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PCS Special:

09 December 2025

1.

Renowned socialist leader Baba Adhav passes away at 95, condolences pour in

प्रख्यात समाजवादी नेता बाबा अधव 95 वर्ष की उम्र में निधन, शोक संदेश प्राप्त

Renowned socialist leader Baba Adhav passes away at 95, condolences pour in

PCS

The Hindu Bureau
MUMBAI

Renowned socialist leader Baba Adhav, 95, passed away at a hospital in Pune on Monday night.

“He was kept in the ICU at Poona Hospital for the last 12 days. He was responding to the treatment earlier. But his kidneys failed. Today, at 8.25 p.m., he suffered a cardiac arrest. His mortal remains will be kept at Hamal Bhavan, the focal point of his tireless struggle, on Tuesday, from 10 a.m. to 5 p.m. He will thereafter be cremated without any religious rituals at the electric crematorium at 5.30 p.m.,” Nitin Pawar, his close associate, told journalists.

Baba Adhav was a prominent progressive leader in the socialist movement in Maharashtra, and had fought against the caste system and for the rights of labourers, head-loaders, waste-pickers, and street vendors.

He had participated in



Socialist leader Baba Adhav during his protest against EVMs last year in Pune. PTI

the freedom movement, the Samyukta Maharashtra movement, anti-Emergency protests, one village-one water source movement (against caste system), and protests for the removal of Manu’s statue. He had also helmed a cycle rally from Pune to Delhi to seek social security for unorganised labourers. Last year, he sat on a protest against electronic voting machines (EVMs).

Condolences poured in from leaders. “Baba Adhav Ji will be remembered for his efforts to serve society through various causes,

notably empowering the marginalised and furthering labour welfare,” Prime Minister Narendra Modi said in a post on X.

“He was the backbone of the movement for the rights of head-loaders, rickshaw drivers, construction workers. He built a movement to give them justice. His fight against the social evils will be remembered,” Maharashtra Chief Minister Devendra Fadnis said.

His followers called him the inheritor of Mahatma Phule’s ideology. Shiv Sena UBT leader Uddhav Thackeray said: “He was the lighthouse for all those who fight for the protection of democracy.”

“Dr. Baba Adhav was among the rare reformers who never feared consequences while taking a stand. His struggle for social justice and his relentless fight for labour rights will always be remembered,” NCP (SP) chief Sharad Pawar said in his condolence message.



