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PATRIOTIC IAS

THE HINDU NEWSPAPER

DAILY CURRENT AFFAIRS

08 APRIL 2025

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08_04_2025 DAILY CURRENT AFFAIRS

TOPICS COVERED (GS Paper I: History, Society and Geography)

1. Japan emperor visits Iwo Jima to honour war dead

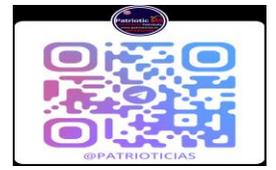
जापान के सम्राट युद्ध में मारे गए लोगों को सम्मान देने के लिए इवो जिमा पहुँचे

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Japanese Emperor Naruhito and Empress Masako bow to Iwo Jima war veterans monument in Japan on Monday. AP

Japan emperor visits Iwo Jima to honour war dead

GS Paper I: WH
Associated Press
IWO JIMA

Japan's Emperor Naruhito and Empress Masako on Monday made a rare visit to the tiny Pacific island of Iwo Jima to mark the 80th anniversary of the end of Second World War.

The Japanese island, around 1,250 km south of Tokyo, was the scene of a five-week battle between wartime enemies Japan and the United States in 1945. Nearly all of Japan's 21,000 soldiers on the island were killed during the fight, while the U.S. side saw more than 6,800 fatalities and 19,000 wounded.

The royal couple bowed deeply as they offered flowers and ritually poured water at a memorial for the war dead as rain fell on the island, which is known in Japan as Iwo-To.

Prime Minister Shigeru Ishiba and U.S. Defense Secretary Pete Hegseth visited the island together last month for a ceremony to mark 80 years since the Battle of Iwo Jima.

The battle inspired movies and books but is perhaps best associated with one of the most famous photos of Second World War – showing a group of U.S. Marines raising the American flag on the rubble-covered surface of Mount Suribachi.

Today, the island is off-limits for civilians and decayed warship parts litter its brown beaches, while rust-covered abandoned tanks sit in lush greenery. Efforts to find the remains of the war dead continue on the remote volcanic island, where an AFP journalist said on Monday that a smell of sulphur permeates the air.

Naruhito's parents, Emperor-emeritus Akihito and his wife Michiko, visited the island in 1994.

Japan emperor visits Iwo Jima to honour war dead

जापान के सम्राट युद्ध में मारे गए लोगों को सम्मान देने के लिए इवो जिमा पहुँचे

- Japan's Emperor Naruhito and Empress Masako on Monday made a rare visit to the tiny Pacific island of Iwo Jima to mark the 80th anniversary of the end of Second World War.

जापान के सम्राट नारुहितो और सम्राज्ञी मासाको ने सोमवार को प्रशांत महासागर के छोटे से द्वीप इवो जिमा की एक दुर्लभ यात्रा की, ताकि द्वितीय विश्व युद्ध के अंत की 80वीं वर्षगांठ को चिन्हित किया जा सके।

- The Japanese island, around 1,250 km south of Tokyo, was the scene of a five-week battle between wartime enemies Japan and the United States in 1945.

यह जापानी द्वीप, टोक्यो से लगभग 1,250 किमी दक्षिण में स्थित है और यह 1945 में जापान और अमेरिका के बीच पांच सप्ताह की लड़ाई का स्थान था।

- Nearly all of Japan's 21,000 soldiers on the island were killed during the fight, while the U.S. side saw more than 6,800 fatalities and 19,000 wounded.

द्वीप पर मौजूद जापान के लगभग 21,000 सैनिकों में से लगभग सभी लड़ाई में मारे गए, जबकि अमेरिकी पक्ष में 6,800 से अधिक मौतें और 19,000 घायल हुए।

- The royal couple bowed deeply as they offered flowers and ritually poured water at a memorial for the war dead, as rain fell on the island, which is known in Japan as Iwo-To.

शाही दंपति ने युद्ध में मारे गए लोगों की स्मृति में बनाए गए स्मारक पर फूल चढ़ाए



और पारंपरिक रूप से जल अर्पित किया, जब द्वीप पर बारिश हो रही थी। जापान में इसे इवो-टो के नाम से जाना जाता है।

- **Prime Minister Shigeru Ishiba and U.S. Defense Secretary Pete Hegseth** visited the island **last month** for a ceremony to mark **80 years since the Battle of Iwo Jima**.
प्रधानमंत्री शिगेरु इशिबा और अमेरिकी रक्षा सचिव पीट हेगसेथ ने इस द्वीप का पिछले महीने दौरा किया था, जहां इवो जिमा की लड़ाई के 80 साल पूरे होने के उपलक्ष्य में एक समारोह आयोजित किया गया था।
- The battle inspired movies and books but is perhaps best associated with one of the most famous photos of **Second World War** — showing a group of **U.S. Marines raising the American flag on the rubble-covered surface of Mount Suribachi**.
इस लड़ाई ने फिल्मों और किताबों को प्रेरित किया, लेकिन यह शायद द्वितीय विश्व युद्ध की सबसे प्रसिद्ध तस्वीरों में से एक से सबसे अधिक जुड़ी हुई है — जिसमें अमेरिकी मरीन सैनिकों का एक समूह माउंट सुरिबाची की मलबे से ढकी सतह पर अमेरिकी झंडा फहराते हुए दिखाई देता है।
- Today, the island is **off-limits for civilians** and **decayed warship parts** litter its **brown beaches**, while **rust-covered abandoned tanks** sit in lush greenery.
आज, यह द्वीप सामान्य नागरिकों के लिए निषिद्ध है और इसके भूरे रंग के तटों पर जंग खाए युद्धपोतों के टुकड़े बिखरे पड़े हैं, वहीं जंग लगे छोड़े गए टैंक हरे-भरे इलाकों में पड़े हुए हैं।
- Efforts to find the **remains of the war dead** continue on the **remote volcanic island**, where an **AFP journalist** said on **Monday** that a **smell of sulphur** permeates the air.
दूरस्थ ज्वालामुखीय द्वीप पर युद्ध में मारे गए लोगों के अवशेषों को खोजने के प्रयास जारी हैं, जहां सोमवार को एक **AFP पत्रकार** ने बताया कि वहां की हवा में **गंधक की तेज़ गंध** फैली हुई है।
- **Naruhito's parents, Emperor-emeritus Akihito** and his wife **Michiko**, visited the island in **1994**.
नारुहितो के माता-पिता, सेवानिवृत्त सम्राट अकिहितो और उनकी पत्नी मिचिको ने इस द्वीप की यात्रा 1994 में की थी।

TOPICS COVERED GS Paper II: Polity, Governance, and International Relations)



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1. Civil disputes turn criminal: CJI says shows collapse of rule of law in U.P.

नागरिक विवादों का आपराधिक मामलों में बदलना: सीजेआई ने कहा, यूपी में क़ानून के शासन का पतन दर्शाता है

2. Foreign funds must be used within four years: Centre

विदेशी फंड को चार वर्षों के भीतर खर्च करना अनिवार्य: केंद्र सरकार

3. Supreme Courts of India, Nepal sign deal for judicial cooperation and exchange

भारत और नेपाल के सर्वोच्च न्यायालयों ने न्यायिक सहयोग और आदान-प्रदान के लिए समझौता किया

4. Inconclusive chapter

अधूरी कहानी

5. Clean voter lists or the choice of Aadhaar linkage

साफ मतदाता सूची या आधार से लिंक करने का विकल्प

6. India's aviation arbitration cases will still fly off overseas

भारत के विमानन मध्यस्थता मामले अब भी विदेशों में ही सुलझेंगे

7. A case for a fair seat allocation

न्यायपूर्ण सीट आवंटन के लिए एक मामला



Civil disputes turn criminal: CJI says shows collapse of rule of law in U.P.

Judiciary

The Hindu Bureau
NEW DELHI

Chief Justice of India Sanjiv Khanna on Monday found it “absurd” that ordinary civil disputes are being converted to criminal cases “day in and day out in Uttar Pradesh”, reflecting a complete breakdown of the law and order machinery in the State.

“Every day, civil suits are being converted to criminal cases. It is absurd. Disputes over civil issues cannot be turned into offences... There is a complete breakdown of rule of law in Uttar Pradesh,” Chief Justice Khanna, heading a three-judge Bench, including Justices Sanjay Kumar and K.V. Viswanathan, observed.



Every day, civil suits are being converted to criminal cases. It is absurd. Disputes over civil issues cannot be turned into offences... There is a complete breakdown of rule of law in Uttar Pradesh

SANJIV KHANNA
Chief Justice of India

The remarks came during the hearing of an appeal filed by Debu Singh and Deepak Singh against an Allahabad High Court decision declining to quash a criminal case filed against them.

The duo facing a cheque bounce case had suddenly found themselves charge-sheeted for criminal of-

fences, including breach of trust, intimidation, and criminal conspiracy. Their counsel said the registration of criminal cases was a ploy to reach a speedy resolution as civil disputes took a long time.

The top court stayed the criminal proceedings against the two men, but said the case against the

dishonoured cheque would continue.

The Chief Justice said the police officer investigating the case should be made to stand in the witness box during trial to explain his move to make a matter of cheque bounce into a criminal case.

“Let the investigating officer stand in the witness box and make out a case of crime. Let him learn his lesson. This is not the way you file chargesheets,” Chief Justice Khanna said.

The court directed the Director-General of Police and the investigating officer to file affidavits in two weeks, giving reasons for setting the criminal law in motion in a civil dispute. The court listed the case for May 5.

Civil disputes turn criminal: CJI says shows collapse of rule of law in U.P.

नागरिक विवादों का आपराधिक मामलों में बदलना: सीजेआई ने कहा, यूपी में क़ानून के शासन का पतन दर्शाता है

Chief Justice of India Sanjiv Khanna on Monday found it “absurd” that ordinary civil disputes are being converted to criminal cases day in and day out in Uttar Pradesh, reflecting a complete breakdown of the law and order machinery in the State.

भारत के मुख्य न्यायाधीश संजय खन्ना ने सोमवार को इसे "अAbsurd" कहा कि उत्तर



प्रदेश में सामान्य नागरिक विवादों को हर दिन आपराधिक मामलों में बदला जा रहा है, जो राज्य में कानून व्यवस्था तंत्र के पूर्ण पतन को दर्शाता है।

- “Every day, civil suits are being converted to criminal cases. It is absurd. Disputes over civil issues cannot be turned into offences... There is a complete breakdown of rule of law in **Uttar Pradesh**,” Chief Justice Khanna, heading a **three-judge Bench**, including **Justices Sanjay Kumar and K.V. Viswanathan**, observed.
“हर दिन नागरिक वादों को आपराधिक मामलों में बदला जा रहा है। यह **अAbsurd** है। **नागरिक मामलों में विवादों** को अपराध नहीं बनाया जा सकता... **उत्तर प्रदेश में कानून के शासन का पूर्ण पतन** हो गया है,” मुख्य न्यायाधीश खन्ना ने, जो कि **तीन-न्यायाधीशों की पीठ** की अध्यक्षता कर रहे थे, जिसमें **न्यायमूर्ति संजय कुमार और के.वी. विश्वनाथन** शामिल थे, यह टिप्पणी की।
- The remarks came during the hearing of an appeal filed by **Debu Singh and Deepak Singh** against an **Allahabad High Court** decision declining to quash a **criminal case** filed against them.
यह टिप्पणी **Debu Singh और Deepak Singh** द्वारा **इलाहाबाद उच्च न्यायालय** के उस निर्णय के खिलाफ दायर **अपील** की सुनवाई के दौरान आई, जिसमें उनके खिलाफ दर्ज **आपराधिक मामले** को रद्द करने से इनकार कर दिया गया था।
- The duo facing a **cheque bounce case** had suddenly found themselves **chargesheeted for criminal offences**, including **breach of trust, intimidation, and criminal conspiracy**.
दोनों को एक **चेक बाउंस मामले** का सामना करना पड़ रहा था, लेकिन अचानक उन्हें **आपराधिक आरोपों** जैसे कि **भरोसे का उल्लंघन, धमकी, और आपराधिक साजिश** के तहत **चार्जशीट** कर दिया गया।
- Their counsel said the registration of **criminal cases** was a **ploy** to reach a speedy resolution as **civil disputes** took a long time.
उनके वकील ने कहा कि **आपराधिक मामलों** का पंजीकरण एक **चाल** है ताकि **नागरिक विवादों** को जल्दी सुलझाया जा सके क्योंकि वे लंबा समय लेते हैं।
- The **top court** stayed the **criminal proceedings** against the two men, but said the case against the **dishonoured cheque** would continue.
सर्वोच्च न्यायालय ने दोनों व्यक्तियों के खिलाफ **आपराधिक कार्यवाही** पर **रोक** लगा दी, लेकिन कहा कि **बाउंस हुए चेक** के खिलाफ मामला जारी रहेगा।
- The Chief Justice said the **police officer** investigating the case should be made to stand in the **witness box** during trial to explain his move to make a matter of **cheque bounce** into a **criminal case**.
मुख्य न्यायाधीश ने कहा कि इस मामले की जांच कर रहे **पुलिस अधिकारी** को **गवाही के कटघरे** में खड़ा होना चाहिए ताकि वह यह समझा सके कि **चेक बाउंस** के एक मामले को **आपराधिक मामला** क्यों बनाया गया।
- “Let the investigating officer stand in the witness box and make out a case of crime. Let him learn his lesson. This is not the way you file chargesheets,” Chief Justice Khanna said.



“जांच अधिकारी को गवाही के कटघरे में खड़ा होने दो और अपराध का मामला साबित करने दो। उसे अपनी सीख मिलनी चाहिए। चार्जशीट दाखिल करने का यह तरीका नहीं है,” मुख्य न्यायाधीश खन्ना ने कहा।

- The court directed the **Director-General of Police** and the **investigating officer** to file **affidavits** in **two weeks**, giving reasons for setting the **criminal law** in motion in a **civil dispute**.
न्यायालय ने पुलिस महानिदेशक और जांच अधिकारी को आदेश दिया कि वे दो सप्ताह में हलफनामा दाखिल करें, जिसमें यह बताया जाए कि नागरिक विवाद में आपराधिक क़ानून क्यों लागू किया गया।
- The court listed the case for **May 5**.
न्यायालय ने इस मामले की अगली सुनवाई की तारीख **5 मई** निर्धारित की।

Foreign funds must be used within four years: Centre

GS Paper II: Governance

NEW DELHI

The Union Home Ministry said on Monday that foreign funds obtained through the prior permission route would be valid only for four years. The Ministry said not adhering to the time limit would be a violation of the Foreign Contribution (Regulation) Act, 2010, and necessary punitive actions could be taken.

In a communication to all banks, it said that for a prior permission application, “the validity period for receiving foreign contribution shall be three years from the date of approval of the application” and the period for “utilising the foreign contribution shall be four years from the date of approval”. “Further, in respect of prior permission applications which have already been approved and where the remaining period of the approved project/ activity in the prior permission is more than three years, the above time limit shall be reckoned from the date of issue of this order instead of the date of approval of the application,” the Ministry said.

Foreign funds must be used within four years: Centre
विदेशी फंड को चार वर्षों के भीतर खर्च करना अनिवार्य: केंद्र सरकार

The Union Home Ministry said on Monday that foreign funds obtained through the prior permission route would be valid only for four years.

गृह मंत्रालय ने सोमवार को कहा कि पूर्व अनुमति मार्ग से प्राप्त विदेशी फंड केवल चार वर्षों तक वैध रहेंगे।

- The Ministry said not adhering to the **time limit** would be a **violation** of the **Foreign Contribution (Regulation) Act, 2010**, and **necessary punitive actions** could be taken.
• मंत्रालय ने कहा कि यदि इस समय-सीमा का पालन नहीं किया गया तो यह विदेशी अंशदान (विनियमन) अधिनियम, 2010 का उल्लंघन माना जाएगा और आवश्यक दंडात्मक कार्रवाई की जा सकती है।
- In a communication to all **banks**, it said that for a **prior permission application**, “the **validity period** for receiving foreign contribution shall be **three years** from the **date of approval** of the application”.
• सभी बैंकों को भेजे गए एक पत्र में कहा गया कि पूर्व अनुमति आवेदन के लिए विदेशी अंशदान प्राप्त करने की वैधता अवधि, अनुमोदन की तिथि से तीन वर्ष होगी।
- And the period for “**utilising the foreign contribution** shall be **four years** from the **date of approval**”.
• और विदेशी अंशदान के उपयोग की अवधि, अनुमोदन की तिथि से चार वर्ष होगी।
- “Further, in respect of **prior permission applications** which have **already been approved** and where the **remaining period** of the approved project/activity is **more**



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than three years, the above time limit shall be reckoned from the date of issue of this order instead of the date of approval of the application,” the Ministry said.

• “इसके अतिरिक्त, जिन पूर्व अनुमति आवेदनों को पहले ही अनुमोदन मिल चुका है और जिन परियोजनाओं/गतिविधियों की शेष अवधि तीन वर्षों से अधिक है, उनके लिए यह समय-सीमा आवेदन की अनुमोदन तिथि के बजाय इस आदेश की तिथि से मानी जाएगी,” मंत्रालय ने कहा।

Supreme Courts of India, Nepal sign deal for judicial cooperation and exchange

GS Paper II

The Hindu Bureau
NEW DELHI

The Supreme Courts of India and Nepal on Monday signed a Memorandum of Understanding (MoU) for judicial cooperation, an occasion which Chief Justice of India Sanjiv Khanna termed as the lighting of a new torch in the relationship between the two countries' judiciaries.

Chief Justice Khanna, who spoke in the presence of Chief Justice of Nepal Prakash Man Singh Raut, said: “Jurisprudential exchanges ensure that our constitutional democracies are not insular, but open to learning, adaptation, and evolution.”

This MoU aims to create formal mechanisms for

judicial exchanges, joint research, training programmes, seminars, and visits. It would be crucial to better understand and resolve common challenges faced by the judiciary like lack of access to justice, judicial delays, digitisation and the “protection of constitutional rights in a rapidly changing world”.

He recounted how the Supreme Court was inspired by a decision of its Nepal counterpart that led to decriminalising Section 377 of the Indian Penal Code (IPC).

“The Indian court noted the Nepalese judgment with approval, particularly drawing inspiration from how it linked the rights of LGBTQ persons to their right to privacy,” Chief Jus-

tice Khanna said.

Likewise, the CJI said Nepal has incorporated Indian constitutional doctrines. “These include the celebrated doctrine of the Basic Structure of the Constitution. I am happy to note how some of the Indian constitutional principles have found a home in Nepal’s jurisprudence!” the CJI noted.

Chief Justice Khanna appreciated the Nepal Supreme Court’s interpretation of the concept of “ecocide”.

“It not only recognised the drastic long-term consequences of environmental degradation but also firmly grounded the right to a clean and healthy environment,” Chief Justice Khanna said.

Supreme Courts of India, Nepal sign deal for judicial cooperation and exchange

भारत और नेपाल के सर्वोच्च न्यायालयों ने न्यायिक सहयोग और आदान-प्रदान के लिए समझौता किया

The Supreme Courts of India and Nepal on Monday signed a Memorandum of Understanding (MoU) for judicial cooperation, an occasion which Chief Justice of India Sanjiv Khanna termed

as the lighting of a new torch in the relationship between the two countries' judiciaries.

