is a national, cross-party movement to ban toxic forever chemicals in consumer products and to make polluters pay for the clean-up.

"This victory belongs to all those who stood by us and said, 'We will not be poisoned in silence'. Thank you," said Nicolas Thierry, French politician and lead spokesperson of the firm, while accepting the award.

Orsed was declared the winner in the 'Fix Our Climate' category for transforming its business from coal-intensive utilities to renewable energy.

The ceremony was hosted by director Karan Johar. Among the celebrities who took to stage were British actress and musician Simone Ashley, actor and previous Earthshot Awards presenter Rami Malek, Indian cinema stars Alia Bhatt and Sonam Kapoor, and cricket legend Sachin Tendulkar.

Prelims Pointers

- What is the Earthshot Prize, and what are its main objectives?
- What are the five categories of the Earthshot Prize?
- What are PFAS, and why are they called persistent chemicals?

Horticultural production shows 4.36% growth: govt.

The Hindu Bureau
NEW DELHI



The rise in production came despite a reduction in the area under horticultural cultivation, says Union Agriculture Minister. FILE PHOTO

India's total horticultural production is expected to reach 3,869.15 lakh tonnes in 2025-26, an increase of 161.77 lakh tonnes (4.36%) over the production recorded in 2024-25, according to the third advanced estimates of area and production of horticultural crops released by Union Agriculture Minister Shivraj Singh Chouhan in New Delhi on Tuesday. In the previous crop season, horticulture production stood at 3,707.38 lakh tonnes.

Mr. Chouhan expressed satisfaction over the projected growth and said the significant increase in horticultural production reflected the hard work of India's farmers and the impact of the Union government's farmer-friendly policies. "This record production would not only strengthen the country's nutritional security but also directly contribute to higher incomes for horticulture farmers," the Minister said, congratulating farmers across the country for their efforts.

Farmers were increasingly moving beyond traditional crops towards the cultivation of fruits, vegetables, flowers, spices, and plantation crops, including cashew, coconut and cocoa, as well as aromatic and medicinal plants, he said.

"This growing interest in commercial and high-value crops is opening up new avenues of income for farmers while creating fresh opportunities for self-reliance and growth in the agricultural sector," Mr. Chouhan said.

He added that one of the most significant aspects of the latest estimates was an increase in production despite a reduction in the area under horticultural cultivation.

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GS III – Agriculture

Key Pointers

- What are horticultural crops, and how are they different from foodgrain crops?
- What are the major categories of horticultural crops in India?
- Which factors have contributed to the growth of horticultural production?
- How can horticulture increase farmers' income and create rural employment?
- Why is horticulture important for nutritional security and agricultural diversification?

President hails country's progress in malaria control

The Hindu Bureau
NEW DELHI

President Droupadi Murmu inaugurated the golden jubilee celebrations of the Indian Council of Medical Research-National Institute of Malaria Research (ICMR-NIMR) here on Tuesday.

The President highlighted India's progress in malaria control, noting that malaria cases and deaths had declined by nearly 80% between 2015 and 2025, while the number of high-burden districts fell from 155 to 33. She also noted that 160 districts reported zero indigenous malaria cases during 2022-2025.

Appreciating India's exit from the World Health Organization (WHO)'s High Burden to High Impact (HBHI) group in 2024, she acknowledged the collective efforts of scientists, healthcare workers, and citizens. She also recognised ICMR-NIMR's contribution over five decades to research on malaria parasites, mosquito vectors, vector control, insecticide resistance, and community surveillance.



President Droupadi Murmu visiting an exhibition stall at the ICMR National Institute of Malaria Research on Tuesday. X/ANI

Continued vigilance

Emphasising the need for continued vigilance and effective interventions, Ms. Murmu called for strengthened malaria diagnosis, treatment and surveillance, mosquito control, development of new medicines and vaccines, greater public awareness, and community participation.

She stressed that scientific research and its outcomes should reach villages and communities where they are most needed. She also expressed satisfaction over ICMR-NIMR's contribution to the indigenous malaria vaccine being developed in Bhubaneswar and voiced confidence that it would support India's malaria elimination efforts.

Prelims Pointers

- What causes malaria, and how does it spread?
- What is the role of the female Anopheles mosquito in malaria transmission?
- What are the major symptoms and complications of malaria?
- What is the difference between Plasmodium falciparum and Plasmodium vivax?
- What are the major challenges in malaria elimination, including drug and insecticide resistance?