Renowned socialist leader Baba Adhav passes away at 95, condolences pour in

प्रख्यात समाजवादी नेता बाबा अधव 95 वर्ष की उम्र में निधन, शोक संदेश प्राप्त

- **Renowned socialist leader Baba Adhav passes away at 95**, condolences pour in प्रख्यात समाजवादी नेता **बाबा अधव** का **95 वर्ष** की उम्र में निधन, शोक संदेश प्राप्त
- Renowned socialist leader Baba Adhav, 95, passed away at a hospital in Pune on Monday night.
प्रख्यात समाजवादी नेता **बाबा अधव**, **95 वर्ष**, का सोमवार रात **पुणे** के एक अस्पताल में निधन हुआ
- “He was kept in the ICU at Poona Hospital for the last 12 days. He was responding to the treatment earlier. But his kidneys failed. Today, at 8.25 p.m., he suffered a **cardiac arrest**. His mortal remains will be kept at Hamal Bhavan, the focal point of his tireless struggle, on Tuesday, from 10 a.m. to 5 p.m. He will thereafter be **cremated without any religious rituals at the electric crematorium** at 5.30 p.m.,” Nitin Pawar, his close associate, told journalists.
“उन्होंने पिछले **12 दिनों** से **पूना अस्पताल** के **ICU** में रखा गया था। वह पहले उपचार को प्रतिक्रिया दे रहे थे। लेकिन उनके **किडनी** फेल हो गई। आज **शाम 8.25 बजे** उन्हें **कार्डियक अरेस्ट** हुआ। उनके पार्थिव शरीर को मंगलवार को **सुबह 10 बजे से शाम 5 बजे तक हमाल भवन** में रखा जाएगा, जो उनके संघर्ष का केंद्र रहा है। इसके बाद **शाम 5.30 बजे** उनका अंतिम संस्कार **बिना किसी धार्मिक अनुष्ठान के इलेक्ट्रिक क्रेमेटोरियम** में किया जाएगा,” उनके करीबी सहयोगी **नितिन पवार** ने पत्रकारों को बताया
- **Baba Adhav was a prominent progressive leader in the socialist movement in Maharashtra, and had fought against the caste system and for the rights of labourers, head-loaders, waste-pickers, and street vendors.**
बाबा अधव महाराष्ट्र के समाजवादी आंदोलन के एक प्रमुख प्रगतिशील नेता थे, और उन्होंने **जाति प्रणाली** के खिलाफ तथा **मजदूरों, हमालों, कचरा बीनने वालों, और फेरीवालों** के अधिकारों के लिए संघर्ष किया था
- **He had participated in the freedom movement, the Samyukta Maharashtra movement, anti-Emergency protests, one village-one water source movement (against caste system), and protests for the removal of Manu's statue.**
उन्होंने **स्वतंत्रता आंदोलन, संयुक्त महाराष्ट्र आंदोलन, आपातकाल विरोधी आंदोलनों, वन विलेज-वन वाटर सोर्स आंदोलन** (जाति व्यवस्था के खिलाफ), और **मनु की मूर्ति हटाने** के आंदोलनों में भाग लिया था
- He had also helmed a cycle rally from Pune to Delhi to seek social security for unorganised labourers. Last year, he sat in on a protest against electronic voting machines (EVMs).
उन्होंने असंगठित मजदूरों के लिए **सामाजिक सुरक्षा** की मांग को लेकर **पुणे से दिल्ली** तक साइकिल रैली का नेतृत्व किया था। पिछले वर्ष वह **EVMs** के खिलाफ प्रदर्शन में भी बैठे थे
- Condolences poured in from leaders. “Baba Adhav Ji will be remembered for his efforts to serve society through various causes, notably empowering the marginalised and furthering labour welfare,” Prime Minister Narendra Modi said in a post on X.
नेताओं की ओर से शोक संदेश आने लगे। **प्रधानमंत्री नरेंद्र मोदी** ने X पर पोस्ट किया, “**बाबा अधव जी** को समाज सेवा के उनके प्रयासों, विशेषकर **वंचितों को सशक्त बनाने और मजदूर कल्याण** को आगे बढ़ाने के प्रयासों के लिए याद किया जाएगा”
- “He was the backbone of the movement for the rights of head-loaders, rickshaw drivers, and construction workers. He built a movement to give them justice. His fight against the social evils will be remembered,” Maharashtra Chief Minister Devendra Fadnavis said.
महाराष्ट्र के मुख्यमंत्री देवेंद्र फडणवीस ने कहा, “वह **हमालों, रिक्शा चालकों, निर्माण मजदूरों** के अधिकारों के आंदोलन की रीढ़ थे। उन्होंने इन्हें न्याय दिलाने के लिए आंदोलन खड़ा किया। सामाजिक बुराइयों के खिलाफ उनकी लड़ाई को याद रखा जाएगा”
- **His followers called him the inheritor of Mahatma Phule's ideology.** Shiv Sena UBT leader Uddhav Thackeray said: “He was the lighthouse for all those who fight for the protection of democracy.”
उनके अनुयायियों ने उन्हें **महात्मा फुले** की विचारधारा का उत्तराधिकारी बताया। **शिवसेना (UBT)** के नेता **उद्धव ठाकरे** ने कहा: “वह लोकतंत्र की रक्षा के लिए लड़ने वालों के लिए **मार्गदर्शक प्रकाश** थे”
- “Dr. Baba Adhav was among the rare reformers who never feared consequences while taking a stand. His struggle for social justice and his relentless fight for labour rights will always be remembered,” NCP (SP) chief Sharad Pawar said in his condolence message.
NCP (SP) प्रमुख **शरद पवार** ने अपने शोक संदेश में कहा, “**डॉ. बाबा अधव** उन दुर्लभ सुधारकों में से थे जो



किसी भी परिणाम से डरे बिना अपना पक्ष रखते थे। सामाजिक न्याय के लिए उनका संघर्ष और मजदूर अधिकारों के लिए उनकी निरंतर लड़ाई हमेशा याद की जाएगी”

GS Paper 1: History,

TOPICS COVERED

09 December 2025

1.