सोमवार को भारत और नेपाल के सर्वोच्च न्यायालयों ने न्यायिक सहयोग के लिए सहमति पत्र (MoU) पर हस्ताक्षर किए, जिसे भारत के मुख्य न्यायाधीश संजीव खन्ना ने दोनों देशों की न्यायपालिका के संबंधों में नई मशाल जलाने के रूप में वर्णित किया।

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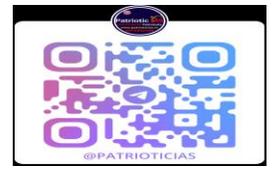
- Chief Justice Khanna, who spoke in the presence of Chief Justice of Nepal Prakash Man Singh Raut, said: “Jurisprudential exchanges ensure that our constitutional democracies are not insular, but open to learning, adaptation, and evolution.”
- मुख्य न्यायाधीश खन्ना ने नेपाल के मुख्य न्यायाधीश प्रकाश मान सिंह राउत की उपस्थिति में कहा: “न्यायिक आदान-प्रदान यह सुनिश्चित करता है कि हमारी संवैधानिक लोकतंत्र प्रणाली संकीर्ण न होकर सीखने, अनुकूलन और विकास के लिए खुली रहे।”
- This MoU aims to create formal mechanisms for judicial exchanges, joint research, training programmes, seminars, and visits.
- यह MoU न्यायिक आदान-प्रदान, संयुक्त शोध, प्रशिक्षण कार्यक्रमों, सेमिनारों, और दौरे के लिए औपचारिक तंत्र बनाने का उद्देश्य रखता है।
- It would be crucial to better understand and resolve common challenges faced by the judiciary like lack of access to justice, judicial delays, digitisation, and the “protection of constitutional rights in a rapidly changing world”.
- यह न्यायपालिका द्वारा सामना की जाने वाली सामान्य चुनौतियों जैसे न्याय तक पहुंच की कमी, न्यायिक देरी, डिजिटलीकरण, और “तेज़ी से बदलती दुनिया में संवैधानिक अधिकारों की सुरक्षा” को समझने और सुलझाने के लिए अत्यंत महत्वपूर्ण होगा।
- He recounted how the Supreme Court was inspired by a decision of its Nepal counterpart that led to decriminalising Section 377 of the Indian Penal Code (IPC).
- उन्होंने बताया कि कैसे सुप्रीम कोर्ट ने नेपाल के न्यायालय के एक निर्णय से प्रेरणा ली जिससे भारतीय दंड संहिता (IPC) की धारा 377 को अपराध की श्रेणी से बाहर किया गया।
- “The Indian court noted the Nepalese judgment with approval, particularly drawing inspiration from how it linked the rights of LGBTQ persons to their right to privacy,” Chief Justice Khanna said.
- मुख्य न्यायाधीश खन्ना ने कहा, “भारतीय न्यायालय ने नेपाल के फैसले को स्वीकृति के साथ देखा, विशेष रूप से इस बात से प्रेरणा ली कि उसने LGBTQ व्यक्तियों के अधिकारों को उनके गोपनीयता के अधिकार से कैसे जोड़ा।”
- Likewise, the CJI said Nepal has incorporated Indian constitutional doctrines.
- इसी तरह, मुख्य न्यायाधीश ने कहा कि नेपाल ने भारतीय संवैधानिक सिद्धांतों को अपनाया है।
- “These include the celebrated doctrine of the Basic Structure of the Constitution. I am happy to note how some of the Indian constitutional principles have found a home in Nepal’s jurisprudence!” the CJI noted.
- “इसमें संविधान की मूल संरचना का प्रसिद्ध सिद्धांत भी शामिल है। मुझे यह देखकर खुशी हो रही है कि कुछ भारतीय संवैधानिक सिद्धांतों को नेपाल की न्यायिक प्रणाली में भी स्थान मिला है!” मुख्य न्यायाधीश ने यह कहा।



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- Chief Justice Khanna appreciated the Nepal Supreme Court's interpretation of the concept of "ecocide".
- मुख्य न्यायाधीश खन्ना ने "पर्यावरण विनाश (ecocide)" की अवधारणा की नेपाल सुप्रीम कोर्ट की व्याख्या की सराहना की।
- "It not only recognised the drastic long-term consequences of environmental degradation but also firmly grounded the right to a clean and healthy environment," Chief Justice Khanna said.
- मुख्य न्यायाधीश खन्ना ने कहा, "इसने न केवल पर्यावरणीय क्षरण के गंभीर दीर्घकालिक परिणामों को मान्यता दी बल्कि स्वच्छ और स्वस्थ पर्यावरण के अधिकार को भी मजबूत आधार दिया।"

GS Paper II: Center-States Relations

Inconclusive chapter

Tamil Nadu should help prepare its students for clearing NEET

With President Droupadi Murmu withholding assent for the Tamil Nadu Admission to Undergraduate Medical Degree Courses Bill 2021, the State is bracing for another battle against National Eligibility cum Entrance Test (NEET)-based admissions. State Chief Minister M.K. Stalin has convened a meeting of legislature party leaders on April 9 to strategise the next move. With the admission season approaching, the development is bound to cause uncertainty and make medical aspirants anxious. Exemption from NEET now remains an inconclusive chapter in the State's decade-old policy discourse. No other State effort to legislate against a central mandate has been so protracted and unpredictable. In September 2017, two anti-NEET Bills met with a similar fate in Rashtrapati Bhavan. Four years later, the ruling DMK – having made NEET exemption a central electoral promise – passed the Bill in the Assembly based on the recommendations of the Justice A.K. Rajan Committee. Instead of forwarding it for presidential assent, Governor R.N. Ravi returned it to the House after five months. In a historic first, the Assembly unanimously re-adopted the Bill and sent it back to him; the Governor subsequently forwarded it to the President. Last week, Mr. Stalin informed the Assembly that assent had been denied, without specifying when Rashtrapati Bhavan had communicated the decision.

This delay in the matter attaining finality is concerning as students have been left facing a state of perpetual uncertainty. The State remains firm in its policy of conducting admission for government quota medical seats based on the Class 12 Board examination scores. Early on, the Ministry of Home Affairs had asked "whether the Bill endangered the sovereignty, unity and integrity of the nation" to which the AYUSH Ministry responded affirmatively. The framers of the Constitution had incorporated Article 254 (2) empowering the President to grant assent to Bills repugnant to central laws on Concurrent List matters. NEET has been consistently upheld by the Supreme Court of India too. The President is under no obligation to give assent, although the Bill reflects the collective will of Tamil Nadu's legislature: it was passed unanimously. True, NEET is neither foolproof nor an absolute measure of academic competency, but Tamil Nadu's legal options are limited. The judiciary is unlikely to settle the issue with any urgency. The State must prepare for a legal struggle, and in the interim, coach students to face NEET with confidence.

Inconclusive chapter

अधूरी कहानी

Tamil Nadu should help prepare its students for clearing NEET

तमिलनाडु को अपने छात्रों को NEET पास करने के लिए तैयार करने में मदद करनी चाहिए

- With President Droupadi Murmu withholding assent for the Tamil Nadu Admission to Undergraduate Medical Degree Courses Bill 2021, the State is bracing for another battle against National Eligibility cum Entrance Test (NEET)-based admissions.

राष्ट्रपति द्रौपदी मुर्मू द्वारा तमिलनाडु स्नातक चिकित्सा पाठ्यक्रम प्रवेश विधेयक 2021 को मंजूरी न दिए जाने के कारण, राज्य राष्ट्रीय पात्रता सह प्रवेश परीक्षा (NEET) आधारित प्रवेश के खिलाफ एक और संघर्ष के लिए तैयार हो रहा है।

- Chief Minister M.K. Stalin has convened a meeting of legislature party leaders on April 9 to strategise the next move.

मुख्यमंत्री एम.के. स्टालिन ने अगली रणनीति बनाने के लिए 9 अप्रैल को विधानसभा पार्टी नेताओं की बैठक बुलाई है।

- With the admission season approaching, the development is bound to cause uncertainty and make medical aspirants anxious.

प्रवेश सत्र नजदीक आने के साथ, यह घटनाक्रम निश्चित रूप से अनिश्चितता पैदा करेगा और चिकित्सा क्षेत्र के इच्छुक छात्रों को चिंतित करेगा।

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• **Exemption from NEET** now remains an **inconclusive chapter** in the State's **decade-old** policy discourse.

NEET से छूट अब भी राज्य की **दशक पुरानी** नीतिगत चर्चा में एक **अधूरी कहानी** बनी हुई है।

• No other State effort to legislate against a **central mandate** has been so **protracted and unpredictable**.

किसी अन्य राज्य का **केंद्रीय आदेश** के खिलाफ कानून बनाने का प्रयास इतना **लंबा और अनिश्चित** नहीं रहा है।

• In **September 2017**, two anti-NEET Bills met with a similar fate in **Rashtrapati Bhavan**.

सितंबर 2017 में, राष्ट्रपति भवन में दो **एनईईटी विरोधी विधेयकों** का भी यही हश्र हुआ।

• **Four years later**, the ruling **DMK** — having made NEET exemption a central **electoral promise** — passed the Bill in the Assembly based on the recommendations of the **Justice A.K. Rajan Committee**.

चार साल बाद, सत्तारूढ़ **DMK** ने NEET छूट को अपना मुख्य **चुनावी वादा** बनाते हुए **न्यायमूर्ति ए.के. राजन समिति** की सिफारिशों के आधार पर विधानसभा में यह विधेयक पारित किया।

• Instead of forwarding it for **presidential assent**, **Governor R.N. Ravi** returned it to the House after **five months**.

राष्ट्रपति की स्वीकृति के लिए भेजने की बजाय, **राज्यपाल आर.एन. रवि** ने इसे **पाँच महीने** बाद विधानसभा को लौटा दिया।

• In a **historic first**, the Assembly unanimously **re-adopted** the Bill and sent it back to him; the Governor subsequently forwarded it to the President.

एक **ऐतिहासिक पहली घटना** में, विधानसभा ने सर्वसम्मति से विधेयक को फिर से पारित किया और राज्यपाल को वापस भेजा; इसके बाद राज्यपाल ने इसे राष्ट्रपति को भेजा।

• Last week, **Mr. Stalin** informed the Assembly that **assent had been denied**, without specifying when **Rashtrapati Bhavan** had communicated the decision.

पिछले सप्ताह, **श्री स्टालिन** ने विधानसभा को बताया कि **मंजूरी अस्वीकार कर दी गई** है, लेकिन यह नहीं बताया कि **राष्ट्रपति भवन** ने यह निर्णय कब भेजा।

• This delay in the matter attaining **finality** is concerning as students have been left facing a state of **perpetual uncertainty**.

इस मामले के **निपटारे में देरी** चिंताजनक है क्योंकि छात्र **लगातार अनिश्चितता** की स्थिति का सामना कर रहे हैं।

• The State remains firm in its policy of conducting admission for **government quota medical seats** based on the **Class 12 Board examination scores**.

राज्य अपनी नीति पर अडिग है कि **सरकारी कोटा की चिकित्सा सीटों** पर प्रवेश **कक्षा 12 की बोर्ड परीक्षा के अंकों** के आधार पर हो।

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• Early on, the **Ministry of Home Affairs** had asked “whether the Bill endangered the **sovereignty, unity and integrity of the nation**” to which the **AYUSH Ministry** responded affirmatively.

प्रारंभ में, गृह मंत्रालय ने पूछा था कि क्या यह विधेयक राष्ट्र की संप्रभुता, एकता और अखंडता को खतरे में डालता है, जिस पर आयुष मंत्रालय ने सहमति जताई थी।

• The framers of the Constitution had incorporated **Article 254 (2)** empowering the **President** to grant assent to Bills **repugnant to central laws** on **Concurrent List** matters.

संविधान निर्माताओं ने अनुच्छेद 254 (2) में यह प्रावधान किया कि राष्ट्रपति समवर्ती सूची के मामलों में केंद्रीय कानूनों से टकराने वाले विधेयकों को मंजूरी दे सकते हैं।

• **NEET** has been consistently upheld by the **Supreme Court of India** too.

NEET को भारत के सर्वोच्च न्यायालय ने भी लगातार समर्थन दिया है।

• The **President** is under no obligation to give assent, although the Bill reflects the **collective will** of **Tamil Nadu's legislature**: it was passed **unanimously**.

हालांकि यह विधेयक तमिलनाडु की विधानसभा की सामूहिक इच्छा को दर्शाता है और सर्वसम्मति से पारित किया गया था, फिर भी राष्ट्रपति को मंजूरी देने की कोई संवैधानिक बाध्यता नहीं है।

• True, NEET is neither **foolproof** nor an **absolute measure** of academic competency, but Tamil Nadu's **legal options are limited**.

सच है, NEET न तो पूरी तरह सुरक्षित है और न ही शैक्षणिक योग्यता का पूर्ण मापदंड, लेकिन तमिलनाडु के कानूनी विकल्प सीमित हैं।

• The **judiciary** is unlikely to settle the issue with any **urgency**.

न्यायपालिका के इस मुद्दे को किसी भी शीघ्रता से सुलझाने की संभावना नहीं है।

• The State must prepare for a **legal struggle**, and in the interim, coach students to face **NEET with confidence**.

राज्य को एक कानूनी लड़ाई के लिए तैयार रहना चाहिए और इस बीच, छात्रों को आत्मविश्वास के साथ NEET का सामना करने के लिए प्रशिक्षित करना चाहिए।



Clean voter lists or the choice of Aadhaar linkage

GS Paper II: Elections

In its March 20, 2025 issue, *The Economist* lamented how “India is obsessed with giving its people unique IDs”. It mocked how various arms of the Indian state announce new unique IDs nearly “every month for everyone from doctors, teachers, athletes, judges, gig workers to even cows and buffaloes”.

The Economist got it half wrong. India is obsessed with IDs but not “unique” IDs. There is a profound and fundamental difference between the two. An ID can identify a person’s eligibility for a certain role or function or a group, such as an ID to drive or to vote or to perform surgery. A unique ID identifies the individual, regardless of their role or function. It certifies that the person is who he or she claims to be. India’s governance establishment often conflates and confuses between an “ID” and a “Unique ID”, with some disastrous consequences – as the Election Commission of India (ECI) did recently.

In March this year, the ECI announced that it was going to embark on an exercise to ‘link Voter ID with Aadhaar’. Voter ID (Electoral Photo Identity Card or EPIC) is an ID for the purposes of voting. Aadhaar is a Unique ID with no specific functional purpose. In simple terms, the ECI wants to convert its ID to a Unique ID.

The Maharashtra election as turning point
On September 18, 2008, under the leadership of then Chief Election Commissioner N. Gopalaswami, the ECI, in a letter to all the State Chief Electoral Officers, said that it was issuing an EPIC ‘for the purposes of correct identification of voters’ and that ‘every EPIC is unique’. Seventeen years later, in announcing a mission to link EPIC with Aadhaar, the ECI has implicitly admitted that its EPIC was only an ID and not unique, as it had previously claimed.

Evidently, the ECI has not understood the difference between an ID and a Unique ID or has misled Indians for nearly two decades. The Maharashtra State election, in November 2024, was a wake-up call for the ECI.

There were roughly 40 lakh new voters registered in Maharashtra in just five months



Praveen Chakravarty

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The Election Commission of India must pay heed to B.R Ambedkar’s note of caution – that the ‘sanctity of voter lists is the foundation of India’s democracy’

between the 2024 general election in April and the Assembly election in November. But in the previous full five-year period between the 2019 Assembly election and the 2024 general election in Maharashtra, only 32 lakh new voters were added. Did Maharashtra experience a sudden population explosion in five months? Obviously, this is illogical and mysterious.

Contrary to what many, including this daily, claimed, it is not the absolute number of 40 lakh new voters by itself that is mysteriously large, but the fact that it defies common sense that more new voters can be added in five months than in the previous five years. As one would expect, never before in India’s seven-decade electoral history have more new voters been added in a few months than in previous five-year election cycles.

Expectedly, in similar past election cycles in all States, the number of new voters added in a few months was only a fraction of the total added in five-year periods.

It does not take Sherlock Holmes to deduce that the new voters enrolled in such large numbers in Maharashtra were either fake or duplicate. That is, the same person had many Voter IDs. This was seen in several constituencies, where thousands of voters with valid Voter IDs from another State were registered as new voters in Maharashtra.

Subsequently, in Bengal, it was pointed out that there were many voters with the same Voter ID number in multiple constituencies in Bengal as well as in other States. That is, one Voter ID number assigned to many people. So, neither was a Voter ID number unique to every voter nor was a voter unique to a Voter ID number. The ECI’s claim in 2008, that every Voter ID number is unique has been a plain lie, wittingly or otherwise.

There is a catch

Now jolted, the ECI seemingly wishes to fix this by linking the Voter ID with the Aadhaar. With its biometric process, the Aadhaar can ensure that one person cannot have multiple Voter IDs. This

is a step in the right direction. But it is more complex than what the ECI makes it out to be.

To ensure that the same person is not duplicated, the Aadhaar numbers of all one billion registered voters have to be linked to their Voter ID. Having only some voters linked to Aadhaar will make the entire exercise futile, since then there is no guarantee of uniqueness and non-duplication. So, cleaning and de-duplicating voter lists with Aadhaar is an all or none exercise and cannot be half done. It implies that to be an Indian voter, an Aadhaar is a must. That is, Aadhaar will be a necessary but not a sufficient condition for voting in India. But by law, Aadhaar cannot be mandatory for anyone and is only optional. In short, India needs clean, de-duplicated voter lists. But de-duplication is only possible with 100% Aadhaar linkage. And Aadhaar is not mandatory. This is the conundrum that the ECI faces.

I venture to posit that Babasaheb Ambedkar would have taken a utilitarian approach to this dilemma and argued that the benefits of de-duplicated Voter IDs outweigh the costs of 100% Aadhaar linkage. He had warned in the Constituent Assembly in 1949 that the ‘sanctity of voter lists are the foundation of India’s democracy’.

Ensure a guarantee under oath

Further, Aadhaar can not only solve the ‘one person with many Voter IDs’ problem but also eliminate the issue of ‘one voter voting many times’. It is no secret that the archaic practice of inking a voter’s finger using an indelible ink after voting is bypassed using chemicals that can remove the ink. The benefits of Aadhaar linking to Voter IDs are significant and obvious.

But, as the saying goes, in a liberal society, it is fine for a hundred guilty people to go unpunished even if it means punishing even one innocent person. All of this can work out only under the absolute guarantee that no single eligible Indian citizen will ever be denied the right to vote. And this guarantee from the ECI has to be under oath – not like its ‘guarantee’, in 2008, of Unique IDs.

Clean voter lists or the choice of Aadhaar linkage

साफ मतदाता सूची या आधार से लिंक करने का विकल्प

In its March 20, 2025 issue, *The Economist* lamented how “India is obsessed with giving its people unique IDs”.

20 मार्च 2025 के अंक में *The Economist* ने यह अफसोस जताया कि “भारत अपने नागरिकों को यूनिक आईडी देने को लेकर जुनूनी है।”

• It mocked how various arms of the Indian state announce new **unique IDs** nearly **every month** for everyone from **doctors, teachers, athletes, judges, gig workers to even cows and buffaloes**.

इसने यह व्यंग्य किया कि भारत में डॉक्टर्स, शिक्षक, खिलाड़ी, न्यायाधीश, गिग वर्कर यहां तक कि गाय और भैंसों तक के लिए सरकार लगभग हर महीने नई यूनिक आईडी घोषित करती है।



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- *The Economist* got it **half wrong**. India is obsessed with **IDs** but not “**unique**” IDs.
The Economist ने यह बात **आधा गलत** कही। भारत में **आईडी** का जुनून है, लेकिन जरूरी नहीं कि वह “**यूनिक**” आईडी हो।
- There is a **profound and fundamental difference** between the two.
इन दोनों के बीच एक **गंभीर और मूलभूत अंतर** है।
- An ID can identify a person’s **eligibility** for a certain **role or function** or a group, such as an ID to **drive**, to **vote**, or to **perform surgery**.
आईडी किसी व्यक्ति की किसी **भूमिका या कार्य** या समूह के लिए **योग्यता** की पहचान कर सकती है, जैसे **डाइविंग, वोटिंग, या सर्जरी** करने के लिए।
- A **unique ID** identifies the **individual**, regardless of their role or function.
यूनिक आईडी व्यक्ति की पहचान करती है, उसके **रोल या फंक्शन** से अलग।
- It certifies that the person **is who he or she claims to be**.
यह प्रमाणित करती है कि व्यक्ति **वही है जो वह कह रहा है**।
- India’s **governance establishment** often **conflates and confuses** between an “ID” and a “Unique ID”, with some **disastrous consequences** — as the **Election Commission of India (ECI)** did recently.
भारत की **शासन व्यवस्था** अक्सर “आईडी” और “यूनिक आईडी” के बीच **भ्रमित और गड़मड़** करती है, जिससे **गंभीर परिणाम** होते हैं — जैसा कि हाल ही में **भारत निर्वाचन आयोग (ECI)** ने किया।
- In **March this year**, the **ECI** announced that it was going to embark on an exercise to ‘**link Voter ID with Aadhaar**’.
इस वर्ष मार्च में, **ECI** ने घोषणा की कि वह ‘**वोटर आईडी को आधार से लिंक**’ करने की प्रक्रिया शुरू कर रहा है।
- **Voter ID (EPIC)** is an ID for the purposes of **voting**. **Aadhaar** is a **Unique ID** with no specific functional purpose.
वोटर आईडी (EPIC) मतदान के लिए एक आईडी है। **आधार** एक **यूनिक आईडी** है, जिसका कोई विशिष्ट कार्यात्मक उद्देश्य नहीं है।
- In simple terms, the **ECI** wants to **convert** its ID to a **Unique ID**.
सरल शब्दों में, **ECI** अपनी आईडी को **यूनिक आईडी** में बदलना चाहता है।

The Maharashtra election as turning point

महाराष्ट्र चुनाव एक निर्णायक मोड़ के रूप में

- On **September 18, 2008**, under the leadership of then **Chief Election Commissioner N. Gopalaswami**, the **ECI** said that it was issuing an EPIC for ‘**correct identification of voters**’



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and that 'every EPIC is unique'.