Voyager 1, one light-day away from earth today, is a marvel of science

Measurements lying in the shadows of their successors can find new lives in the light of new theories. The Voyager 1 mission's longevity made that more apparent, allowing successive generations of researchers to find more uses for its data even as it continues to collect new information

Yasudevan Mukunth

Today, the Voyager 1 spacecraft will be one light-day away from the earth. This means a signal travelling at the speed of light will take one full day to go from the earth to Voyager 1, and signals from the spacecraft will similarly take one day to reach receivers on the earth.

This is a tremendous distance – almost 26 billion kilometres. Since February 17, 1998, Voyager 1 has been the farthest any space mission has been from us. And it keeps going at 61,000 km/hr. But even at such breathtaking speed, Voyager 1 is still barely out of the solar system. Each star's gravitational and magnetic fields extend out for billions of kilometres around them, bending the destinies of multiple worlds to their stellar will.

It is no surprise then that Voyager 1 has itself been defined by superlatives for providing a sense of the influence of our own sun: the first, the farthest, and indeed the oldest space mission still going.



An artist's rendering of Voyager 1 barrelling through space. AP

Pleasant surprise

When NASA launched Voyager 1, the Soviet Union was still a country, the Berlin Wall divided Germany, apartheid was law in South Africa, and neither the World Wide Web nor smartphones existed. Voyager 1 itself has changed during its mission: its operators switched off its cameras in 1990, replaced its ageing components with backups, and, by 2026, left only two of its ten science instruments online. Yet the superlatives have often obscured the important scientific contributions these instruments have themselves made.

For example, scientists were in for a pleasant surprise when they found that one of the instruments onboard Voyager 1 was actually tracking galactic cosmic rays even though it was not designed to. The ultraviolet spectrometer's purpose was to study ultraviolet light, released by grains of dust scattering sunlight in space and by the atmospheres of distant planets. The detector also registered noise from other sources, including from Voyager's nuclear power source, and scientists routinely subtracted it from the data to reveal the ultraviolet signals.

But in 2014, researchers reported in the journal *Astronomy & Astrophysics* that the background noise was actually created by cosmic rays – high-energy particles coming from beyond the solar system. They reanalysed this data collected between 1992 and 2003 and compared them to other instruments elsewhere that were tracking cosmic rays, and concluded the ultraviolet spectrometer onboard Voyager 1 was indeed sensitive to cosmic rays within a small energy range.

Little surprises

The team also sought independent evidence in this data to check whether Voyager 1 had reached or crossed the heliopause, the boundary of the region dominated by the solar wind, in 2012, although the implications went further.

For example, the spectrometer's unexpected readings raised questions about the part of space immediately inside the heliopause, where the solar wind seemed to flow more slowly. After more study, scientists proposed that the wind braked due to interactions between the subatomic particles it contained and the electrically neutral atoms from interstellar space. The proposal remains unconfirmed but nonetheless offered a new way to investigate the possibility that the heliopause may look different in different directions.

Voyager 1 has sprung many little surprises of similar nature that have often skipped the public eye. For another example, when Voyager 1 came close to Saturn, its instruments collected data scientists subsequently used to test one of Albert Einstein's predictions: that the frequency of electromagnetic radiation, such as light, changes when it passes through a gravitational field.

In a study published in *Physical Review Letters* in March 1990, researchers confirmed the prediction with 1% accuracy – a rare instance of an interplanetary mission contributing to fundamental physics. To be fair, the Voyager 1 result also depended on an assumption that radiation around Saturn did not interfere with the spacecraft's frequency reference.

Second, the NASA Gravity Probe A experiment had already confirmed Einstein's prediction in 1976, that too within a better accuracy of 0.02%. The finding based on Voyager 1 was nonetheless interesting because it was independent: based on wholly different instruments and from within a distinct planetary environment. Physicists seek such differences because there are alternative theories of gravity that, on paper, predict varying effects in varying conditions, and differences in the observed data could challenge theories that do not predict them.

Stepping stones

In the same visit to Saturn, scientists also used the radio signals Voyager 1 could emit to study the planet's rings. Specifically, as the spacecraft moved behind the rings, its signals bound for the earth travelled through the rings first. And by studying how the signals were scattered and weakened, scientists could piece together the distribution of materials in the rings.