Govt., Opposition spar over Vande Mataram
सरकार, विपक्ष वंदे मातरम पर विवाद

Govt., Opposition spar over Vande Mataram

Nehru 'betrayed' song by echoing Muslim League leader Jinnah's communal concerns, says Modi | Priyanka accuses govt. of using 'strange' debate to divert attention from unemployment, rising prices | Since Nehru is on your mind, let's assign a time, debate the topic and close the chapter, she adds

GS 1: History
The Hindu Bureau
NEW DELHI

The Centre and the Opposition on Monday sparred in the Lok Sabha over Vande Mataram, with Prime Minister Narendra Modi terming it the voice of the freedom movement that had been "fragmented" by the Congress in its "surrender before the Muslim League".

Initiating the debate to mark 150 years of the National Song, Mr. Modi claimed that India's first Prime Minister Jawaharlal Nehru "betrayed" the song by echoing Muslim League leader Muhammad Ali Jinnah's communal concerns. Leading the charge for the Opposition, Priyanka Gandhi Vadra questioned the need to have a debate on the song and accused the government of using it to divert attention from real issues such as unemployment and rising prices.

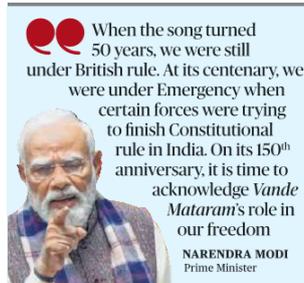
She said the debate was

being held in the view of Assembly elections in West Bengal next year and to level fresh allegations against those who fought for the country's freedom. She dared the ruling party to have a debate on Nehru and "close the chapter for once and all".

Earlier, Mr. Modi said that every Indian breathing the air of freedom owed a debt to Vande Mataram for fostering the fight against colonial rule, but targeted the Congress for truncating the song.

"When the song turned 50, we were still under British rule and at its centenary, we were under the Emergency when certain forces were trying to finish Constitutional rule in India. On its 150th anniversary, it is time to acknowledge Vande Mataram's role in our freedom struggle. Every Indian breathing the air of freedom owes a debt to Vande Mataram," Mr. Modi said.

He said that the Congress had compromised on



NARENDRA MODI
Prime Minister

Vande Mataram and surrendered before the Muslim League.

He said Nehru wrote to Netaji Subhas Chandra Bose that following Jinnah's reservations about Vande Mataram in 1937, he had examined the background of Bankim Chandra Chatterjee's Anand Math, the novel in which the song appeared, and said that it could irritate Muslims.

"There was a betrayal of Vande Mataram; the National Song was sabotaged.

This fragmentation of the song by the Congress reflected the politics of appeasement and also led to its acceptance of the country's Partition," Mr. Modi said, referring to the current official version of the National Song as fragmentation.

"Vande Mataram was written at a time when British rulers were trying to impose 'God Save the Queen' on Indians," Mr. Modi said, and added the song went beyond being a



PRIYANKA GANDHI VADRA
Congress MP

When we mention Vande Mataram, it reminds us of the history of our freedom struggle. This debate is strange; this song has made a place in people's hearts, so what is the need for a debate?

political mantra. "Vande Mataram is not just a mantra for political freedom; it was a sacred war cry to rid Bharatmata of the vestiges of colonialism," he said.

Hitting back, Ms. Vadra criticised Mr. Modi for targeting Nehru and put up a strong defence of the country's first Prime Minister.