18 सितंबर 2008 को, तत्कालीन मुख्य चुनाव आयुक्त एन. गोपालस्वामी के नेतृत्व में, ECI ने कहा कि वह मतदाताओं की 'सही पहचान' के लिए EPIC जारी कर रहा है और 'हर EPIC यूनिक है'।

• **Seventeen years later**, in announcing a mission to link EPIC with Aadhaar, the **ECI** has implicitly admitted that its EPIC was only an **ID** and not **unique**, as it had previously claimed.

सत्रह साल बाद, EPIC को आधार से लिंक करने की घोषणा में, ECI ने यह अप्रत्यक्ष रूप से स्वीकार कर लिया कि उसका EPIC सिर्फ एक आईडी है, यूनिक नहीं, जैसा कि पहले दावा किया गया था।

• Evidently, the **ECI** has not understood the **difference** between an ID and a Unique ID or has **misled Indians** for nearly **two decades**.

यह स्पष्ट है कि ECI ने ID और Unique ID के बीच का अंतर नहीं समझा है या फिर लगभग दो दशकों से भारतीयों को भ्रमित कर रहा है।

• The **Maharashtra State election**, in **November 2024**, was a **wake-up call** for the **ECI**. **नवंबर 2024** में हुआ महाराष्ट्र राज्य चुनाव, ECI के लिए एक चेतावनी थी।

• There were roughly **40 lakh new voters** registered in Maharashtra in just **five months** between the **2024 general election in April** and the **Assembly election in November**.

अप्रैल 2024 के आम चुनाव और नवंबर 2024 के विधानसभा चुनाव के बीच पाँच महीनों में महाराष्ट्र में लगभग 40 लाख नए मतदाता पंजीकृत हुए।

• In the previous full **five-year period** between the **2019 Assembly election** and the **2024 general election**, only **32 lakh** new voters were added.

2019 के विधानसभा चुनाव और 2024 के आम चुनाव के बीच के पूरे पाँच वर्षों में केवल 32 लाख नए मतदाता जोड़े गए थे।

• Did Maharashtra experience a sudden **population explosion** in five months? Obviously, this is **illogical and mysterious**.

क्या महाराष्ट्र में पाँच महीनों में अचानक जनसंख्या विस्फोट हुआ? जाहिर है, यह तर्कहीन और रहस्यमय है।

• Contrary to what many, including this daily, claimed, it is not the absolute number of **40 lakh new voters** by itself that is mysteriously large, but the fact that it **defies common sense** that more new voters can be added in five months than in the previous five years.

कई लोगों, जिसमें यह समाचार पत्र भी शामिल है, के दावे के विपरीत, 40 लाख नए मतदाता अपने आप में रहस्यमय नहीं हैं, बल्कि यह बात सामान्य समझ के खिलाफ है कि पाँच महीनों में पांच वर्षों से अधिक नए मतदाता जोड़ दिए जाएं।

• As one would expect, never before in India's **seven-decade electoral history** have more new voters been added in a few months than in previous five-year election cycles.



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जैसा कि अपेक्षित है, भारत के सात दशकों के चुनावी इतिहास में पहले कभी कुछ महीनों में पिछले पाँच वर्षों से ज्यादा नए मतदाता नहीं जुड़े हैं।

• Expectedly, in similar past election cycles in all States, the number of new voters added in a few months was only a **fraction** of the total added in five-year periods.

पूर्व में सभी राज्यों के चुनावों में, कुछ महीनों में जोड़े गए नए मतदाता, पाँच वर्षों की तुलना में केवल एक छोटा हिस्सा होते थे।

• It does not take **Sherlock Holmes** to deduce that the new voters enrolled in such large numbers in Maharashtra were either **fake or duplicate**.

यह समझने के लिए **शरलॉक होम्स** की जरूरत नहीं है कि महाराष्ट्र में इतने बड़े पैमाने पर नए मतदाताओं का नामांकन या तो फर्जी था या दोहराया गया।

• That is, the same person had many **Voter IDs**.

यानी, एक ही व्यक्ति के पास कई वोटर आईडी थे।

• This was seen in several constituencies, where **thousands of voters** with valid **Voter IDs from another State** were registered as new voters in **Maharashtra**.

यह कई निर्वाचन क्षेत्रों में देखा गया, जहाँ हजारों मतदाता जो दूसरे राज्यों से वैध वोटर आईडी रखते थे, उन्हें महाराष्ट्र में नए मतदाता के रूप में पंजीकृत किया गया।

• Subsequently, in **Bengal**, it was pointed out that there were many voters with the **same Voter ID number** in multiple constituencies in **Bengal** as well as in other States.

बाद में, पश्चिम बंगाल में यह पाया गया कि कई मतदाताओं के पास एक ही वोटर आईडी नंबर था, जो बंगाल और अन्य राज्यों के विभिन्न निर्वाचन क्षेत्रों में दर्ज थे।

• That is, one **Voter ID number** assigned to **many people**.

यानि, एक ही वोटर आईडी नंबर को कई लोगों को सौंपा गया था।

• So, neither was a **Voter ID number unique** to every voter nor was a **voter unique** to a Voter ID number.

इस प्रकार, न तो कोई वोटर आईडी नंबर हर मतदाता के लिए यूनिक था और न ही कोई मतदाता किसी एक आईडी नंबर से यूनिक था।

• The **ECI's claim in 2008**, that every Voter ID number is unique has been a **plain lie, wittingly or otherwise**.

ECI का 2008 में यह दावा कि हर वोटर आईडी नंबर यूनिक है, यह एक स्पष्ट झूठ था, चाहे वह जानबूझकर कहा गया हो या नहीं।



There is a catch

एक पेच है

- Now jolted, the ECI seemingly wishes to fix this by linking the **Voter ID** with the **Aadhaar**. अब चौंकने के बाद, ऐसा लगता है कि **चुनाव आयोग (ECI)** इस समस्या को **वोटर आईडी** को **आधार** से जोड़कर ठीक करना चाहता है।
- With its **biometric process**, the Aadhaar can ensure that one person cannot have multiple Voter IDs. **बायोमेट्रिक प्रक्रिया** के कारण, **आधार** यह सुनिश्चित कर सकता है कि एक व्यक्ति के पास कई **वोटर आईडी** न हों।
- This is a step in the right direction. यह सही दिशा में एक कदम है।
- But it is more complex than what the ECI makes it out to be. लेकिन यह उतना सरल नहीं है जितना कि **ECI** इसे दिखाता है।
- To ensure that the same person is not duplicated, the **Aadhaar numbers of all one billion registered voters** have to be linked to their Voter ID. यह सुनिश्चित करने के लिए कि एक ही व्यक्ति की **दोहरी प्रविष्टि (duplication)** न हो, **एक अरब पंजीकृत मतदाताओं** के **आधार नंबर** को उनकी **वोटर आईडी** से जोड़ना होगा।
- Having only some voters linked to Aadhaar will make the entire exercise **futile**, since then there is no guarantee of **uniqueness** and **non-duplicacy**. केवल कुछ मतदाताओं को **आधार** से जोड़ना इस पूरे प्रयास को **व्यर्थ** बना देगा, क्योंकि तब **विशिष्टता** और **दोहराव से बचाव** की कोई गारंटी नहीं रहेगी।
- So, cleaning and de-duplicating voter lists with Aadhaar is an **all or none** exercise and cannot be half done. इसलिए **आधार** से वोटर सूची को साफ़ और **डुप्लिकेट मुक्त** करना एक **संपूर्ण या कुछ नहीं** वाला कार्य है, इसे अधूरा नहीं किया जा सकता।
- It implies that to be an Indian voter, an **Aadhaar** is a must. इसका अर्थ है कि एक भारतीय मतदाता बनने के लिए **आधार अनिवार्य** है।
- That is, Aadhaar will be a **necessary but not a sufficient** condition for voting in India. अर्थात्, **आधार** भारत में मतदान करने के लिए **आवश्यक लेकिन पर्याप्त नहीं** होगा।



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- But by law, Aadhaar cannot be **mandatory** for anyone and is only **optional**.
लेकिन कानून के अनुसार, आधार किसी के लिए भी अनिवार्य नहीं हो सकता और यह केवल वैकल्पिक है।
- In short, India needs **clean, de-duplicated voter lists**.
संक्षेप में, भारत को स्वच्छ और डुप्लिकेट मुक्त मतदाता सूचियों की आवश्यकता है।
- But de-duplication is only possible with **100% Aadhaar linkage**.
लेकिन **100% आधार लिंकिंग** के बिना डुप्लिकेट हटाना संभव नहीं है।
- And Aadhaar is not **mandatory**.
और आधार अनिवार्य नहीं है।
- This is the **conundrum** that the ECI faces.
यही वह **दुविधा** है जिसका सामना **ECI** कर रहा है।
- I venture to posit that **Babasaheb Ambedkar** would have taken a **utilitarian approach** to this dilemma and argued that the benefits of de-duplicated Voter IDs outweigh the costs of 100% Aadhaar linkage.
मैं यह मानता हूँ कि **बाबासाहेब अंबेडकर** इस दुविधा पर **उपयोगितावादी दृष्टिकोण** अपनाते और कहते कि **डुप्लिकेट मुक्त वोटर आईडी** के लाभ **100% आधार लिंकिंग** की लागत से अधिक हैं।
- He had warned in the **Constituent Assembly in 1949** that the '**sanctity of voter lists are the foundation of India's democracy**'.
उन्होंने **1949 में संविधान सभा** में चेतावनी दी थी कि '**मतदाता सूचियों की पवित्रता भारत के लोकतंत्र की नींव है**'।

Ensure a guarantee under oath

शपथ के तहत गारंटी सुनिश्चित करें

- Further, Aadhaar can not only solve the '**one person with many Voter IDs**' problem but also eliminate the issue of '**one voter voting many times**'.
इसके अलावा, आधार न केवल '**एक व्यक्ति के पास कई वोटर आईडी**' की समस्या को हल कर सकता है, बल्कि '**एक मतदाता द्वारा कई बार मतदान**' की समस्या को भी समाप्त कर सकता है।
- It is no secret that the archaic practice of **inking a voter's finger** using an indelible ink after voting is bypassed using chemicals that can remove the ink.
यह कोई रहस्य नहीं है कि मतदान के बाद **अमिट स्याही से मतदाता की उंगली पर निशान लगाने** की पुरानी प्रक्रिया को ऐसे **रसायनों** से हटाया जा सकता है जो स्याही को मिटा देते हैं।
- The benefits of **Aadhaar linking** to Voter IDs are **significant and obvious**.
वोटर आईडी से आधार को जोड़ने के लाभ **महत्वपूर्ण और स्पष्ट** हैं।

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• But, as the saying goes, in a **liberal society**, it is fine for a **hundred guilty people to go unpunished** even if it means **punishing even one innocent person**.

लेकिन जैसा कि कहावत है, एक उदार समाज में यह स्वीकार्य है कि सौ दोषियों को छोड़ दिया जाए, भले ही इसका अर्थ एक निर्दोष को सज़ा देना हो।

• All of this can work out only under the **absolute guarantee** that **no single eligible Indian citizen** will ever be **denied the right to vote**.

यह सब तभी संभव है जब यह **पूर्ण गारंटी** हो कि **कोई भी पात्र भारतीय नागरिक** कभी भी **मतदान के अधिकार से वंचित नहीं होगा**।

• And this guarantee from the ECI has to be **under oath** — not like its 'guarantee', in **2008**, of **Unique IDs**.

और यह गारंटी **ECI** की तरफ से **शपथ के तहत** होनी चाहिए — न कि **2008** में **यूनिक आईडी** की उसकी 'गारंटी' की तरह।

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India's aviation arbitration cases will still fly off overseas

GS Paper II: ADR

In 1934, India's skies were not its own. Under British colonial rule, the Aircraft Act of 1934 governed aviation in India, a law that was designed not to foster a burgeoning aviation sector but to ensure British control over airspace. The idea of ordinary Indians flying in commercial aircraft seemed like a far-fetched dream. Designed to control air traffic for military and administrative purposes, the Act soon showed that it was ill-equipped to handle rapid technological advancements, soaring passenger numbers, and the rise of private sector participation in aviation. Despite India's growing aviation industry over the decades, the legal framework has remained stuck in the past.

This legal inertia has led to significant challenges for India's aviation sector. Private and public airlines faced bureaucratic delays that hampered their growth. New ventures struggled to enter the market due to the cumbersome licensing process. Air traffic management was inefficient, and even fundamental issues such as passenger compensation for flight delays or cancellations were not adequately addressed. It became painfully clear that the old laws were no longer fit for a nation whose aviation sector had evolved far beyond what the Aircraft Act anticipated.

Fast forward to 2024, where India has moved beyond its colonial past. The Bharatiya Vayuyan Adhiniyam, 2024 marks a new era, introducing reforms and replacing the 1934 Act, and promising a future where Indian aviation can truly take flight. However, there is one issue that remains: Will India's new aviation reforms also help its arbitration system align with global norms? Or will commercial aviation disputes continue to move to Singapore, London and Paris?

A forward step but still incomplete

The Bharatiya Vayuyan Adhiniyam 2024 is a breath of fresh air for India's aviation industry. By streamlining licensing procedures and tackling the inefficiencies of air traffic management, it aims to position India as a global leader in aviation. Passengers also stand to benefit, with enhanced rights and compensation mechanisms for delays and cancellations.

However, despite these impressive reforms, there is one critical aspect that remains

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unaddressed: arbitration. While the Adhiniyam overhauls much of India's aviation infrastructure, it has done little to modernise the legal framework to resolve international disputes. So, with the lack of specialised aviation arbitration in India, will the country continue to lose aviation cases to global arbitration hubs?

India's current framework for commercial arbitration, governed by the Arbitration and Conciliation Act of 1996, does not address the unique needs of aviation disputes. These often involve specialised issues that range from technical matters to international treaties. India's courts and arbitration centres lack the expertise to handle such complex cases effectively without a dedicated aviation arbitration framework. This gap in expertise and specialisation means that aviation companies that deal with issues such as cross-border regulations, airline contracts, and aviation safety standards are unlikely to look to India as a preferred venue for dispute resolution.

India versus overseas centres

Despite establishing institutions such as the Delhi International Arbitration Centre and the Mumbai Centre for International Arbitration, India has yet to make a significant mark on the global arbitration stage. The Singapore International Arbitration Centre currently handles around 90% of corporate arbitration cases involving Indian parties, a statistic that highlights India's failure to build the necessary institutional support for high-stakes arbitration. This lack of infrastructure for specialised sectors such as aviation is why its arbitration sector remains underdeveloped. Without a dedicated focus on aviation disputes, cases will continue to move abroad. The issue is not about laws alone but about the right people, the systems and the infrastructure to handle complex international disputes.

If India is serious about becoming a global leader in aviation, it must make a concerted effort to develop a specialised aviation arbitration framework. This would involve establishing dedicated institutions with panels of experts in aviation law, technology and international treaties. It is not enough to have a generic arbitration framework. Aviation disputes require a deep understanding of the sector's unique challenges.

India should also look to jurisdictions such as

Singapore and the United Kingdom, which have built strong and specialised arbitration systems catering to the aviation sector. India needs to adopt a similar approach by creating specialised arbitration panels, creating incentives for private sector involvement and focusing on building expertise in aviation law. Law schools can play an important role in this.

This arbitration exodus is a procedural economic and policy failure that affects India's global standing. Every case that moves abroad means lost revenue for Indian arbitrators, law firms and legal institutions. More importantly, it sends a troubling signal to foreign investors and aviation companies – that India lacks the confidence and the infrastructure to handle high-stakes disputes. However, with a robust aviation arbitration system, India could attract more aviation businesses, increasing investments, economic growth and having a more substantial global aviation presence.

India must ensure neutrality in arbitrator appointments. The government should appoint arbitrators only through mutual agreement or by an independent arbitration body. This is standard practice in leading arbitration hubs, and India must follow suit if it wants to be taken seriously. Further, India must reduce judicial and executive interference in arbitration. Indian arbitration awards often get dragged into long court battles. A stable and predictable legal environment is essential if India wants to attract more arbitration cases.

Key areas to focus on

The path forward is clear: India must prioritise neutrality, transparency, and institutional strength. It must align itself with the best global practices and eliminate provisions that create a perception of bias. The Bharatiya Vayuyan Adhiniyam 2024 is a landmark step but remains incomplete without arbitration reform. The Arbitration and Conciliation Act, 1996 provides a general framework, but aviation disputes demand specialised expertise.

Unless India builds a dedicated aviation arbitration ecosystem with expert arbitrators, specialised institutions, and global credibility, disputes will keep flying off abroad, and investments may follow suit. The time for reform is now.

India's aviation arbitration cases will still fly off overseas

भारत के विमानन मध्यस्थता मामले अब भी विदेशों में ही सुलझेंगे

In 1934, India's skies were not its own. Under British colonial rule, the Aircraft Act of 1934 governed aviation in India.

1934 में भारत का आकाश उसका अपना नहीं था। ब्रिटिश औपनिवेशिक शासन के तहत, भारत में विमानन को 1934 के एयरक्राफ्ट एक्ट द्वारा नियंत्रित किया गया था।

The law was designed not to foster a burgeoning aviation sector but to ensure British control over airspace.