Thus they discovered fine structures such as narrow gaps between the rings and wave-like undulations in their density, and determined that the particles making up the rings were at best 10-20 metres wide in certain regions.

Operators repeated the same technique with Saturn's moon Titan, which is the only moon in the solar system with a substantial atmosphere, and the only other planetary body to have liquids on its surface. When the Voyager 1 radio transmissions travelled through Titan's atmosphere, scientists were able to measure its temperature and pressure.

Both sets of findings were stepping stones for the landmark NASA Cassini mission, which studied the Saturnian system up close from 2004 to 2017. The data also informed plans for the mission's Huygens probe, which descended through Titan's atmosphere in 2005.

Measurements lying in the shadows of their successors can find new lives in the light of new theories. The Voyager 1 mission's longevity made that more apparent, allowing successive generations of researchers to find more uses for its data even as it continues to collect new information.

As it pulls farther away from the earth, its signals will grow dimmer and its instruments will eventually fall silent, but the scientific life of its observations will keep going.

(mukunth.v@thehindu.co.in)

THE GIST

Voyager 1's one unexpected discovery came when its ultraviolet spectrometer, designed to study UV light, was found to be unintentionally detecting galactic cosmic rays; scientists later realised the instrument was providing useful data on cosmic rays

When the spacecraft came close to Saturn, its instruments collected data scientists subsequently used to test one of Albert Einstein's predictions; this result was notable for providing independent confirmation, albeit to a weaker degree than ideal, of a concept in fundamental physics

Voyager 1's radio signals revealed detailed structures in Saturn's rings and helped measure the temperature and pressure of Titan's atmosphere; these findings laid the groundwork for the later Cassini-Huygens mission

GS III – Science & Technology

Key Pointers

- What is the Voyager 1 mission, and when was it launched?
- What are the major scientific objectives of the Voyager programme?
- What is the heliosphere, and how is it different from interstellar space?
- How has Voyager 1 helped scientists study cosmic rays and the solar wind?
- How did Voyager 1 help test predictions of Einstein's theory of general relativity?
- What information has Voyager 1 provided about Saturn and its moon Titan?

WHAT IS IT?

LineShine stays defending champ

Vasudevan Mukunth

China's LineShine supercomputer has retained its top spot in the list of the world's most powerful supercomputers, the latest edition of which was released at the SC26 conference in Chicago on Monday. LineShine first summited this list in June this year, where it displaced the U.S. El Capitan.

The updated list is also remarkable because its top 10 machines are unchanged from June. The overall 500 admitted only 27 newcomers in this time — the lowest in history — although the reason is obvious: the amount of computing power required to enter the list increased by 7.3% in the same period. The highest-ranked newcomer was HANGANG in South Korea, at number 12.

The Shenzhen Cloud Computing Centre built and installed LineShine at the National Supercomputing Centre in the same city. It is the first Chinese supercomputer to lead the Top500 since Sunway TaihuLight did in 2017.

During one standardised test, engineers found LineShine could perform up to 2.198 quintillion calculations per second, becoming the first Top500 machine to cross the 2 quintillion mark. During the same test it consumed around 42 MW of power. Researchers built LineShine for atmospheric and ocean research.

It uses China-made processors and an operating system called Kylin. Its topping the Top500 is thus a vote of confidence for China against the backdrop of the U.S. restricting its access to advanced computing chips.

After LineShine and El Capitan, the top five include Frontier and Aurora, also in the U.S., and JUPITER Booster in Germany. The highest ranked Indian machine on the list is Shakti Cloud at #35.



World's fastest: China's LineShine supercomputer has retained the top spot in the latest Top500 rankings XINHUA

For feedback and suggestions for 'Science', please write to **science@thehindu.co.in** with the subject 'Daily page'

GS III – Science & Technology

Key Pointers

- What is a supercomputer, and how is it different from a normal computer?
- What is the role of supercomputers in scientific research and weather forecasting?
- What is the TOP500 list, and how are the world's fastest supercomputers ranked?
- How does high-performance computing support climate and ocean research?
- What are the uses of supercomputers in artificial intelligence and data analysis?
- Why are advanced semiconductors important for building powerful supercomputers?

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