"Since you keep talking about Nehru, let us do one thing - let us assign a time for a discussion, list out all the insults against him... debate it and close the

chapter once and for all. After that, let us talk about today's issues - price rise and unemployment," she said. "The topic that we are discussing is part of the soul of the country. When we mention Vande Mataram, it reminds us of the history of our freedom struggle. This debate is strange; this song has found a place in people's hearts; so what is the need for a debate?" Ms. Vadra asked.

Chronology of the song She claimed that Bankim Chandra had written only the first two stanzas in 1875 and four stanzas were added to the original composition seven years later.

Refuting Mr. Modi, the Congress MP from Wayanad listed the "chronology" of the song and cited correspondence between Nehru and Bose, in which Bose urged Nehru to discuss the matter with Rabin-drath Tagore.

She said the composition was first sung by Ta-

gore in the 1896 session of the Congress and since then it had become the war cry for freedom fighters. However, controversy surrounded the song only in the 1930s with the rise in communal politics.

On October 28, 1937, she said the Congress Working Committee adopted the first two stanzas as the song in the presence of stalwarts like Mahatma Gandhi, Sardar Vallabhbhai Patel, Nehru, Bose and Tagore. When the Constituent Assembly approved Vande Mataram, it was approved by everyone, including Chairman of the Drafting Committee of the Constitution Dr. B.R. Ambedkar and Jana Sangh founder Shyama Prasad Mookerjee.

"Questioning the form of Vande Mataram, which was accepted by the Constituent Assembly, is an insult to those great souls who took this decision with their great wisdom. It also reveals an anti-Constitution intention," she said.

Govt., Opposition spar over Vande Mataram

सरकार, विपक्ष वंदे मातरम पर विवाद

- Govt., Opposition spar over Vande Mataram
सरकार और विपक्ष वंदे मातरम को लेकर भिड़े
- Nehru 'betrayed' song by echoing Muslim League leader Jinnah's communal concerns, says Modi
मोदी ने कहा कि नेहरू ने मुस्लिम लीग नेता जिन्ना की सांप्रदायिक चिंताओं को दोहराकर गीत के साथ "विश्वसघात" किया
- Priyanka accuses govt. of using 'strange' debate to divert attention from unemployment, rising prices
प्रियंका ने सरकार पर बेरोज़गारी और मंहगाई से ध्यान भटकाने के लिए "अजीब" बहस का उपयोग करने का आरोप लगाया