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यह कानून उभरते हुए विमानन क्षेत्र को बढ़ावा देने के लिए नहीं, बल्कि हवाई क्षेत्र पर ब्रिटिश नियंत्रण बनाए रखने के लिए बनाया गया था।

- The idea of **ordinary Indians flying in commercial aircraft** seemed like a far-fetched dream. साधारण भारतीयों द्वारा वाणिज्यिक विमान में उड़ान भरना उस समय एक असंभव सपना लगता था।
- Designed to control air traffic for **military and administrative purposes**, the Act soon showed it was **ill-equipped** to handle rapid technological advancements. सैन्य और प्रशासनिक उद्देश्यों के लिए हवाई यातायात को नियंत्रित करने हेतु बनाया गया यह कानून जल्दी ही स्पष्ट कर दिया कि यह तेजी से हो रहे तकनीकी विकास को संभालने में असक्षम है।
- It failed to accommodate **soaring passenger numbers and private sector participation** in aviation. यह कानून तेजी से बढ़ती यात्री संख्या और निजी क्षेत्र की भागीदारी को समायोजित करने में विफल रहा।
- Despite India's growing aviation industry over the decades, the **legal framework** remained **stuck in the past**. हालांकि दशकों में भारत का विमानन उद्योग बढ़ा, फिर भी इसकी कानूनी संरचना पुराने ढर्रे पर ही अटकी रही।
- This **legal inertia** led to significant challenges for India's aviation sector. यह कानूनी जड़ता भारत के विमानन क्षेत्र के लिए गंभीर चुनौतियों का कारण बनी।
- **Private and public airlines** faced **bureaucratic delays** that hampered their growth. निजी और सार्वजनिक एयरलाइनों को नौकरशाही में देरी का सामना करना पड़ा, जिससे उनकी वृद्धि बाधित हुई।
- New ventures struggled to enter the market due to the **cumbersome licensing process**. नई कंपनियों को जटिल लाइसेंसिंग प्रक्रिया के कारण बाज़ार में प्रवेश करने में कठिनाई हुई।
- **Air traffic management** was inefficient. हवाई यातायात प्रबंधन अक्षम था।
- Even basic issues such as **passenger compensation for flight delays or cancellations** were not adequately addressed. यहां तक कि उड़ान में देरी या रद्द होने पर यात्रियों को मुआवज़ा देने जैसे मूलभूत मुद्दे भी ठीक से हल नहीं किए गए।
- It became clear that the **old laws** were no longer fit for a nation whose aviation sector had **evolved** far beyond the **Aircraft Act's vision**. यह स्पष्ट हो गया कि पुराने कानून उस देश के लिए उपयुक्त नहीं हैं, जिसका विमानन क्षेत्र एयरक्राफ्ट एक्ट की कल्पना से कहीं आगे बढ़ चुका है।



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- Fast forward to **2024**, India has moved beyond its colonial past.
2024 तक आते-आते भारत अपने औपनिवेशिक अतीत से आगे निकल चुका है।
- The **Bharatiya Vayuyan Adhiniyam, 2024** introduces reforms and replaces the **1934 Act**.
भारतीय वायुवहन अधिनियम, 2024 ने 1934 के कानून को हटाकर सुधारों की शुरुआत की है।
- It promises a future where **Indian aviation** can truly take flight.
यह भविष्य में एक ऐसा मार्ग प्रशस्त करता है, जहां भारतीय विमानन वास्तव में उड़ान भर सके।
- However, one issue remains: will India's **new aviation reforms** help its **arbitration system** align with **global norms**?
हालांकि एक समस्या बनी हुई है: क्या भारत के नए विमानन सुधार उसके मध्यस्थता तंत्र को वैश्विक मानकों के अनुरूप बना पाएंगे?
- Or will **commercial aviation disputes** continue to move to **Singapore, London, and Paris**?
या फिर व्यावसायिक विमानन विवाद अब भी सिंगापुर, लंदन और पेरिस जाते रहेंगे?

A forward step but still incomplete

एक आगे का कदम, लेकिन अब भी अधूरा

- The **Bharatiya Vayuyan Adhiniyam 2024** is a **breath of fresh air** for India's aviation industry.
भारतीय वायुवहन अधिनियम 2024, भारत के विमानन उद्योग के लिए एक नई ताज़गी की तरह है।
- By streamlining **licensing procedures** and tackling **air traffic management inefficiencies**, it aims to make India a **global leader in aviation**.
यह लाइसेंसिंग प्रक्रियाओं को सरल बनाकर और हवाई यातायात प्रबंधन की अक्षमताओं से निपटकर भारत को वैश्विक विमानन क्षेत्र का अग्रणी बनाने की दिशा में प्रयासरत है।
- Passengers stand to benefit from **enhanced rights** and **compensation mechanisms** for **delays and cancellations**.
यात्रियों को देरी और रद्दीकरण के लिए बेहतर अधिकारों और मुआवज़ा प्रणाली से लाभ होगा।
- However, one critical aspect remains unaddressed: **arbitration**.
हालांकि, एक महत्वपूर्ण पहलू अब भी छूटा रह गया है: मध्यस्थता।
- While the Adhiniyam overhauls India's aviation infrastructure, it has done **little to modernise the legal framework** for **international disputes**.
जहां अधिनियम भारत के विमानन बुनियादी ढांचे को नया रूप देता है, वहीं यह अंतरराष्ट्रीय विवादों के कानूनी ढांचे को आधुनिक बनाने के लिए बहुत कम करता है।

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• Due to lack of **specialised aviation arbitration** in India, will the country continue to lose cases to **global arbitration hubs**?

भारत में विशेष विमानन मध्यस्थता के अभाव में, क्या देश अब भी वैश्विक मध्यस्थता केंद्रों को केस खोता रहेगा?

• India's current framework for **commercial arbitration**, governed by the **Arbitration and Conciliation Act of 1996**, does not meet the **unique needs** of aviation disputes.

भारत का वाणिज्यिक मध्यस्थता का वर्तमान ढांचा, जो कि 1996 के मध्यस्थता और सुलह अधिनियम द्वारा शासित है, विमानन विवादों की विशिष्ट आवश्यकताओं को पूरा नहीं करता।

• Aviation disputes often involve **technical matters** and **international treaties**.

विमानन विवादों में अक्सर तकनीकी मुद्दे और अंतरराष्ट्रीय संधियाँ शामिल होती हैं।

• India's **courts and arbitration centres** lack the **expertise** to handle such **complex cases** without a **dedicated aviation arbitration framework**.

भारत की अदालतों और मध्यस्थता केंद्रों में ऐसे जटिल मामलों को सुलझाने के लिए आवश्यक विशेषज्ञता की कमी है, क्योंकि विशिष्ट विमानन मध्यस्थता ढांचा नहीं है।

• This **gap in expertise and specialisation** makes **aviation companies** hesitant to choose India for **dispute resolution**.

विशेषज्ञता और विशिष्टता की इस कमी के कारण, विमानन कंपनियाँ भारत को विवाद समाधान के लिए चुनने में हिचकती हैं।

India versus overseas centres

भारत बनाम विदेशी मध्यस्थता केंद्र

• Despite establishing institutions such as the **Delhi International Arbitration Centre** and the **Mumbai Centre for International Arbitration**, India has yet to make a **significant mark** on the **global arbitration stage**.

हालांकि भारत ने दिल्ली अंतरराष्ट्रीय मध्यस्थता केंद्र और मुंबई अंतरराष्ट्रीय मध्यस्थता केंद्र जैसे संस्थानों की स्थापना की है, फिर भी वह वैश्विक मध्यस्थता मंच पर अब तक कोई महत्वपूर्ण छाप नहीं छोड़ पाया है।

• The **Singapore International Arbitration Centre** currently handles around **90% of corporate arbitration cases** involving Indian parties.

सिंगापुर अंतरराष्ट्रीय मध्यस्थता केंद्र वर्तमान में भारतीय पक्षों से जुड़े लगभग 90% कॉर्पोरेट मध्यस्थता मामलों को संभालता है।

• This highlights India's **failure** to build the **necessary institutional support** for **high-stakes arbitration**.

यह भारत की उच्च-स्तरीय मध्यस्थता के लिए आवश्यक संस्थागत समर्थन बनाने में विफलता को दर्शाता है।



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• The lack of **infrastructure for specialised sectors** such as aviation is why its **arbitration sector remains underdeveloped**.

विमानन जैसे विशिष्ट क्षेत्रों के लिए आवश्यक ढांचे की कमी ही कारण है कि भारत का मध्यस्थता क्षेत्र अब भी अविकसित है।

• Without a **dedicated focus on aviation disputes**, cases will continue to move abroad.

विमानन विवादों पर विशेष ध्यान न होने से ये मामले विदेशों में ही जाते रहेंगे।

• The issue is not about **laws alone** but about the **right people, systems**, and **infrastructure** to handle **complex international disputes**.

समस्या केवल कानूनों की नहीं बल्कि उचित लोग, प्रणाली और संरचना की है जो जटिल अंतरराष्ट्रीय विवादों को संभाल सकें।

• If India is serious about becoming a **global leader in aviation**, it must make a **concerted effort** to develop a **specialised aviation arbitration framework**.

अगर भारत वास्तव में वैश्विक विमानन नेता बनना चाहता है, तो उसे एकजुट प्रयास करते हुए एक विशेष विमानन मध्यस्थता ढांचा विकसित करना होगा।

• This would involve **establishing dedicated institutions** with **panels of experts** in **aviation law, technology**, and **international treaties**.

इसमें विशेष संस्थानों की स्थापना और विमानन कानून, प्रौद्योगिकी तथा अंतरराष्ट्रीय संधियों के विशेषज्ञों के पैनल बनाने की आवश्यकता होगी।

• It is not enough to have a **generic arbitration framework**.

केवल एक सामान्य मध्यस्थता ढांचा पर्याप्त नहीं है।

• **Aviation disputes** require a **deep understanding** of the sector's **unique challenges**.

विमानन विवादों के लिए इस क्षेत्र की विशिष्ट चुनौतियों की गहरी समझ आवश्यक है।

• India should also look to jurisdictions such as **Singapore** and the **United Kingdom**, which have built **strong and specialised arbitration systems** for aviation.

भारत को सिंगापुर और यूनाइटेड किंगडम जैसे देशों की ओर देखना चाहिए, जिन्होंने विमानन के लिए मजबूत और विशिष्ट मध्यस्थता प्रणाली विकसित की है।

• India needs to adopt a similar approach by creating **specialised arbitration panels**, offering **incentives** for **private sector involvement**, and focusing on **aviation law expertise**.

भारत को भी इसी तरह का रास्ता अपनाना होगा जैसे कि विशेष मध्यस्थता पैनल बनाना, निजी क्षेत्र की भागीदारी के लिए प्रोत्साहन देना और विमानन कानून की विशेषज्ञता पर ध्यान केंद्रित करना।

• **Law schools** can play an **important role** in this.

इसमें कानून स्कूल एक महत्वपूर्ण भूमिका निभा सकते हैं।

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• This **arbitration exodus** is a **procedural, economic, and policy failure** that affects India's **global standing**.

यह मध्यस्थता पलायन एक प्रक्रियात्मक, आर्थिक और नीतिगत विफलता है जो भारत की वैश्विक स्थिति को प्रभावित करता है।

• Every case that moves abroad means **lost revenue** for Indian **arbitrators, law firms, and legal institutions**.

हर वह मामला जो विदेश चला जाता है, भारत के मध्यस्थों, कानून फर्मों और कानूनी संस्थानों के लिए राजस्व की हानि है।

• More importantly, it sends a **troubling signal** to **foreign investors and aviation companies** — that India lacks the **confidence and infrastructure** to handle **high-stakes disputes**.

और इससे भी महत्वपूर्ण, यह विदेशी निवेशकों और विमानन कंपनियों को एक चिंताजनक संकेत भेजता है कि भारत में गंभीर विवादों को सुलझाने की क्षमता और ढांचा नहीं है।

• However, with a **robust aviation arbitration system**, India could **attract more aviation businesses**, increase **investments**, and improve its **global aviation presence**.

हालांकि, यदि भारत के पास एक मजबूत विमानन मध्यस्थता प्रणाली हो, तो वह अधिक विमानन व्यवसाय आकर्षित कर सकता है, निवेश बढ़ा सकता है और अपनी वैश्विक विमानन स्थिति को सुधार सकता है।

• India must ensure **neutrality in arbitrator appointments**.

भारत को मध्यस्थों की नियुक्ति में निष्पक्षता सुनिश्चित करनी चाहिए।

• The government should appoint arbitrators only through **mutual agreement** or by an **independent arbitration body**.

सरकार को केवल आपसी सहमति या स्वतंत्र मध्यस्थता निकाय के माध्यम से ही मध्यस्थों की नियुक्ति करनी चाहिए।

• This is **standard practice** in leading **arbitration hubs**, and India must **follow suit** if it wants to be taken seriously.

यह प्रमुख मध्यस्थता केंद्रों में मानक प्रक्रिया है और यदि भारत को गंभीरता से लिया जाना है, तो उसे भी इसी राह पर चलना होगा।

• Further, India must reduce **judicial and executive interference** in arbitration.

इसके अलावा, भारत को न्यायिक और कार्यपालिका हस्तक्षेप को कम करना होगा।

• **Indian arbitration awards** often get dragged into **long court battles**.

भारतीय मध्यस्थता निर्णय अक्सर लंबे अदालत मुकदमों में फंस जाते हैं।

• A **stable and predictable legal environment** is essential if India wants to **attract more arbitration cases**.

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अगर भारत को और अधिक मध्यस्थता मामले आकर्षित करने हैं, तो एक स्थिर और पूर्वानुमान योग्य कानूनी वातावरण जरूरी है।

Key areas to focus on

ध्यान देने योग्य प्रमुख क्षेत्र

• The path forward is clear: India must prioritise **neutrality, transparency, and institutional strength**.

आगे का रास्ता स्पष्ट है: भारत को निष्पक्षता, पारदर्शिता और संस्थागत मज़बूती को प्राथमिकता देनी होगी।

• It must align with the **best global practices** and eliminate provisions that create a **perception of bias**.

उसे सर्वोत्तम वैश्विक प्रथाओं के अनुरूप होना चाहिए और ऐसे प्रावधानों को हटाना चाहिए जो पक्षपात की धारणा बनाते हैं।

• The **Bharatiya Vayuyan Adhiniyam 2024** is a **landmark step** but remains **incomplete without arbitration reform**.

भारतीय वायुवहन अधिनियम 2024 एक ऐतिहासिक कदम है, लेकिन मध्यस्थता सुधारों के बिना अधूरा है।

• The **Arbitration and Conciliation Act, 1996** provides a **general framework**, but **aviation disputes demand specialised expertise**.

मध्यस्थता और सुलह अधिनियम, 1996 एक सामान्य ढांचा देता है, लेकिन विमानन विवादों के लिए विशिष्ट विशेषज्ञता की जरूरत होती है।

• Unless India builds a **dedicated aviation arbitration ecosystem** with **expert arbitrators, specialised institutions, and global credibility**, disputes will **keep flying off abroad**, and **investments may follow**.

जब तक भारत विशेष विमानन मध्यस्थता तंत्र नहीं बनाता जिसमें विशेषज्ञ मध्यस्थ, विशिष्ट संस्थाएं और वैश्विक विश्वसनीयता हो, तब तक विवाद विदेशों में जाते रहेंगे और निवेश भी पीछे-पीछे चले जाएंगे।

• **The time for reform is now.**

सुधार का समय अभी है।



A case for a fair seat allocation

Article 1 of the Constitution proclaims that India shall be a Union of States. The term Union implies that the arrangement or rearrangement of the component units should be on the basis of equity. There are serious apprehensions in the south on the question of readjustment of seats in the Lok Sabha

GS Paper II: Delimitation
FULL CONTEXT

P.D.T. Achary

The issue of readjustment of Lok Sabha seats in the context of the new Census is being hotly debated in the country. In fact, it is being wrongly referred to as delimitation in all public debates.

Delimitation is the act of fixing or re-fixing the boundaries of constituencies. This is done by the Delimitation Commission only after the Census is taken. Under **Article 82** of the Constitution, on the completion of each Census, the seats in the Lok Sabha are required to be readjusted so as to reflect the increased population in the number of seats. The present strength of the Lok Sabha was fixed on the basis of the decennial Census figures of 1971. The total population of India in 1971 was around 54.79 crore which is estimated to have gone up to 141 crore as of March 2025. Thus, during the past 50 years there has been a phenomenal increase in India's population. This has not reflected in the strength of the Lok Sabha, as the number of seats have been frozen at the population level of 1971 till 2026, through an amendment of the Constitution.

Various formulae

The most important point to remember is that much of the increase in the population of the country was due to the failure of some of the major States in the north, such as Uttar Pradesh and Bihar, in implementing the national policy on population control. The result is an abnormal increase in the population of these States. For example, the population of Uttar Pradesh in 1971, was a little over 8.38 crore which is estimated to have gone up to 24.1 crore in 2025. Similarly, the population of Bihar was 4.21 crore in 1971, which has probably reached 13.1 crore in 2025. The idea behind not raising the strength of the Lok Sabha till 2026 was to give time to the States, which were registering huge increases in population, to stabilise it so that the readjustment of seats would not create a serious imbalance between States in southern and northern India.

The southern States could implement the population program successfully and arrest the growth in population. In 1971, the ratio between the number of Lok Sabha seats allotted to a State and its population was almost the same for all the States. Thus, in all major States the population base was 10 lakh for a Lok Sabha constituency. However, the picture has now changed drastically. If the formula contained in Article 81 is followed now, it will create a huge divergence in the number of seats between the northern States and southern States. For example, for a population of 24 crore, Uttar Pradesh will be entitled to 240 seats which will be a threefold increase from the present 80 seats. Whereas a State like Kerala, will only get 36 seats in place of the 20 seats at present as its population is estimated to have increased by only 68% over the past 50 years. If on the other hand, the population to seat ratio is changed to 15 lakh per constituency, Uttar Pradesh will get 160 seats in place of 80, whereas Kerala may get only a few seats more than the present 20 seats. Incidentally, Kerala is being cited as an example because it has registered the lowest growth in population among all major States.

There is another calculation which produces interesting results. The population of the country in 1952, was 372



Putting up a fight: Tamil Nadu Chief Minister M.K. Stalin addresses the Joint Action Committee meeting for Fair Delimitation, in Chennai on March 22. ANI

million (37.2 crore) and the total number of Lok Sabha seats was 489. This works out to an average of 7.6 lakh people in a parliamentary constituency. In 1971, the population was 54.8 crore and the total number of Lok Sabha seats was raised to 543 which works out to one million (10 lakh) people in a constituency. The readjustment of seats was done as per the mandate of Article 82 of the Constitution which will have to be repeated after 2026. Assuming that the strength of the Lok Sabha is going to be raised from the present 543 to 800 (the capacity of the Lok Sabha chamber in the new Parliament is reported to be above 800), the average population of a parliamentary constituency will be nearly 18 lakh. If this figure is taken as the population base of a constituency for readjustment, then Kerala may retain the same number of seats, Tamil Nadu will gain a mere four seats whereas as Uttar Pradesh will gain as much as 54 seats.

Rewarding incompetence

There are serious apprehensions in the south on the question of readjustment of seats in the Lok Sabha. Although the Union Government has remained silent on it so far, unofficial discussions on certain formulae are reportedly being held in some quarters. The State of Tamil Nadu, under the leadership of Chief Minister M.K. Stalin, has powerfully articulated the fears of the States in the southern region about losing political importance in the event of a readjustment of seats in the Lok Sabha. The recent

conclave of southern Chief Ministers and other political leaders, including the Chief Minister of Punjab, held in Chennai is a pointer to the possibility of this issue becoming a major rallying point for southern States. Therefore, there is an urgent need to devise a rational formula for the readjustment of seats in Lok Sabha.

Articles 81 and 82 clearly show that readjustment of seats is done solely on the basis of population. So, a solution to this vexed problem can be found on the basis of what population base can be accepted for readjusting seats. The problem has arisen because of the huge increase of population in a large number of States due to the non-implementation of family planning programs. Equity demands that States which failed to implement population control programs not be rewarded with an increase of seats which give them great political advantage.

Ideal solution

In these circumstances, a fair formula for readjustment of seats would be to take the State which has registered the lowest increase in population as the template. Figures show that Kerala is the State in the south which has registered the lowest growth in population since 1971. The population of Kerala was 2.14 crore in 1971, which is estimated to have gone up to 3.6 crore in 2025 which is an increase of 68%. This can be considered a reasonable growth in population for the last 50 years. So a 68% step-up in the number of seats in all States can be a

reasonable basis for readjustment. This will, on the one hand, maintain the present equation among the States in terms of seats and on the other obviate the need to abnormally raise the number of seats in the States which are remiss in controlling the population. So, under this formula, Uttar Pradesh will get 134 seats, Kerala 34 and Tamil Nadu around 66 seats. This way the present equation among States in terms of seats will remain unchanged. A 68% step-up in seats will raise the total number of seats in the Lok Sabha to 912.

Of course, this formula will make **Article 81(2)(a)**, which says that the ratio between the number of seats and the population of a State shall be the same for all the States, irrelevant. In fact, it had become irrelevant long back – a formula that was laid down in 1950 will cause serious injustice in 2026. The allocation of seats in the Lok Sabha is not a political issue – it needs to be done on the basis of the constitutional principle of equity. It is bound with the bargaining power of the federating units or groups of such units situated in various geographical regions. A sensitive approach is necessary to deal with this issue. Article 1 of the Constitution proclaims that India shall be a Union of States. The term Union implies that the arrangement of the component units should be on the basis of equity in terms of its share in Parliament. We should try to live up to the implications of this constitutional scheme.

P.D.T. Achary is Former Secretary General of the Lok Sabha.

THE GIST

Delimitation is the act of fixing or re-fixing the boundaries of constituencies. This is done by the Delimitation Commission only after the Census is taken.