- Since Nehru is on your mind, let's assign a time, debate the topic and close the chapter, she adds
उन्होंने कहा कि जब नेहरू आपके दिमाग में हैं, तो समय तय करें, बहस करें और इस अध्याय को बंद करें
- The Centre and the Opposition on Monday sparred in the Lok Sabha over Vande Mataram, with Prime Minister Narendra Modi terming it the voice of the freedom movement that had been "fragmented" by the Congress in its "surrender before the Muslim League".
सोमवार को लोकसभा में केंद्र और विपक्ष ने **वंदे मातरम** को लेकर तकरार की, प्रधानमंत्री **नरेंद्र मोदी** ने इसे स्वतंत्रता आंदोलन की आवाज बताया जिसे कांग्रेस ने "मुस्लिम लीग के सामने आत्मसमर्पण" करके "खंडित" किया था
- Initiating the debate to mark 150 years of the National Song, Mr. Modi claimed that India's first Prime Minister Jawaharlal Nehru "betrayed" the song by echoing Muslim League leader Muhammad Ali Jinnah's communal concerns.
राष्ट्रीय गीत के **150 साल** पूरे होने पर बहस की शुरुआत करते हुए, मोदी ने दावा किया कि देश के पहले प्रधानमंत्री **जवाहरलाल नेहरू** ने मुस्लिम लीग नेता **मुहम्मद अली जिन्ना** की सांप्रदायिक चिंताओं को दोहराकर गीत के साथ "विश्वासघात" किया
- Leading the charge for the Opposition, Priyanka Gandhi Vadra questioned the need to have a debate on the song and accused the government of using it to divert attention from real issues such as unemployment and rising prices.
विपक्ष की ओर से नेतृत्व करते हुए **प्रियंका गांधी वाड़ा** ने गीत पर बहस की जरूरत पर सवाल उठाया और सरकार पर **बेरोज़गारी** तथा **मंहगाई** जैसे वास्तविक मुद्दों से ध्यान भटकाने का आरोप लगाया
- She said the debate was being held in view of the Assembly elections in West Bengal next year and to level fresh allegations against those who fought for the country's freedom.
उन्होंने कहा कि यह बहस अगले साल **पश्चिम बंगाल** में होने वाले विधानसभा चुनावों को ध्यान में रखकर और देश की स्वतंत्रता के लिए लड़ने वालों पर नए आरोप लगाने के लिए की जा रही है
- She dared the ruling party **to have a debate on Nehru and "close the chapter for once and all"**.
उन्होंने सत्तारूढ़ दल को **नेहरू** पर बहस करने और "इस अध्याय को हमेशा के लिए बंद करने" की चुनौती दी
- Earlier, Mr. Modi said that every Indian breathing the air of freedom owed a debt to Vande Mataram for fostering the fight against colonial rule, but targeted the Congress for truncating the song.
इससे पहले मोदी ने कहा कि आजादी की हवा में सांस लेने वाला हर भारतीय **वंदे मातरम** का ऋणी है, लेकिन कांग्रेस पर गीत को खंडित करने का आरोप लगाया
- "When the song turned 50, we were still under British rule and at its centenary, we were under the Emergency when certain forces were trying to finish Constitutional rule in India. On its 150th anniversary, it is time to acknowledge Vande Mataram's role in our freedom struggle. Every Indian breathing the air of freedom owes a debt to Vande Mataram," Mr. Modi said.
मोदी ने कहा, "जब यह गीत **50 साल** का हुआ, हम ब्रिटिश शासन में थे, और इसके **100 वर्ष** पूरे होने पर आपातकाल लगा था, जब कुछ शक्तियाँ भारत में संवैधानिक शासन को खत्म करने की कोशिश कर रही थीं। इसके **150वें वर्ष** पर, स्वतंत्रता संघर्ष में वंदे मातरम की भूमिका को स्वीकार करने का समय है।"
- He said that the Congress had compromised on Vande Mataram and surrendered before the Muslim League.
उन्होंने कहा कि कांग्रेस ने **वंदे मातरम** पर समझौता किया और मुस्लिम लीग के सामने आत्मसमर्पण किया
- He said **Nehru wrote to Netaji Subhas Chandra Bose that following Jinnah's reservations about Vande Mataram in 1937, he had examined the background of Bankim Chandra Chatterjee's Anand Math, the novel in which the song appeared, and said that it could irritate Muslims.**
उन्होंने कहा कि **नेहरू** ने **1937** में जिन्ना की आपत्तियों के बाद नेताजी **सुभाष चंद्र बोस** को लिखा था कि उन्होंने **बंकिम चंद्र चटर्जी** के उपन्यास **आनंद मठ** की पृष्ठभूमि की जांच की और कहा कि यह मुसलमानों को चिढ़ा सकता है
- "There was a betrayal of Vande Mataram; the National Song was sabotaged. This fragmentation of the song by the Congress reflected the politics of appeasement and also led to its acceptance of the country's Partition," Mr. Modi said, referring to the current official version of the National Song as fragmentation.
"**वंदे मातरम** के साथ विश्वासघात हुआ; राष्ट्रीय गीत को नुकसान पहुँचाया गया। कांग्रेस द्वारा गीत का यह विभाजन तुष्टिकरण की राजनीति को दर्शाता है और देश के **विभाजन** को स्वीकारने का कारण बना," मोदी ने कहा