The State of Tamil Nadu, under the leadership of Chief Minister M.K. Stalin, has powerfully articulated the fears of the States in the southern region about losing political importance in the event of a readjustment of seats in the Lok Sabha.

In these circumstances, a fair formula for readjustment of seats would be to take the State which has registered the lowest increase in population as the template. Figures show that Kerala is the State in the south which has registered the lowest growth in population since 1971.

A case for a fair seat allocation

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न्यायपूर्ण सीट आवंटन के लिए एक मामला

Article 1 of the Constitution proclaims that India shall be a Union of States. The term Union implies that the arrangement or rearrangement of the component units should be on the basis of equity.

संविधान का अनुच्छेद 1 घोषित करता है कि भारत राज्यों का एक संघ होगा। "संघ" शब्द का अर्थ है कि घटक इकाइयों की व्यवस्था या पुनः व्यवस्था न्यायसंगत आधार पर होनी चाहिए।

- There are serious apprehensions in the south on the question of readjustment of seats in the Lok Sabha.
लोकसभा सीटों के पुनः समायोजन के मुद्दे पर दक्षिण भारत में गंभीर आशंकाएं हैं।
- **Readjustment vs Delimitation**
पुनः समायोजन बनाम परिसीमन
- The issue of **readjustment of Lok Sabha seats** in the context of the new **Census** is being hotly debated in the country.
नई जनगणना के संदर्भ में लोकसभा सीटों के पुनः समायोजन का मुद्दा देश में गर्मजोशी से बहस का विषय बना हुआ है।
- In fact, it is being wrongly referred to as **delimitation** in all public debates.
असल में, सभी सार्वजनिक बहसों में इसे गलत तरीके से **परिसीमन** कहा जा रहा है।
- **Delimitation** is the act of fixing or refixing the **boundaries of constituencies**.
परिसीमन का अर्थ है निर्वाचन क्षेत्रों की सीमाओं को तय या पुनः तय करना।
- This is done by the **Delimitation Commission** only after the **Census** is taken.
यह कार्य जनगणना के बाद ही **परिसीमन आयोग** द्वारा किया जाता है।
- Under **Article 82** of the Constitution, on the completion of each **Census**, the **seats in the Lok Sabha** are required to be readjusted to reflect the **increased population**.
संविधान के अनुच्छेद 82 के तहत, हर जनगणना के बाद लोकसभा सीटों का बढ़ी हुई जनसंख्या के अनुसार पुनः समायोजन होना आवश्यक है।
- The present strength of the **Lok Sabha** was fixed on the basis of the **1971 Census**.
लोकसभा की वर्तमान सीटों की संख्या को 1971 की जनगणना के आधार पर तय किया गया था।
- The total population of India in **1971** was around **54.79 crore** which is estimated to have gone up to **141 crore** as of **March 2025**.
1971 में भारत की कुल जनसंख्या लगभग 54.79 करोड़ थी, जो मार्च 2025 तक अनुमानित रूप से 141 करोड़ तक पहुंच चुकी है।
- Thus, during the past **50 years**, there has been a **phenomenal increase** in India's population.
इस प्रकार, पिछले 50 वर्षों में भारत की जनसंख्या में अभूतपूर्व वृद्धि हुई है।



- This has not reflected in the strength of the **Lok Sabha**, as the number of seats has been **frozen** at the **1971** population level till **2026**, through a **constitutional amendment**.
लेकिन यह वृद्धि लोकसभा की सीटों की संख्या में प्रकट नहीं हुई है, क्योंकि एक संवैधानिक संशोधन द्वारा इन्हें **1971** की जनसंख्या के स्तर पर **2026** तक स्थिर कर दिया गया था।
- **Various formulae**
विभिन्न सूत्र
- Much of the increase in population was due to the failure of major northern States like **Uttar Pradesh** and **Bihar** in implementing the **population control policy**.
जनसंख्या वृद्धि का अधिकांश कारण उत्तर प्रदेश और बिहार जैसे प्रमुख उत्तर भारतीय राज्यों का जनसंख्या नियंत्रण नीति को लागू करने में विफल रहना रहा।
- The result is an **abnormal increase** in the population of these States.
इसका परिणाम इन राज्यों में जनसंख्या की असामान्य वृद्धि के रूप में सामने आया।
- In **1971**, the population of **Uttar Pradesh** was a little over **8.38 crore**, which is estimated to have gone up to **24.1 crore** in **2025**.
1971 में उत्तर प्रदेश की जनसंख्या **8.38 करोड़** से थोड़ी अधिक थी, जो **2025** में अनुमानतः **24.1 करोड़** हो गई है।
- Similarly, the population of **Bihar** was **4.21 crore** in **1971**, which has probably reached **13.1 crore** in **2025**.
इसी तरह, **1971** में बिहार की जनसंख्या **4.21 करोड़** थी, जो संभवतः **2025** में **13.1 करोड़** तक पहुंच गई है।
- The idea behind not raising the strength of the **Lok Sabha** till **2026** was to give time to these States to **stabilise population growth**.
2026 तक लोकसभा की सीटें न बढ़ाने का उद्देश्य इन राज्यों को जनसंख्या वृद्धि को स्थिर करने का समय देना था।
- The **southern States** successfully implemented the **population program** and controlled population growth.
दक्षिणी राज्यों ने जनसंख्या कार्यक्रम को सफलतापूर्वक लागू किया और जनसंख्या वृद्धि को नियंत्रित किया।
- In **1971**, the ratio between the number of Lok Sabha seats and population was almost **equal across States**, around **10 lakh per seat**.
1971 में लोकसभा सीटों और जनसंख्या के बीच अनुपात लगभग सभी राज्यों में समान था, लगभग **10 लाख प्रति सीट**।
- However, now the picture has changed **drastically**.
हालांकि अब तस्वीर काफी बदल चुकी है।
- If **Article 81** is followed now, it will create a **huge divergence** between **northern** and **southern States** in seat allocation.
अगर अब अनुच्छेद 81 को लागू किया गया, तो उत्तर और दक्षिण राज्यों के बीच सीटों में बड़ा अंतर पैदा होगा।



- For a population of **24 crore**, **Uttar Pradesh** will be entitled to **240 seats**, a **threefold increase** from the current **80 seats**.
24 करोड़ की जनसंख्या के लिए उत्तर प्रदेश को 240 सीटें मिलेंगी, जो वर्तमान 80 सीटों से तीन गुना अधिक है।
- Whereas **Kerala**, with a population increase of only **68%**, will get **36 seats** in place of the current **20 seats**.
जबकि **केरल**, जिसकी जनसंख्या केवल **68%** बढ़ी है, उसे **20 सीटों** की बजाय **36 सीटें** मिलेंगी।
- If the ratio is changed to **15 lakh per constituency**, **Uttar Pradesh** will get **160 seats**, and **Kerala** only a few more than the existing **20**.
अगर प्रति क्षेत्र **15 लाख की जनसंख्या** का आधार रखा गया, तो **उत्तर प्रदेश** को **160 सीटें** मिलेंगी और **केरल** को वर्तमान **20** से केवल कुछ ही सीटें अधिक मिलेंगी।
- **Kerala** is being cited as it has registered the **lowest population growth** among major States.
केरल का उल्लेख इसलिए किया गया है क्योंकि इसने सभी प्रमुख राज्यों में **सबसे कम जनसंख्या वृद्धि** दर्ज की है।

Historical context and projections

ऐतिहासिक संदर्भ और अनुमानों की बात

- In **1952**, India's population was **372 million (37.2 crore)** and **Lok Sabha** had **489 seats**, which gave an average of **7.6 lakh people per seat**.
1952 में भारत की जनसंख्या **37.2 करोड़** थी और **लोकसभा** में **489 सीटें** थीं, जिससे प्रति सीट औसतन **7.6 लाख लोग** थे।
- In **1971**, the population rose to **54.8 crore** and **Lok Sabha** seats were increased to **543**, which meant **10 lakh per seat**.
1971 में जनसंख्या **54.8 करोड़** हो गई और **लोकसभा** **सीटें 543** हो गईं, जिससे प्रति सीट **10 लाख** का औसत बना।
- Seat readjustment was done as per **Article 82**, and it will need to be repeated after **2026**.
सीटों का पुनः **समायोजन अनुच्छेद 82** के अनुसार किया गया था और इसे **2026** के बाद फिर से करना होगा।
- Assuming **Lok Sabha strength** is raised to **800** (the new chamber capacity), the average population per seat will be about **18 lakh**.
अगर **लोकसभा की ताकत** को **800** किया जाए (नई इमारत की क्षमता), तो प्रति सीट औसत जनसंख्या **18 लाख** होगी।

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- Kerala may retain the **same number of seats**.
केरल अपनी मौजूदा सीटों की संख्या बनाए रख सकता है।
- Tamil Nadu may gain only **4 additional seats**.
तमिलनाडु को केवल 4 अतिरिक्त सीटें मिलेंगी।
- Uttar Pradesh will gain as many as **54 new seats**.
उत्तर प्रदेश को 54 नई सीटें मिलेंगी।

Rewarding Incompetence

अयोग्यता को इनाम देना

- There are serious apprehensions in the south on the question of **readjustment of seats in the Lok Sabha**.

दक्षिण भारत में लोकसभा में सीटों के पुनः समायोजन को लेकर गंभीर आशंकाएँ हैं।

- Although the Union Government has remained **silent**, **unofficial discussions** on certain **formula** are reportedly being held in some quarters.

हालांकि केंद्र सरकार ने इस पर चुप्पी साध रखी है, लेकिन कुछ हलकों में कुछ सूत्रों के अनुसार अनौपचारिक चर्चाएँ चल रही हैं।

- The State of **Tamil Nadu**, under the leadership of **Chief Minister M.K. Stalin**, has powerfully articulated the fears of the States in the southern region about losing **political importance**.

मुख्यमंत्री एम.के. स्टालिन के नेतृत्व में तमिलनाडु राज्य ने दक्षिणी राज्यों की राजनीतिक महत्व खोने की आशंकाओं को प्रभावशाली ढंग से व्यक्त किया है।

- The recent **conclave of southern Chief Ministers and other political leaders**, including the **Chief Minister of Punjab**, held in **Chennai**, is a pointer to the possibility of this issue becoming a major **rallying point** for southern States.

हाल ही में चेन्नई में हुए दक्षिणी राज्यों के मुख्यमंत्रियों और अन्य नेताओं के सम्मेलन (जिसमें पंजाब के मुख्यमंत्री भी शामिल थे) से यह संकेत मिलता है कि यह मुद्दा दक्षिणी राज्यों के एकजुटता का केंद्र बन सकता है।

- Therefore, there is an **urgent need** to devise a **rational formula** for the **readjustment of seats** in Lok Sabha.

इसलिए, लोकसभा में सीटों के पुनः समायोजन के लिए तार्किक फार्मूला बनाने की तत्काल आवश्यकता है।

Ideal Solution

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• Articles **81** and **82** clearly show that **readjustment of seats** is done solely on the basis of **population**.

अनुच्छेद **81** और **82** स्पष्ट रूप से दिखाते हैं कि **सीटों का पुनः समायोजन** केवल **जनसंख्या** के आधार पर किया जाता है।

• So, a solution to this vexed problem can be found on the basis of what **population base** can be accepted for **readjusting seats**.

इस जटिल समस्या का समाधान इस बात के आधार पर निकाला जा सकता है कि **सीटों के समायोजन** के लिए कौन सा **जनसंख्या आधार** स्वीकार किया जाए।

• The problem has arisen because of the **huge increase of population** in a large number of States due to the **non-implementation of family planning programs**.

यह समस्या इस कारण उत्पन्न हुई क्योंकि कई राज्यों में **परिवार नियोजन कार्यक्रमों को लागू नहीं किया गया**, जिससे **जनसंख्या में अत्यधिक वृद्धि** हुई।

• **Equity** demands that States which **failed to implement population control programs** not be **rewarded with an increase of seats**, which give them great **political advantage**.

न्याय की माँग है कि जो राज्य **जनसंख्या नियंत्रण कार्यक्रमों को लागू करने में असफल रहे**, उन्हें **सीटों की वृद्धि** द्वारा **राजनीतिक लाभ** नहीं मिलना चाहिए।

• In these circumstances, a **fair formula** for **readjustment of seats** would be to take the State which has registered the **lowest increase in population** as the **template**.

इन परिस्थितियों में **सीटों के समायोजन** के लिए एक **उचित फार्मूला** यह हो सकता है कि जिस राज्य में **जनसंख्या वृद्धि सबसे कम** हुई है, उसे **आदर्श** के रूप में लिया जाए।

• Figures show that **Kerala** is the State in the south which has registered the **lowest growth in population** since **1971**.

आँकड़े बताते हैं कि **1971** से अब तक **केरल** दक्षिण का ऐसा राज्य है, जहाँ **जनसंख्या वृद्धि सबसे कम** हुई है।

• The population of **Kerala** was **2.14 crore** in **1971**, which is estimated to have gone up to **3.6 crore** in **2025**, which is an increase of **68%**.

केरल की जनसंख्या **1971** में **2.14 करोड़** थी, जो **2025** में **3.6 करोड़** हो गई है — जो कि **68%** वृद्धि है।

• This can be considered a **reasonable growth** in population for the last **50 years**.

इसे पिछले **50 वर्षों** में **उचित जनसंख्या वृद्धि** माना जा सकता है।

• So a **68% step-up** in the number of seats in all States can be a reasonable basis for **readjustment**.

इसलिए सभी राज्यों में **सीटों की संख्या में 68%** वृद्धि एक **उचित आधार** हो सकता है।

• This will maintain the **present equation among the States** in terms of seats and obviate the need to abnormally raise the number of seats in the States which are **remiss in controlling**



population.

यह राज्यों के बीच सीटों का वर्तमान संतुलन बनाए रखेगा और उन राज्यों में सीटों की संख्या अत्यधिक रूप से बढ़ाने की आवश्यकता नहीं पड़ेगी जो जनसंख्या नियंत्रण में विफल रहे।

• Under this formula:

इस फार्मूले के तहत:

- Uttar Pradesh will get 134 seats
– उत्तर प्रदेश को 134 सीटें मिलेंगी
- Kerala will get 34 seats
– केरल को 34 सीटें मिलेंगी
- Tamil Nadu around 66 seats
– तमिलनाडु को लगभग 66 सीटें मिलेंगी

• This way the **present equation among States** in terms of seats will remain **unchanged**.
इस तरह राज्यों के बीच सीटों का वर्तमान अनुपात अपरिवर्तित रहेगा।

• A **68% step-up** in seats will raise the **total number of seats** in the Lok Sabha to **912**.
सीटों में 68% वृद्धि से लोकसभा में कुल सीटों की संख्या 912 हो जाएगी।

• Of course, this formula will make **Article 81(2)(a)**, which says that the **ratio between the number of seats and the population** of a State shall be the same for all the States, **irrelevant**.
हालांकि, यह फार्मूला **अनुच्छेद 81(2)(a)** को **अप्रासंगिक** बना देगा, जो कहता है कि सभी राज्यों में **सीटों और जनसंख्या के बीच का अनुपात समान होना चाहिए**।

• In fact, it had become **irrelevant long back** — a formula that was laid down in **1950** will cause serious **injustice in 2026**.

असल में, यह बहुत पहले ही **अप्रासंगिक** हो चुका है — जो फार्मूला **1950** में लागू हुआ था, वह **2026** में **गंभीर अन्याय** करेगा।

• The allocation of seats in the Lok Sabha is not a **political issue** — it needs to be done on the basis of the **constitutional principle of equity**.

लोकसभा में सीटों का आवंटन कोई **राजनीतिक मुद्दा** नहीं है — इसे **संवैधानिक समानता के सिद्धांत** के आधार पर किया जाना चाहिए।

• It is bound with the **bargaining power** of the **federating units** or groups of such units situated in various **geographical regions**.

यह विभिन्न **भौगोलिक क्षेत्रों** में स्थित **राज्य इकाइयों** या उनके **समूहों की सौदेबाजी शक्ति** से जुड़ा हुआ है।

• A **sensitive approach** is necessary to deal with this issue.

इस मुद्दे से निपटने के लिए एक **संवेदनशील दृष्टिकोण** आवश्यक है।



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- Article 1 of the Constitution proclaims that **India shall be a Union of States.**
संविधान का अनुच्छेद 1 यह घोषित करता है कि भारत राज्यों का एक संघ होगा।
- The term **Union** implies that the **arrangement of the component units** should be on the basis of **equity** in terms of its **share in Parliament.**
संघ शब्द का अर्थ है कि संघटक इकाइयों की व्यवस्था संसद में उनके प्रतिनिधित्व के आधार पर समानता पर आधारित होनी चाहिए।
- We should try to live up to the **implications of this constitutional scheme.**
हमें इस संवैधानिक योजना की भावना के अनुसार कार्य करने का प्रयास करना चाहिए।

TOPICS COVERED GS Paper III: Economy, S&T, Environment, DM, IS)

1. **Electronic surveillance system will cover entire Pak. border, says Shah**
शाह ने कहा: संपूर्ण पाक सीमा पर लगेगा इलेक्ट्रॉनिक निगरानी तंत्र
2. **It's clear now: iron inside the sun is more opaque than expected**
यह अब स्पष्ट है: सूर्य के अंदर मौजूद लोहा अपेक्षा से अधिक अपारदर्शी है
3. **Shaping a Future-Ready Workforce**
भविष्य के लिए तैयार कार्यबल का निर्माण
4. **The Magic of a Mirror: How is it Able to Show Your Reflection?**
आईने का जादू: यह आपकी छवि कैसे दिखा पाता है?
5. **Second child dies of measles in the U.S., while almost 650 reported ill**
अमेरिका में खसरे से दूसरे बच्चे की मौत, लगभग 650 लोग बीमार



Electronic surveillance system will cover entire Pak. border, says Shah

GS Paper III: Defence

Vijaita Singh
NEW DELHI

Union Home Minister Amit Shah on Monday said two models of an electronic surveillance system capable of detecting infiltrators and tunnels were being tested along the Jammu border.

The technology is likely to be deployed along the entire Pakistan border in four years, the Minister said during an interaction with Border Security Force (BSF) personnel at Kathua in Jammu.

He said terrorism in Jammu and Kashmir had been curbed but not “completely eliminated”.

Mr. Shah visited the BSF outpost ‘Vinay’ in Kathua, around 30 km from the forested area where a group of freshly infiltrated terro-



Amit Shah during a visit to a forward post of the BSF along the India-Pakistan border in Kathua district on Monday. PTI

rists killed four policemen on March 27. Two terrorists were killed in the encounter, while at least three are absconding as search operation continues.

Since 2021, more than 30 terrorist-related incidents have been reported from the Jammu region. Mr. Shah met the families

of policemen killed by militants and handed over appointment letters to nine nominees on compassionate grounds.

“After the installation of the technology, soldiers will find it much easier to receive information and respond immediately to any actions by the enemy.

Several experiments have been conducted to identify infiltration and to detect and destroy tunnels, using technology. Soon the security forces deployed on the Pakistan and Bangladesh border will be fully equipped with technical assistance. The Modi government has no shortage of budget in the three areas of ensuring minimal casualties, reducing hardships through facilities, and supporting vigilance with technology,” Mr. Shah said.

“Over 26 initiatives related to technology are currently being tested, including anti-drone technology, tunnel identification technology, and electronic surveillance. Some results from these tests could be achieved by next March,” he said.

Electronic surveillance system will cover entire Pak. border, says Shah

शाह ने कहा: संपूर्ण पाक सीमा पर लगेगा इलेक्ट्रॉनिक निगरानी तंत्र

Union Home Minister Amit Shah on Monday said two models of an electronic surveillance system capable of detecting infiltrators and tunnels were being tested along the Jammu border.

गृहमंत्री अमित शाह ने सोमवार को कहा कि घुसपैठियों और सुरंगों का पता लगाने में



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सक्षम इलेक्ट्रॉनिक निगरानी प्रणाली के दो मॉडलों का जम्मू सीमा पर परीक्षण किया जा रहा है।

- The technology is likely to be **deployed** along the **entire Pakistan border** in **four years**, the Minister said during an interaction with **BSF personnel** at **Kathua** in **Jammu**.
- मंत्री ने कहा कि यह तकनीक चार वर्षों में पूरी पाकिस्तान सीमा पर तैनात की जा सकती है, उन्होंने यह बात जम्मू के कठुआ में बीएसएफ जवानों से बातचीत के दौरान कही।
- He said **terrorism** in **Jammu and Kashmir** had been **curbed** but not “completely eliminated”.
- उन्होंने कहा कि जम्मू-कश्मीर में आतंकवाद को काबू में किया गया है लेकिन यह “पूरी तरह समाप्त नहीं हुआ” है।
- Mr. Shah visited the **BSF outpost ‘Vinay’** in **Kathua**, around **30 km** from the forested area where a group of freshly infiltrated **terrorists killed four policemen** on **March 27**.
- श्री शाह ने कठुआ में बीएसएफ की ‘विनय’ पोस्ट का दौरा किया, जो उस जंगल क्षेत्र से लगभग **30 किमी** दूर है जहाँ **27 मार्च** को हाल ही में घुसे आतंकवादियों ने चार पुलिसकर्मियों की हत्या कर दी थी।
- **Two terrorists** were killed in the encounter, while at least **three are absconding** as search operation continues.
- मुठभेड़ में दो आतंकवादी मारे गए, जबकि तीन अभी फरार हैं और तलाशी अभियान जारी है।
- Since **2021**, more than **30 terrorist-related incidents** have been reported from the **Jammu region**.
- **2021** से, जम्मू क्षेत्र में **30 से अधिक आतंकवाद से जुड़े घटनाओं** की सूचना मिली है।
- Mr. Shah met the **families of policemen killed** by militants and handed over **appointment letters** to **nine nominees** on **compassionate grounds**.
- श्री शाह ने आतंकियों द्वारा मारे गए पुलिसकर्मियों के परिवारों से मुलाकात की और नौ नामित लोगों को संवेदनशील आधार पर नियुक्ति पत्र सौंपे।
- “After the installation of the technology, **soldiers** will find it much easier to receive information and respond immediately to any actions by the enemy.
- “तकनीक के लगने के बाद, सैनिकों के लिए जानकारी प्राप्त करना और दुश्मन की किसी भी कार्रवाई पर तुरंत प्रतिक्रिया देना और भी आसान हो जाएगा।
- Several experiments have been conducted to **identify infiltration** and to **detect and destroy tunnels**, using technology.
- तकनीक का उपयोग कर घुसपैठ की पहचान और सुरंगों का पता लगाकर उन्हें नष्ट करने के लिए कई प्रयोग किए गए हैं।

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- Soon the **security forces** deployed on the **Pakistan and Bangladesh border** will be fully equipped with **technical assistance**.
- जल्द ही पाकिस्तान और बांग्लादेश सीमा पर तैनात सुरक्षा बलों को तकनीकी सहायता से पूरी तरह लैस कर दिया जाएगा।
- The **Modi government** has no shortage of **budget** in the three areas of ensuring **minimal casualties**, reducing **hardships through facilities**, and supporting **vigilance with technology**,” Mr. Shah said.
- श्री शाह ने कहा कि मोदी सरकार के पास कम से कम जान-माल के नुकसान, सुविधाओं के माध्यम से कठिनाइयों को कम करने, और तकनीक से निगरानी को मजबूत करने के लिए बजट की कोई कमी नहीं है।
- “Over **26 initiatives** related to **technology** are currently being tested, including **anti-drone technology**, **tunnel identification technology**, and **electronic surveillance**.
- “तकनीक से जुड़े 26 से अधिक प्रयोग वर्तमान में परीक्षण के दौर में हैं, जिनमें एंटी-ड्रोन तकनीक, सुरंग पहचान तकनीक और इलेक्ट्रॉनिक निगरानी प्रणाली शामिल हैं।
- Some **results** from these tests could be achieved by **next March**,” he said.
- उन्होंने कहा कि इन परीक्षणों के कुछ परिणाम अगले मार्च तक सामने आ सकते हैं।

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It's clear now: iron inside the sun is more opaque than expected

Researchers found that the temperature of the sun is determined to a great degree by the opacity of minerals within it and the computer models that were used to estimate and calculate various facts about the star were not quite accurate, and modelling parameters probably needed a relook

GS Paper III: S&T

Vasudevan Mukunth

The world is full of mysteries but not all of them are grand. Sure, we don't know what the mind really is or what the inside of a black hole looks like. But there are also many mysteries hiding in the little details. For example, we don't know why iron inside the sun is so opaque.

Solid iron objects are everywhere around us. They're used to make doorknobs, cooking utensils, furniture, water tanks – all sorts of things. And they're all opaque. When light hits an iron object, it can't pass through. Instead, some of it is absorbed and some of it is scattered. How much light an object absorbs is called its opacity: the more it absorbs, the more opaque it is.

Iron's opacity isn't an important detail when making a doorknob. But when we're talking about the sun, the implications are practically cosmic.

The universe's engines

The sun is the star closest to the earth and thus the one humans have studied the most. A lot of what we know, or think we know, about different kinds of stars comes from studying the sun.

This is true on two levels. First: scientists have developed various theories to explain the sun's properties. Over many decades, they pointed telescopes, detectors, and antennae at emissions from the star to capture electromagnetic radiation, charged particles, heat, etc. and compare the data with each theory. Then they eliminated theories that disagreed with the data and refined those that did.

On the second level, the sun is just one kind of star; the universe has many kinds. To understand their properties, scientists used the theories to build models that "simulate" them. These properties include the generation of heat and energy and their movement through the star, the star's magnetic field, its rotation and quakes on its surface, the evolution of the stellar atmosphere, the formation of sunspots and flares, and the effects of these changes on near-star space.

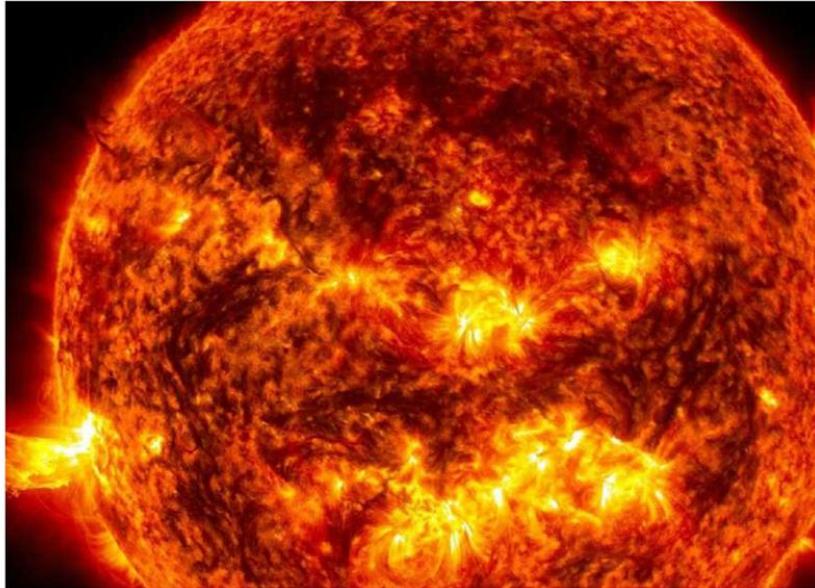
Stars are the universe's engines: we can't understand the universe if we don't understand how stars work. When stars form, they allow planets to form around them, which they subsequently supply with light, heat, and a protective magnetic shield. (Sometimes they supply too much or too little: scientists have found more than a few exoplanets fried by their host stars or turned into giant ice balls.)

Their mass deflects asteroids and comets, and their flares energise nearby gas clouds and increase the formation of other stars. When a star dies, depending on its manner of death, it releases copious amounts of metals and other elements into the universe that aren't made in any other natural process.

This variety of effects means stars' properties affect the formation of star clusters, galaxies, the universe's structure, and its evolution. Scientific models can thus simulate all these things if they get the stars' properties right, and herein lies the rub.

Up to 400% higher

Several independent studies until the



This image from June 20, 2013, shows the bright light of a solar flare on the left side of the sun and an eruption of solar material shooting through the sun's atmosphere, called a prominence eruption. Shortly thereafter, this same region of the sun sent a coronal mass ejection out into space. NASA/GODDARD/SDO

mid-2010s reported that there appeared to be 30-50% less carbon, oxygen, and nitrogen in the sun than what models predicted.

These models aren't easy to tweak with new data. They have been able to successfully predict some things, like the sun's current brightness and how many neutrinos nuclear fusion in the sun's core produces every second. The models have also become so complicated they can run only on the most powerful supercomputers. When faced with the discrepancy, modellers suspected they were due to problems in the way the elements' abundances were measured. If the measurements are improved, the discrepancy might go away, they said.

But a notable study published in 2015 disagreed: its authors wrote that the discrepancy "could be resolved if the true mean opacity for the solar interior matter were roughly 15% higher than predicted."

How much energy an element absorbs inside the star affects the star's temperature profile. The authors were thus suggesting the models' data about the opacity of elements inside the sun were off. To buttress their argument, they subjected a plasma containing iron to conditions expected at the star's radiation/convection zone boundary, a layer about 30% of the way from the surface to its centre. They reported that depending on the frequency of radiation striking it, iron's opacity was found to be 30-400% higher than predicted.

Dark of the shadow

Subsequent studies upheld the crux of these findings: that models were underestimating iron's opacity. In a study published on January 27 this year, scientists reported "opacity profiles" of



We find that our seismic opacity is about 10% higher than theoretical values used in current solar models by around 2 million degrees, but lower by 35% than some recent available theoretical values

various elements derived from helioseismic inferences, i.e. based on the propagation of sound within the sun. They wrote: "We find that our seismic opacity is about 10% higher than theoretical values used in current solar models by around 2 million degrees, but lower by 35% than some recent available theoretical values." But researchers who banked on models – which were based on their theories – still had to be sure if uncertainties in the measurements of the time-varying properties of the plasma in these studies could explain the discrepancy.

In a study published on March 3 in *Physical Review Letters*, researchers from the US and France reported they had put this question to the test and concluded the problem was indeed in the theory, not in the observed data.

At Sandia National Laboratories in the US, the team exposed a thin sample of iron to X-rays and pointed spectrometers at the X-ray source. The spectrometers observed the X-ray shadow cast by the iron sample. The team also linked up the spectrometers to ultrafast X-ray cameras that recorded changes in temperature and particle density more than one billion times per second.

The team wrote in its paper, "Our new measurements use a novel technology to

measure opacity sample evolution ... These measurements quantify the impact of temporal gradients on published film-integrated data and contradict the hypothesis that the temporal evolution might explain the published model-data discrepancy."

'Many more requirements'

The study's challenges weren't trivial. Measuring opacity in sun-like conditions requires technologies that didn't exist until recently. To mimic the conditions in the sun, the electrons in a plasma need to be energised to at least 180 eV while their density exceeds 30,000 billion billion particles per millilitre. The energy came from the X-ray source at Sandia.

The thin iron sample also contained a small amount of magnesium as a tracer. The magnesium's interaction with the X-rays, as observed at the spectrometer, allowed the team to calculate the electrons' energy and density.

The team inferred iron's opacity to the X-rays based on how strongly it absorbed the radiation. The more strongly it did, the darker the shadow it would cast in the spectrometer readings. This "darkness" is called the line optical depth.

The paper added, "The ultimate approach to resolving the model-data discrepancy entails measuring iron opacity as a function of time. However, that must satisfy many more requirements, including absolute transmission measurements, rather than line optical depth reported here, and formal uncertainty determination, while measuring plasma conditions."

"Such an absolute opacity approach is presently under investigation," the team added.

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It's clear now: iron inside the sun is more opaque than expected

यह अब स्पष्ट है: सूर्य के अंदर मौजूद लोहा अपेक्षा से अधिक अपारदर्शी है

Researchers found that the temperature of the sun is determined to a great degree by the opacity of minerals within it and the computer models that were used to estimate and calculate various facts about the star were not quite accurate, and modelling parameters probably needed a relook.

शोधकर्ताओं ने पाया कि सूर्य का तापमान काफी हद तक उसके अंदर मौजूद खनिजों की अपारदर्शिता पर निर्भर करता है और जिन कंप्यूटर मॉडलों का उपयोग तारे के विभिन्न तथ्यों को अनुमानित और गणना करने के लिए किया गया था, वे पूरी तरह से सटीक नहीं थे और मॉडलिंग मापदंडों की पुनः समीक्षा की आवश्यकता हो सकती है।

The world is full of mysteries, big and small दुनिया रहस्यों से भरी हुई है, बड़े और छोटे दोनों

- The world is full of mysteries but not all of them are grand.
- दुनिया रहस्यों से भरी हुई है लेकिन उनमें से सभी महान नहीं होते।
- Sure, we don't know what the **mind** really is or what the inside of a **black hole** looks like.
- निश्चित रूप से, हमें नहीं पता कि वास्तव में **मन** क्या है या किसी **ब्लैक होल** के अंदर कैसा दिखता है।
- But there are also many mysteries hiding in the little details.
- लेकिन बहुत से रहस्य छोटे-छोटे विवरणों में भी छिपे होते हैं।
- For example, we don't know why **iron inside the sun** is so **opaque**.
- उदाहरण के लिए, हमें नहीं पता कि **सूर्य के अंदर मौजूद लोहा** इतना **अपारदर्शी** क्यों है।

Iron and opacity

लोहा और अपारदर्शिता

- Solid **iron objects** are everywhere around us.
- हमारे चारों ओर ठोस लोहे की वस्तुएं हर जगह मौजूद हैं।



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• They're used to make **doorknobs, cooking utensils, furniture, water tanks** — all sorts of things.

• इनका उपयोग दरवाज़ों के हैंडल, रसोई के बर्तन, फर्नीचर, पानी की टंकियों और अन्य वस्तुओं को बनाने में होता है।

• And they're all **opaque**.

• और ये सभी अपारदर्शी होते हैं।

• When **light** hits an iron object, it can't pass through.

• जब प्रकाश लोहे की वस्तु पर पड़ता है, तो वह आर-पार नहीं जा सकता।

• Instead, some of it is **absorbed** and some of it is **scattered**.

• इसके बजाय कुछ अवशोषित हो जाता है और कुछ बिखर जाता है।

• How much light an object absorbs is called its **opacity**: the more it absorbs, the more opaque it is.

• कोई वस्तु कितनी रोशनी अवशोषित करती है उसे उसकी अपारदर्शिता कहते हैं: जितना अधिक अवशोषण, उतनी अधिक अपारदर्शिता।

The sun and cosmic implications

सूर्य और ब्रह्मांडीय प्रभाव

• Iron's opacity isn't an important detail when making a doorknob.

• जब हम दरवाज़े का हैंडल बनाते हैं तब लोहे की अपारदर्शिता कोई खास मुद्दा नहीं होती।

• But when we're talking about the **sun**, the implications are practically **cosmic**.

• लेकिन जब बात सूर्य की हो, तो इसके प्रभाव ब्रह्मांडीय स्तर के होते हैं।

The universe's engines: Stars

ब्रह्मांड के इंजन: तारे

• The **sun** is the star closest to the **earth** and thus the one humans have studied the most.

• सूर्य पृथ्वी के सबसे निकट स्थित तारा है और इसलिए मनुष्यों ने इसे सबसे अधिक अध्ययन किया है।

• A lot of what we know, or think we know, about different kinds of **stars** comes from studying the **sun**.

• अलग-अलग प्रकार के सितारों के बारे में जो कुछ भी हम जानते हैं या सोचते हैं, वह सूर्य के अध्ययन से आता है।

• Scientists have developed various **theories** to explain the **sun's properties**.

• वैज्ञानिकों ने सूर्य की विशेषताओं को समझाने के लिए विभिन्न सिद्धांतों का विकास किया है।

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- Over many decades, they used **telescopes, detectors, and antennae** to study the sun's **emissions**.
- कई दशकों तक उन्होंने **दूरबीनों, डिटेक्टरों और एंटेना** का उपयोग करके सूर्य के **उत्सर्जनों** का अध्ययन किया।
- Then they **eliminated theories** that disagreed with the data and **refined** those that did.
- इसके बाद उन्होंने उन **सिद्धांतों को हटा दिया** जो आंकड़ों से मेल नहीं खाते थे और शेष को **परिष्कृत** किया।
- Scientists used these theories to build **models** that simulate different **types of stars**.
- वैज्ञानिकों ने इन सिद्धांतों का उपयोग विभिन्न **प्रकार के सितारों** का अनुकरण करने वाले **मॉडल** बनाने में किया।
- These models simulate things like **heat and energy generation, magnetic fields, sunspots, and stellar evolution**.
- ये मॉडल **ऊष्मा और ऊर्जा का निर्माण, चुंबकीय क्षेत्र, सूर्य धब्बे, और तारकीय विकास** जैसी चीजों का अनुकरण करते हैं।
- **Stars** affect the formation of **planets, galaxies, and even the universe's structure**.
- तारे, ग्रहों, गैलेक्टिक संरचनाओं, और यहां तक कि **ब्रह्मांड की संरचना** के निर्माण को प्रभावित करते हैं।

Opacity discrepancy and its discovery

अपारदर्शिता का अंतर और इसकी खोज

- Several **independent studies** until the **mid-2010s** reported that there appeared to be **30–50% less carbon, oxygen, and nitrogen** in the sun than what **models** predicted.
- **2010 के मध्य तक कई स्वतंत्र अध्ययनों** ने बताया कि सूर्य में **30–50% कम कार्बन, ऑक्सीजन और नाइट्रोजन** था जितना कि **मॉडलों** ने अनुमान लगाया था।
- These models can predict things like the sun's **brightness and neutrino production**, but they are **very complex** and run only on **supercomputers**.
- ये मॉडल **सूर्य की चमक और न्यूट्रिनो उत्पादन** जैसी चीजों का अनुमान लगा सकते हैं, लेकिन ये **बहुत जटिल** होते हैं और केवल **सुपरकंप्यूटरों** पर ही चलते हैं।
- When faced with the discrepancy, **modellers** suspected it was due to problems in the **element abundance measurements**.
- जब इस अंतर का सामना हुआ, तो **मॉडल बनाने वाले वैज्ञानिकों** ने संदेह जताया कि यह **तत्वों की मात्रा मापन** में हुई गलतियों के कारण हो सकता है।

Breakthrough in 2015 study

2015 के अध्ययन में महत्वपूर्ण खोज

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- A notable study published in 2015 disagreed and said the discrepancy could be resolved if the true mean opacity was 15% higher than predicted.
- 2015 में प्रकाशित एक महत्वपूर्ण अध्ययन ने असहमति जताई और कहा कि यह अंतर तभी हल हो सकता है जब वास्तविक औसत अपारदर्शिता अनुमान से 15% अधिक हो।
- The amount of energy absorbed by an element affects the star's temperature profile.
- किसी तत्व द्वारा अवशोषित ऊर्जा की मात्रा तारे के तापमान प्रोफाइल को प्रभावित करती है।
- The authors tested plasma with iron under conditions like the sun's radiation/convection zone boundary (about 30% from the surface to centre).
- लेखकों ने सूर्य के विकिरण/संवहन क्षेत्र की सीमा (जो सतह से केंद्र तक का लगभग 30% है) जैसी परिस्थितियों में लोहे वाला प्लाज्मा परीक्षण में लिया।
- They found that iron's opacity was 30–400% higher than predicted, depending on the radiation frequency.
- उन्होंने पाया कि लोहे की अपारदर्शिता अनुमान से 30–400% अधिक थी, जो विकिरण की आवृत्ति पर निर्भर करती थी।

Dark of the shadow

छाया की गहराई

- Subsequent studies upheld the crux of these findings: that models were underestimating iron's opacity.
- बाद के अध्ययनों ने इन निष्कर्षों की मूल बात को सही ठहराया: कि मॉडल लौह (iron) की अपारदर्शिता को कम आँक रहे थे।
- In a study published on January 27 this year, scientists reported "opacity profiles" of various elements derived from helioseismic inferences, i.e. based on the propagation of sound within the sun.
- 27 जनवरी इस वर्ष प्रकाशित एक अध्ययन में, वैज्ञानिकों ने विभिन्न तत्वों की "अपारदर्शिता प्रोफाइल" रिपोर्ट की, जो सौर-भूकंपीय व्युत्पत्तियों पर आधारित थीं, यानी सूर्य के भीतर ध्वनि के प्रसार पर।
- They wrote: "We find that our seismic opacity is about 10% higher than theoretical values used in current solar models by around 2 million degrees, but lower by 35% than some recent available theoretical values."
- उन्होंने लिखा: "हमने पाया कि हमारी भूकंपीय अपारदर्शिता वर्तमान सौर मॉडलों में प्रयुक्त सैद्धांतिक मूल्यों से लगभग 10% अधिक है, जो कि लगभग 20 लाख डिग्री तक है, लेकिन कुछ हालिया सैद्धांतिक मूल्यों से 35% कम है।"
- But researchers who banked on models — which were based on their theories — still had to be sure if uncertainties in the measurements of the time-varying properties of the plasma in



these studies could explain the discrepancy.

लेकिन जो शोधकर्ता मॉडल पर निर्भर थे — जो उनके सिद्धांतों पर आधारित थे — उन्हें अब भी यह सुनिश्चित करना था कि क्या इन अध्ययनों में प्लाज़्मा की समय-परिवर्ती विशेषताओं के मापन में अनिश्चितताएँ इस विसंगति की व्याख्या कर सकती थीं।

• In a study published on **March 3** in *Physical Review Letters*, researchers from the **US and France** reported they had put this question to the test and concluded the problem was indeed in the **theory**, not in the **observed data**.

3 मार्च को *Physical Review Letters* में प्रकाशित एक अध्ययन में, **अमेरिका और फ्रांस** के शोधकर्ताओं ने बताया कि उन्होंने इस प्रश्न की जांच की और निष्कर्ष निकाला कि समस्या वास्तव में **सिद्धांत** में थी, न कि **अवलोकित आंकड़ों** में।

• At **Sandia National Laboratories** in the US, the team exposed a thin sample of iron to **X-rays** and pointed **spectrometers** at the X-ray source.

अमेरिका के Sandia National Laboratories में टीम ने एक पतले लौह नमूने को **एक्स-रे** के संपर्क में लाया और **स्पेक्ट्रोमीटर** को **एक्स-रे** स्रोत की ओर निर्देशित किया।

• The spectrometers observed the **X-ray shadow** cast by the iron sample.

स्पेक्ट्रोमीटर ने लौह नमूने द्वारा डाली गई **एक्स-रे छाया** को देखा।

• The team also linked up the spectrometers to **ultrafast X-ray cameras** that recorded changes in **temperature** and **particle density** more than **one billion times per second**.

टीम ने स्पेक्ट्रोमीटर को **अल्ट्राफास्ट एक्स-रे कैमरों** से भी जोड़ा, जिन्होंने **तापमान** और **कण घनत्व** में होने वाले परिवर्तनों को प्रति सेकंड **एक अरब से अधिक बार** दर्ज किया।

• The team wrote in its paper, “Our new measurements use a **novel technology** to measure **opacity sample evolution** ... These measurements quantify the impact of **temporal gradients** on published **film-integrated data** and contradict the hypothesis that the **temporal evolution** might explain the published model-data discrepancy.”

टीम ने अपने पेपर में लिखा, “हमारे नए मापन **अपारदर्शिता नमूना विकास** को मापने के लिए **नई तकनीक** का उपयोग करते हैं... ये मापन प्रकाशित **फ़िल्म-एकीकृत डेटा** पर **कालिक ढालों** के प्रभाव को मापते हैं और इस परिकल्पना का खंडन करते हैं कि **कालिक विकास** मॉडल और डेटा के बीच प्रकाशित विसंगति की व्याख्या कर सकता है।”

‘Many more requirements’

‘कई और आवश्यकताएँ’

• The study’s challenges weren’t trivial.

इस अध्ययन की चुनौतियाँ मामूली नहीं थीं।



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• Measuring **opacity** in **sun-like conditions** requires technologies that didn't exist until recently.
सूर्य जैसे परिस्थितियों में अपारदर्शिता को मापने के लिए ऐसी तकनीकों की आवश्यकता होती है जो हाल तक अस्तित्व में नहीं थीं।

• To mimic the conditions in the sun, the electrons in a plasma need to be energised to at least **180 eV** while their **density exceeds 30,000 billion billion particles per millilitre**.

सूर्य की स्थितियों की नकल करने के लिए, प्लाज़्मा में इलेक्ट्रॉनों को कम से कम **180 eV** तक ऊर्जा देनी होती है और उनकी **घनता प्रति मिलीलीटर में 30,000 अरब अरब कणों से अधिक** होनी चाहिए।

• The energy came from the **X-ray source** at **Sandia**.

यह ऊर्जा **Sandia** में **एक्स-रे स्रोत** से प्राप्त की गई।

• The thin iron sample also contained a small amount of **magnesium** as a tracer.

इस पतले लौह नमूने में **मैग्नीशियम** की थोड़ी मात्रा एक ट्रेसर के रूप में भी मौजूद थी।

• The magnesium's interaction with the X-rays, as observed at the **spectrometer**, allowed the team to calculate the **electrons' energy and density**.

स्पेक्ट्रोमीटर में देखे गए **मैग्नीशियम और एक्स-रे के इंटरैक्शन** ने टीम को **इलेक्ट्रॉनों की ऊर्जा और घनता** की गणना करने की अनुमति दी।

• The team inferred iron's opacity to the X-rays based on how strongly it absorbed the radiation.
टीम ने यह निष्कर्ष निकाला कि लौह की **एक्स-रे के प्रति अपारदर्शिता** कितनी अधिक है, यह इस पर निर्भर करता है कि उसने विकिरण को कितनी ताकत से अवशोषित किया।

• The more strongly it did, the darker the **shadow** it would cast in the **spectrometer readings**.
जितनी अधिक ताकत से यह अवशोषण होता, उतनी ही **गहरी छाया स्पेक्ट्रोमीटर रीडिंग्स** में दिखती।

• This "darkness" is called the **line optical depth**.

इस "अंधकार" को **लाइन ऑप्टिकल डेप्थ** कहा जाता है।

• The paper added, "The ultimate approach to resolving the model-data discrepancy entails measuring **iron opacity as a function of time**. However, that must satisfy **many more requirements**, including **absolute transmission measurements**, rather than line optical depth reported here, and **formal uncertainty determination**, while measuring **plasma conditions**."

पेपर में जोड़ा गया, "**मॉडल-डेटा विसंगति** को हल करने का अंतिम तरीका **समय के अनुसार लौह अपारदर्शिता** को मापना है। हालांकि, इसके लिए **कई और आवश्यकताओं** को पूरा करना होगा, जैसे कि **पूर्ण ट्रांसमिशन मापन**, न कि यहां बताई गई **लाइन ऑप्टिकल डेप्थ**, और साथ ही **औपचारिक अनिश्चितता निर्धारण** भी, जब **प्लाज़्मा की स्थितियाँ** मापी जा रही हों।"

• "Such an **absolute opacity** approach is presently under investigation," the team added.

टीम ने जोड़ा, "ऐसी **पूर्ण अपारदर्शिता** पद्धति वर्तमान में जांच के अधीन है।"



Shaping a future-ready workforce

GS Paper III: Employment and Skill

The World Economic Forum's Future of Jobs Report 2025 and QS's World Future Skills Index contain critical insights into the state of India's workforce and its preparedness for the future. They offer a roadmap for the government and universities to address the pressing challenges and opportunities in shaping a future-ready workforce. Their findings accentuate the urgency of aligning educational strategies with the rapidly evolving demands of the global economy.

The findings

The Future of Jobs Report highlights the significant forces driving global labour market changes by 2030. Among these, technological advancements, demographic shifts, geo-economic fragmentation, economic uncertainties, and the green transition stand out. Technological change and digital access are anticipated to play a crucial role, with 60% of employers identifying them as major drivers. At the same time, 50% of employers expect economic factors, such as job displacement, to reshape industries. Climate change mitigation is seen as a dual force, both creating jobs in renewable energy and environmental fields and requiring adaptations to business models due to geopolitical tensions. These trends point to a dynamic labour market characterised by job creation (170 million new jobs are projected) and job displacement (92 million roles could become obsolete).

In response to these shifts, employers have prioritised workforce training, wage increases, and employee well-being. Notably, 59 out of every 100 workers will require training in crucial skills such as analytical thinking, resilience, and technological literacy. Emerging roles such as Big Data specialists and AI engineers are expected to see substantial growth, highlighting the need for a workforce equipped with



P. John J. Kennedy

Former Professor and Dean, Christ University, Bengaluru

The findings of the World Economic Forum's Future of Jobs Report 2025 and the QS's World Future Skills Index underline the urgency of aligning educational strategies with the evolving demands of the global economy

advanced technical and cognitive skills. The emphasis on upskilling indicates that educational institutions must proactively prepare students for a competitive job market. Equally important is the integration of soft skills, such as emotional intelligence, adaptability, and leadership, into professional development programmes. Employers are increasingly valuing these attributes as critical for navigating dynamic work environments.

The QS World Future Skills Index complements these findings. Ranking second globally in terms of preparedness for AI and green skills, India demonstrates considerable potential. However, the report reveals stark gaps in workforce skills, particularly on supply-side indicators. While India excels in its ability to identify and recruit for future-focused skills, as evidenced by its 99.1 score in the 'Future of Work' parameter, its performance in 'Skills Fit' – the ability of the workforce to meet these demands – lags significantly, with the country scoring just 59.1. The report also identifies deficiencies in fostering entrepreneurial and innovative mindsets, with India's overall ranking in 'Academic Readiness' placing it at a modest 26th position. Further, India's performance in future-oriented innovation and sustainability is alarmingly low, a mere 15.6 out of 100. Additionally, India's limited investment in research and development further worsens the issue, hindering its ability to compete globally in areas such as renewable energy technologies and climate-friendly innovations.

An opportunity

The findings emphasise a transformative opportunity for India to align its education system with global trends and workforce demands. To bridge the skill gaps identified, educational institutions and governments must adopt a multi-pronged approach that addresses curriculum innovation, faculty capacity, infrastructure,

and equitable access while fostering robust collaboration among academia, industry, and policymakers. The emphasis on creativity, critical thinking, resilience, problem-solving, and entrepreneurial skills must become central to higher education. Universities must embed these competencies into the curriculum through interdisciplinary courses, experiential learning modules, and problem-based learning approaches. Initiatives such as hackathons, startup incubators, and design-thinking workshops should become integral to the academic framework to nurture innovation and adaptability.

A green curriculum is imperative. Institutions could establish specialised centres for sustainability research, offer courses on green technologies and practices, and encourage student-led community initiatives that address local environmental issues. Collaboration with the private sector is critical for bridging the education-industry gap. Higher education institutions need to form robust partnerships with industries to co-create curricula, offer internships, and ensure that students graduate with job-ready skills. Industry players can contribute by funding skill development centres, mentoring students, and providing real-time insights into market needs.

Faculty development is another area for reform. Universities must implement comprehensive training programmes that include workshops, certifications, and global exchange opportunities.

The government must spearhead systemic reforms by increasing skill development, research, and innovation investments. A specific focus on building digital infrastructure in rural and semi-urban areas will reduce the urban-rural divide.

India's higher education system must undergo a paradigm shift to remain agile and future-focused, while the government must foster an enabling policy environment.



Shaping a Future-Ready Workforce

भविष्य के लिए तैयार कार्यबल का निर्माण

- The *World Economic Forum's Future of Jobs Report 2025* and *QS's World Future Skills Index* contain critical insights into the state of **India's workforce** and its preparedness for the **future**.

वर्ल्ड इकोनॉमिक फोरम की फ्यूचर ऑफ जॉब्स रिपोर्ट 2025 और QS वर्ल्ड फ्यूचर स्किल्स इंडेक्स भारत की कार्यबल की स्थिति और भविष्य की तैयारी पर महत्वपूर्ण जानकारी देती हैं।

- They offer a **roadmap** for the **government** and **universities** to address pressing **challenges and opportunities**.
ये सरकार और विश्वविद्यालयों को चुनौतियों और अवसरों से निपटने के लिए दिशा-निर्देश देती हैं।
- Findings stress the **urgency** of aligning **education strategies** with **global economy demands**.
निष्कर्ष यह दर्शाते हैं कि शिक्षा रणनीतियों को वैश्विक अर्थव्यवस्था की मांगों के अनुसार ढालना अब अत्यंत आवश्यक है।

The Findings

रिपोर्ट के निष्कर्ष

- The report identifies **five key forces** reshaping the labour market by **2030**:
रिपोर्ट के अनुसार **2030** तक श्रम बाजार को बदलने वाले **5 प्रमुख कारक** हैं:
 - **Technological advancements**
प्रौद्योगिकी में उन्नति
 - **Demographic shifts**
जनसांख्यिकीय बदलाव
 - **Geo-economic fragmentation**
भौगोलिक-आर्थिक विघटन
 - **Economic uncertainties**
आर्थिक अनिश्चितताएं
 - **Green transition**
हरित संक्रमण
- **60% of employers** cite **technological change and digital access** as key job market drivers.
60% नियोक्ता तकनीकी बदलाव और डिजिटल पहुंच को मुख्य कारण मानते हैं।



- 50% expect **economic factors** like **job displacement** to reshape industries.
50% नियोक्ताओं को लगता है कि आर्थिक कारक जैसे कि नौकरी का स्थानांतरण उद्योगों को बदल देंगे।
- **Climate change mitigation** will both **create jobs** in **renewable energy** and **demand business adaptations**.
जलवायु परिवर्तन को कम करने से एक ओर नवीकरणीय ऊर्जा में नई नौकरियां बनेंगी, वहीं दूसरी ओर व्यापारिक बदलाव भी जरूरी होंगे।
- The labour market is expected to see **170 million new jobs** and **92 million jobs displaced**.
अनुमान है कि 170 मिलियन नई नौकरियां बनेंगी और 92 मिलियन नौकरियां समाप्त हो जाएंगी।

Skills and Training Priorities

कौशल और प्रशिक्षण की प्राथमिकताएं

- Focus areas for employers include:
नियोक्ताओं के प्रमुख क्षेत्र हैं:
- **Workforce training**
कार्यबल प्रशिक्षण
- **Wage increases**
वेतन वृद्धि
- **Employee well-being**
कर्मचारी कल्याण
- **59 out of 100 workers** will need training in **analytical thinking, resilience, and tech literacy**.
हर 100 में से 59 कर्मचारी को विश्लेषणात्मक सोच, लचीलापन, और तकनीकी साक्षरता में प्रशिक्षण की आवश्यकता होगी।
- Roles like **Big Data specialists** and **AI engineers** will see **substantial growth**.
बिग डेटा विशेषज्ञ और एआई इंजीनियर जैसी नौकरियों में तेज़ी से वृद्धि होगी।
- Institutions must equip students with **technical, cognitive, and soft skills** like:
संस्थानों को छात्रों को तकनीकी, संज्ञानात्मक और सॉफ्ट स्किल्स से लैस करना चाहिए जैसे:
- **Emotional intelligence**
भावनात्मक बुद्धिमत्ता
- **Adaptability**
अनुकूलता
- **Leadership**
नेतृत्व क्षमता



QS World Future Skills Index

QS वर्ल्ड फ्यूचर स्किल्स इंडेक्स

- India ranks **2nd globally in AI and green skills preparedness**.
भारत AI और ग्रीन स्किल्स की तैयारी में वैश्विक रूप से दूसरे स्थान पर है।
- However, there are **significant skill gaps**, especially in **supply-side indicators**.
लेकिन कौशल में भारी अंतर हैं, खासकर आपूर्ति पक्ष संकेतकों में।
- India scored **99.1** in 'Future of Work' but only **59.1** in 'Skills Fit'.
भारत ने 'फ्यूचर ऑफ वर्क' में 99.1 अंक पाए, पर 'स्किल्स फिट' में सिर्फ 59.1।
- India ranks only **26th** in 'Academic Readiness'.
भारत 'शैक्षणिक तैयारी' में केवल 26वें स्थान पर है।
- In 'Innovation and Sustainability', the score is a poor **15.6/100**.
'नवाचार और स्थिरता' में स्कोर केवल 15.6/100 है।
- **Limited R&D investment hinders global competitiveness**.
R&D में सीमित निवेश भारत की वैश्विक प्रतिस्पर्धा को प्रभावित करता है।

An Opportunity

एक अवसर

- India must align **education systems** with **global workforce trends**.
भारत को शिक्षा प्रणाली को वैश्विक कार्यबल प्रवृत्तियों के साथ जोड़ना होगा।
- Adopt a **multi-pronged approach** focusing on:
एक बहु-आयामी रणनीति अपनानी होगी जिसमें ध्यान दिया जाए:
- **Curriculum innovation**
पाठ्यक्रम नवाचार
- **Faculty capacity building**
शिक्षकों की क्षमता निर्माण
- **Infrastructure and equitable access**
सुविधा और समान पहुंच
- Emphasise skills like **creativity, critical thinking, problem-solving, and entrepreneurship**.
रचनात्मकता, समालोचनात्मक सोच, समस्या समाधान, और उद्यमिता पर जोर देना जरूरी है।
- Include activities like:
इन गतिविधियों को शामिल करें:
- **Hackathons**
हैकाथॉन
- **Startup incubators**
स्टार्टअप इनक्यूबेटर



- **Design-thinking workshops**
डिजाइन-थिंकिंग वर्कशॉप्स
- Develop a **green curriculum**, sustainability courses, and **student-led local projects**.
एक हरित पाठ्यक्रम, स्थिरता आधारित कोर्स, और छात्र-नेतृत्व वाले स्थानीय प्रोजेक्ट्स विकसित करें।
- Build strong **industry-academia collaboration** to ensure **job-ready graduates**.
मजबूत उद्योग-शिक्षा साझेदारी से रोजगार के लिए तैयार स्नातक सुनिश्चित करें।
- Improve **faculty training** with **workshops**, **certifications**, and **global exchanges**.
फैकल्टी ट्रेनिंग को वर्कशॉप, प्रमाणपत्र, और वैश्विक आदान-प्रदान से बेहतर बनाएं।
- The **government** must:
सरकार को:
 - Increase **investment** in **skills**, **R&D**, and **innovation**.
कौशल, अनुसंधान और नवाचार में निवेश बढ़ाना चाहिए।
 - Strengthen **digital infrastructure** in **rural and semi-urban areas**.
ग्रामीण और अर्ध-शहरी क्षेत्रों में डिजिटल बुनियादी ढांचे को मजबूत करना चाहिए।
 - India's higher education needs a **paradigm shift** to stay **future-ready**.
भारत की उच्च शिक्षा प्रणाली को भविष्य के लिए तैयार रहने हेतु दृष्टिकोण में बड़ा बदलाव करना होगा।
 - The government must ensure a **supportive policy environment**.
सरकार को सहायक नीतिगत वातावरण बनाना होगा।



GETTY IMAGES



The magic of a mirror: how is it able to show your reflection?

Materials that behave differently on the surface and inside, such as a metal outside and an insulator inside, are called topological materials. Such materials were discovered in the second half of the 20th century and some of its discoverers won the Nobel Prize for physics in 2016

GS Paper III: S&T

Adhip Agarwala

Dressing up is probably one of the most annoying things. You stand in front of a mirror and try to find the right combination of clothes of various colours hoping you look more tolerable to people. This is probably one trait that distinguishes us from other animals: we spend a few good minutes every morning staring at a mirror.

Have you ever wondered, though, when we stare at a mirror, what we're really staring at?

What is a mirror?

Most mirrors feel like glass. They are heavy and break easily. But then if you stare at a glass, say your window, and you stare at a mirror, what you see are very different things.

On a bright day, glasses are transparent, and you can see the outside world through a glass window. At night, if you look at your window and if you are in a well-lit room, you will now see yourself. In a mirror, on the other hand, you always see yourself irrespective of whether it is day or night (and as long as it is not dark).

To understand the difference between a mirror and window glass, we need to learn about metals and insulators.

What are metals and insulators?

Metals are shiny things, like your steel cups and plates, the aluminium pressure cooker, and coins in your purse. Metallic objects are usually hard, not easy to break, and have a silvery shine. They also get hot and cold quite easily and can conduct current. It's one reason why we never touch a live socket using a spoon. Insulator objects on the other hand are made of glass, wood, and plastics. The things that usually don't conduct current also often don't look silvery.

An electric current is conducted by

electrons. Atoms have both positively charged protons and negatively charged electrons. In a metal, electrons are like unruly, fun-loving kids: they leave their parent atoms and move around between different atoms, forming a big soup of electrons. On the other hand, in an insulator, every electron in an atom is a bit shy and stays close to the parent atom. Therefore when we put in a battery and try to push the electrons, they will move freely in a metal, since they are unruly, but in an insulator they won't. Therefore metals conduct current, insulators don't.

But the fact of how electrons behave towards batteries also decides how they behave when light falls on them.

How do light and electrons interact?

Light is an electromagnetic wave. A wave is any disturbance that moves periodically in time and can go from one point to another. For instance, when you drop a stone in a pond, you generate waves of water. When you speak, you generate waves of air, or sound waves.

When light falls on us – that's an electromagnetic wave, a periodic wave of electric and magnetic fields. Electric fields create forces that make electrons move, such as in your watch. Magnetic forces are the ones that keep your refrigerator magnets stuck on the door. But these forces don't change with time. When they start changing periodically in time they generate light, an electromagnetic wave.

Electrons behave very funny when light falls on them. Just like we move periodically when someone pushes us on a swing, when light falls on electrons, these electrons start moving periodically in time, as if they are dancing.

But the way they dance in metal and insulators are different. Since in a metal, all electrons are in a soup, they dance in a group like a flash mob. But in an insulator, every electron just dances individually on its own, inside its atomic home.

The type of electron dance decides whether light can go through a material. When light falls on a metal, all these electrons team up and start dancing together. This obstructs the light so much that it can't go through the metal and just bounces back. On the other hand, in an insulator, since every shy electron just dances a bit in its atomic home, most of the light goes through.

This is why insulators such as glass let some light go through while metals usually don't.

This is also the reason why you can see your face very clearly on a steel plate or spoon. The light from your face is reflected fully by the plate and enters your eye. But on a day when you just look at a window, most of the light from your face just goes through the glass to the other side, making it hard to see yourself. Moreover there is light from the outside that enters the glass into your eye, making you see the outside world. In the night, however, there is little ambient light, so just the light from your well-lit room reflects a bit from the glass and you can see yourself.

How does a mirror work?

So how is it then that a mirror, which feels like glass, an insulator, reflects like a steel plate? This is because the mirror is not just a glass: it has a secret. While it is in fact made of glass, there is a thin layer of metal placed on its back side. The front side is glass that lets the light through but the back side is a metal, where the electrons dance to reflect the light.

This is what makes you see yourself every time you stare into a mirror. A mirror is thus not one material but two. Both the glass (of shy electrons) and metal (of unruly electrons) conspire to make a long-lasting mirror on your almirah or in the washroom.

We just learnt that the back surface of the mirror has a metal layer. Now imagine

a block of glass where you put layers of silver on all its surfaces. This would be very strange: from the outside it will look like a metal but it won't be able to conduct current on the inside. We can create such an object using two different materials – glass and silver, say – but can these properties occur in an object made of a single material? Such a material would have to behave differently on the surface and inside, such as a metal outside and an insulator inside.

Such materials were discovered in the second half of the 20th century and are called topological materials. Some of their discoverers won the Nobel Prize for physics in 2016. More recently, Microsoft released a quantum-computing chip that is made of such topological materials.

To understand why all of this really works, one needs quantum mechanics, one of the most beautiful subjects known to us. In fact, the UN has declared 2025 to be the International year of Quantum Science and Technology. We are currently celebrating 100 years since scientists discovered its foundational principles.

Dance of electrons

While you may have understood a bit about mirrors, if you want to really understand why some electrons are unruly and some are shy or how electrons behave when light falls on them, consider learning quantum mechanics, a subject you can enjoy if you take a course in physics, for example here in IIT Kanpur where some of us teach.

In the meantime, when you next stare at a mirror, don't just look for yourself: also appreciate the dance of electrons, both in the glass and in the shiny metal layer at the back, which is sending your light back to you.

Adhip Agarwala is an assistant professor of physics at IIT Kanpur.

The Magic of a Mirror: How is it Able to Show Your Reflection?

आईने का जादू: यह आपकी छवि कैसे दिखा पाता है?

Materials that behave differently on the surface and inside, such as a metal outside and an insulator inside, are called topological materials.

वे पदार्थ जो सतह पर और अंदर अलग तरह से व्यवहार करते हैं, जैसे कि बाहर से धातु और अंदर से इंसुलेटर, उन्हें टोपोलॉजिकल मैटेरियल्स कहा जाता है।



- Such materials were discovered in the **second half of the 20th century** and some of its discoverers won the **Nobel Prize for Physics in 2016**.
ऐसे पदार्थों की खोज **20वीं सदी के दूसरे भाग** में हुई थी और इसके कुछ खोजकर्ताओं को **2016 में भौतिकी का नोबेल पुरस्कार** मिला था।
- Dressing up is probably one of the most annoying things.
तैयार होना शायद सबसे परेशान करने वाली चीजों में से एक है।
- You stand in front of a mirror and try to find the right combination of clothes of various colours hoping you look more tolerable to people.
आप आईने के सामने खड़े होते हैं और विभिन्न रंगों के कपड़ों का सही संयोजन खोजने की कोशिश करते हैं, उम्मीद करते हैं कि आप लोगों को थोड़ा बेहतर दिखें।
- This is probably one trait that distinguishes us from other animals: we spend a few good minutes every morning staring at a mirror.
यह शायद एक ऐसा गुण है जो हमें अन्य जानवरों से अलग करता है: हम हर सुबह कुछ अच्छे मिनट आईने को घूरते हुए बिताते हैं।
- Have you ever wondered, though, when we stare at a mirror, what we're really staring at?
क्या आपने कभी सोचा है कि जब हम आईने को देखते हैं, तो असल में हम क्या देख रहे होते हैं?

What is a mirror?

आईना क्या है?

- Most mirrors feel like **glass**. They are **heavy** and **break easily**.
अधिकतर आईने कांच जैसे लगते हैं। वे भारी होते हैं और आसानी से टूट जाते हैं।
- But then if you stare at a **glass**, say your window, and you stare at a **mirror**, what you see are very different things.
लेकिन जब आप कांच (जैसे खिड़की का) और आईना दोनों को देखते हैं, तो आपको दोनों में बहुत अलग चीजें दिखाई देती हैं।
- On a **bright day**, glasses are **transparent**, and you can see the outside world through a glass window.
एक रोशन दिन में, कांच पारदर्शी होता है, और आप खिड़की के कांच से बाहर की दुनिया देख सकते हैं।
- At **night**, if you look at your window and if you are in a **well-lit room**, you will now see yourself.
रात में, अगर आप अपनी खिड़की को देखें और आप प्रकाशित कमरे में हों, तो आप खुद को देख सकते हैं।
- In a mirror, on the other hand, you always see yourself irrespective of whether it is **day** or **night** (and as long as it is not **dark**).



TELEGRAM CHANNEL: <https://t.me/patrioticIAS>

YOUTUBE CHANNEL: <https://www.youtube.com/@PatrioticIAS>

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दूसरी ओर, आईने में आप खुद को हमेशा देखते हैं, चाहे दिन हो या रात (जब तक कि बिल्कुल अंधेरा न हो)।

To understand the difference between a mirror and window glass, we need to learn about metals and insulators.

आईने और खिड़की के कांच के अंतर को समझने के लिए हमें धातुओं और इंसुलेटर्स के बारे में जानना होगा।

What are metals and insulators?

धातु और इंसुलेटर क्या होते हैं?

- **Metals** are shiny things, like your **steel cups**, **aluminium pressure cooker**, and **coins** in your purse.
धातुएं चमकीली चीजें होती हैं, जैसे आपके **स्टील के कप**, **एल्यूमिनियम कुकर**, और **पर्स में सिक्के**।
- Metallic objects are **hard**, not easy to **break**, and have a **silvery shine**.
धातु की वस्तुएं **कठोर** होती हैं, आसानी से **नहीं टूटती**, और उनमें **चांदी जैसी चमक** होती है।
- They also **get hot and cold easily** and can **conduct current**.
ये **जल्दी गरम और ठंडी** होती हैं और **करंट प्रवाहित** कर सकती हैं।
- Insulator objects are made of **glass**, **wood**, and **plastics**.
इंसुलेटर वस्तुएं **कांच**, **लकड़ी**, और **प्लास्टिक** से बनी होती हैं।
- Insulators don't conduct current and often don't look silvery.
इंसुलेटर **करंट प्रवाहित नहीं करते** और अक्सर **चमकीले नहीं होते**।
- In **metals**, electrons move freely between atoms, forming a **big soup of electrons**.
धातुओं में इलेक्ट्रॉन परमाणुओं के बीच **स्वतंत्र रूप से घूमते हैं**, जिससे **इलेक्ट्रॉनों का सूप** बनता है।
- In **insulators**, electrons are tightly bound to their parent atoms.
इंसुलेटरों में इलेक्ट्रॉन अपने मूल परमाणुओं से **कड़े रूप से जुड़े रहते हैं**।

How do light and electrons interact?

प्रकाश और इलेक्ट्रॉन कैसे आपस में क्रिया करते हैं?

- Light is an **electromagnetic wave** — a periodic wave of **electric** and **magnetic fields**.
प्रकाश एक **विद्युतचुंबकीय तरंग** है — जो **बिजली** और **चुंबकीय क्षेत्रों** की आवर्त तरंग होती है।
- These fields can push electrons and make them **move**.
ये क्षेत्र इलेक्ट्रॉनों को **गति** देने के लिए बल उत्पन्न कर सकते हैं।
- When light hits electrons, they **start dancing**, i.e., oscillating periodically.
जब प्रकाश इलेक्ट्रॉनों पर पड़ता है, तो वे **नाचने लगते हैं**, यानी समय के साथ कंपन करने लगते हैं।
- In **metals**, all free electrons move together — like a **flash mob**.
धातुओं में सभी स्वतंत्र इलेक्ट्रॉन एक साथ **फ्लैश मॉब** की तरह नाचते हैं।



- In **insulators**, each electron dances alone inside its atomic space.
इंसुलेटरों में प्रत्येक इलेक्ट्रॉन अपने परमाणु क्षेत्र में अकेले नाचता है।
- The type of this **dance** decides whether **light** can **pass through** the material.
यह नृत्य का प्रकार यह तय करता है कि प्रकाश उस पदार्थ से गुजरेगा या नहीं।

Why can't light pass through metals?

प्रकाश धातुओं से क्यों नहीं गुजर सकता?

- In **metals**, the collective electron dance **obstructs light**, so it **bounces back**.
धातुओं में इलेक्ट्रॉनों का सामूहिक नृत्य प्रकाश को रोकता है, जिससे वह टकरा कर लौट जाता है।
- In **insulators**, since electrons are bound, **light passes through**.
इंसुलेटरों में इलेक्ट्रॉन बंधे रहते हैं, इसलिए प्रकाश गुजर जाता है।

Why do mirrors reflect light?

आईने प्रकाश को क्यों परावर्तित करते हैं?

- You can see your face clearly in a **steel plate** or **spoon** because light from your face is **fully reflected**.
आप अपने चेहरे को **स्टील की प्लेट** या **चम्मच** में साफ देख सकते हैं क्योंकि आपके चेहरे से आने वाला प्रकाश पूरी तरह परावर्तित होता है।
- On a bright day, light from your face **passes through** window glass, so you don't see yourself.
एक रोशन दिन में, आपके चेहरे से आने वाला प्रकाश **खिड़की के कांच से गुजर जाता है**, इसलिए आप खुद को नहीं देख पाते।
- At **night**, light from your **well-lit room** is reflected a little from the window glass, and you can see your reflection.
रात में, आपके **रोशनी वाले कमरे** की रोशनी थोड़ी सी **कांच से परावर्तित** होती है, जिससे आप अपनी छवि देख सकते हैं।

How does a mirror work?

आईना कैसे काम करता है?

- So how is it then that a mirror, which feels like **glass**, an **insulator**, reflects like a **steel plate**?
तो फिर ऐसा कैसे है कि एक आईना, जो **कांच** जैसा लगता है और एक **इंसुलेटर** होता है, वह एक **स्टील प्लेट** की तरह प्रकाश परावर्तित करता है?



- This is because the mirror is not just a **glass**: it has a **secret**.
ऐसा इसलिए है क्योंकि आईना केवल कांच नहीं होता: उसमें एक राज़ होता है।
- While it is in fact made of **glass**, there is a thin layer of **metal** placed on its **back side**.
जबकि यह वास्तव में कांच से बना होता है, इसकी पीछली सतह पर एक पतली धातु की परत लगाई जाती है।
- The **front side** is glass that lets the light **through**, but the **back side** is a metal, where the **electrons dance** to reflect the light.
सामने की सतह कांच होती है जो प्रकाश को गुजरने देती है, लेकिन पीछे की सतह धातु होती है, जहाँ इलेक्ट्रॉन नृत्य करते हैं और प्रकाश को परावर्तित करते हैं।
- This is what makes you see yourself every time you stare into a mirror.
यही कारण है कि जब भी आप आईने में देखते हैं, आप खुद को देख पाते हैं।
- A mirror is thus not **one material** but **two**.
इसलिए एक आईना केवल एक पदार्थ नहीं बल्कि दो पदार्थों से बना होता है।
- Both the **glass** (of **shy electrons**) and **metal** (of **unruly electrons**) conspire to make a **long-lasting mirror** on your **almirah** or in the **washroom**.
शर्मिले इलेक्ट्रॉनों वाला कांच और बेकाबू इलेक्ट्रॉनों वाली धातु, दोनों मिलकर आपकी अलमारी या वॉशरूम में एक टिकाऊ आईना बनाते हैं।

Topological Materials

टोपोलॉजिकल पदार्थ

- We just learnt that the back surface of the mirror has a **metal layer**.
हमने अभी सीखा कि आईने की पीछली सतह पर धातु की परत होती है।
- Now imagine a block of **glass** where you put layers of **silver** on **all its surfaces**.
अब कल्पना करें कि एक कांच के ब्लॉक की, जिसमें आप उसकी सभी सतहों पर चांदी की परतें लगाते हैं।
- This would be very strange: from the outside it will look like a **metal** but it won't be able to **conduct current** on the **inside**.
यह बहुत अजीब होगा: बाहर से यह एक धातु जैसा दिखेगा लेकिन अंदर से करंट प्रवाहित नहीं कर पाएगा।
- We can create such an object using **two different materials** — glass and silver, say — but can these properties occur in an object made of a **single material**?
हम ऐसा वस्तु दो अलग-अलग पदार्थों — जैसे कांच और चांदी — से बना सकते हैं, लेकिन क्या यह गुण एक ही पदार्थ में हो सकते हैं?
- Such a material would have to behave differently on the **surface** and **inside**, such as a **metal outside** and an **insulator inside**.
ऐसा पदार्थ अपनी सतह और भीतर में अलग व्यवहार करेगा — जैसे कि बाहर से धातु और भीतर से इंसुलेटर।



- Such materials were discovered in the **second half of the 20th century** and are called **topological materials**.
ऐसे पदार्थों की खोज **20वीं सदी के दूसरे भाग** में हुई थी और इन्हें **टोपोलॉजिकल पदार्थ** कहा जाता है।
- Some of their discoverers won the **Nobel Prize for physics in 2016**.
इनके कुछ खोजकर्ताओं को **2016 में भौतिकी का नोबेल पुरस्कार** मिला था।
- More recently, **Microsoft** released a **quantum-computing chip** that is made of such **topological materials**.
हाल ही में, **माइक्रोसॉफ्ट** ने एक **क्वांटम कंप्यूटिंग चिप** जारी की है जो ऐसे **टोपोलॉजिकल पदार्थों** से बनी है।

Quantum Mechanics

क्वांटम यांत्रिकी

- To understand why all of this really works, one needs **quantum mechanics**, one of the most **beautiful subjects** known to us.
यह सब वास्तव में क्यों काम करता है, इसे समझने के लिए हमें **क्वांटम यांत्रिकी** की जरूरत होती है, जो हमारे लिए सबसे **सुंदर विषयों** में से एक है।
- In fact, the **UN** has declared **2025** to be the **International Year of Quantum Science and Technology**.
वास्तव में, **संयुक्त राष्ट्र (UN)** ने **2025** को **क्वांटम विज्ञान और प्रौद्योगिकी का अंतरराष्ट्रीय वर्ष** घोषित किया है।
- We are currently celebrating **100 years** since scientists discovered its **foundational principles**.
हम अभी **100 वर्षों** का जश्न मना रहे हैं जब वैज्ञानिकों ने इसके **मूल सिद्धांतों** की खोज की थी।

Dance of Electrons

इलेक्ट्रॉनों का नृत्य

- While you may have understood a bit about **mirrors**, if you want to really understand why some **electrons are unruly** and some are **shy**, or how **electrons behave** when **light falls on them**, consider learning **quantum mechanics**.
भले ही आपने **आईनों** के बारे में थोड़ा समझा हो, लेकिन अगर आप वास्तव में यह समझना चाहते हैं कि कुछ **इलेक्ट्रॉन बेकाबू** क्यों होते हैं और कुछ **शर्मीले**, या जब **प्रकाश उन पर पड़ता है** तो वे कैसे व्यवहार करते हैं, तो **क्वांटम यांत्रिकी** सीखने पर विचार करें।
- It is a subject you can enjoy if you take a course in **physics**, for example here in **IIT Kanpur** where some of us teach.
यह एक विषय है जिसे आप **भौतिकी** के कोर्स में पढ़कर **आनंद ले सकते हैं**, जैसे कि यहां **IIT कानपुर** में, जहां हममें से कुछ पढ़ाते हैं।



- In the meantime, when you next stare at a **mirror**, don't just look for yourself: also appreciate the **dance of electrons**, both in the **glass** and in the **shiny metal layer** at the back, which is sending your **light back to you**.

इस बीच, जब अगली बार आप आईने में देखें, तो केवल खुद को न देखें: बल्कि कांच और पीछे की चमकदार धातु परत में हो रहे इलेक्ट्रॉनों के नृत्य की भी सराहना करें, जो आपकी प्रकाश को आप तक लौटा रहा है।

WASHINGTON

Second child dies of **measles** in the U.S., while almost 650 reported ill

GS Paper III: S&T



AP

A measles outbreak has killed a second child in southwestern U.S., authorities said on Sunday, with almost 650 people now infected as the highly contagious disease spreads. Health secretary Robert F. Kennedy Jr., a vaccine sceptic, posted on X that “the most effective way to prevent the spread of measles is the MMR vaccine.” AFP

रही है।

- Health secretary **Robert F. Kennedy Jr.**, a **vaccine sceptic**, posted on **X** that “the most effective way to prevent the spread of measles is the **MMR vaccine**.”

स्वास्थ्य सचिव रॉबर्ट एफ. कैनेडी जूनियर, जो एक टीका संदेहवादी हैं, ने X पर पोस्ट किया कि “खसरे के फैलाव को रोकने का सबसे प्रभावी तरीका MMR वैक्सीन है।”

Second child dies of measles in the U.S., while almost 650 reported ill

अमेरिका में खसरे से दूसरे बच्चे की मौत, लगभग 650 लोग बीमार

A measles outbreak has killed a second child in southwestern U.S., authorities said on Sunday.

रविवार को अधिकारियों ने बताया कि अमेरिका के दक्षिण-पश्चिमी हिस्से में खसरे के प्रकोप से दूसरे बच्चे की मौत हो गई है।

- With almost **650 people** now **infected**, the highly **contagious disease** continues to spread.

अब तक लगभग **650 लोग संक्रमित** हो चुके हैं, और यह अत्यधिक **संक्रामक बीमारी** फैलती जा



- **TOPICS COVERED (PCS Special)**

Valley of flowers



Blooming joy: Tourists flock to the Indira Gandhi Memorial Tulip Garden, the largest tulip garden in Asia set against the Zabarwan hills in Srinagar, on Monday. The garden opened for the season on March 26. AFP

PATK