- “Vande Mataram was written at a time when British rulers were trying to impose ‘God Save the Queen’ on Indians,” Mr. Modi said, and added the song went beyond being a political mantra.
मोदी ने कहा कि "वंदे मातरम तब लिखा गया जब ब्रिटिश शासक गॉड सेव द क्वीन थोपने की कोशिश कर रहे थे," और उन्होंने जोड़ा कि यह गीत राजनीतिक नारा भर नहीं था
- “Vande Mataram is not just a mantra for political freedom; it was a sacred war cry to rid Bharatmata of the vestiges of colonialism,” he said.
उन्होंने कहा, "वंदे मातरम राजनीतिक स्वतंत्रता का मंत्र मात्र नहीं; यह भारत माता को औपनिवेशिक अवशेषों से मुक्त कराने का पवित्र युद्धघोष था"
- Hitting back, Ms. Vadra criticised Mr. Modi for targeting Nehru and put up a strong defence of the country’s first Prime Minister.
जवाबी हमला करते हुए वाड्रा ने मोदी की नेहरू पर टिप्पणी की आलोचना की और देश के पहले प्रधानमंत्री का प्रबल बचाव किया
- “Since you keep talking about Nehru, let us do one thing — let us assign a time for a discussion, list out all the insults against him... debate it and close the chapter once and for all. After that, let us talk about today’s issues — price rise and unemployment,” she said.
उन्होंने कहा, "जब आप बार-बार नेहरू की बात करते हैं, तो आइए एक समय तय करें, सभी आरोपों पर चर्चा करें... बहस करें और इसे हमेशा के लिए खत्म करें। उसके बाद मंहगाई और बेरोज़गारी पर बात करें"
- “The topic that we are discussing is part of the soul of the country. When we mention Vande Mataram, it reminds us of the history of our freedom struggle. This debate is strange; this song has found a place in people’s hearts; so what is the need for a debate?” Ms. Vadra asked.
वाड्रा ने कहा, "हम जिस विषय पर चर्चा कर रहे हैं वह देश की आत्मा का हिस्सा है। वंदे मातरम का नाम लेते ही स्वतंत्रता संघर्ष याद आता है। यह बहस अजीब है; यह गीत लोगों के दिलों में है; फिर बहस की क्या जरूरत?"

Chronology of the song

गीत की कालानुक्रमिक श्रृंखला

- **She claimed that Bankim Chandra had written only the first two stanzas in 1875 and four stanzas were added to the original composition seven years later.**
उन्होंने कहा कि बंकिम चंद्र ने 1875 में केवल दो स्तंभ लिखीं और सात साल बाद चार और जोड़ी गईं
- **Refuting Mr. Modi, the Congress MP from Wayanad listed the “chronology” of the song and cited correspondence between Nehru and Bose, in which Bose urged Nehru to discuss the matter with Rabindranath Tagore.**
वायनाड की कांग्रेस सांसद ने मोदी का खंडन करते हुए गीत की "कालक्रम" सूचीबद्ध की और नेहरू-बोस के पत्रों का हवाला दिया, जिनमें बोस ने नेहरू से रवींद्रनाथ टैगोर से बात करने को कहा था
- **She said the composition was first sung by Tagore in the 1896 session of the Congress and since then it had become the war cry for freedom fighters.**
उन्होंने कहा कि यह रचना पहली बार 1896 के कांग्रेस अधिवेशन में टैगोर द्वारा गाई गई और तब से यह स्वतंत्रता सेनानियों का युद्धघोष बन गई
- **However, controversy surrounded the song only in the 1930s with the rise in communal politics.**
हालाँकि गीत को लेकर विवाद 1930 के दशक में सांप्रदायिक राजनीति बढ़ने के साथ शुरू हुआ
- **On October 28, 1937, she said the Congress Working Committee adopted the first two stanzas as the song in the presence of stalwarts like Mahatma Gandhi, Sardar Vallabhbhai Patel, Nehru, Bose and Tagore.**
उन्होंने कहा कि 28 अक्टूबर 1937 को कांग्रेस कार्यसमिति ने गांधी, पटेल, नेहरू, बोस और टैगोर की उपस्थिति में पहली दो स्तंभों को गीत के रूप में अपनाया
- **When the Constituent Assembly approved Vande Mataram, it was approved by everyone, including Chairman of the Drafting Committee of the Constitution Dr. B.R. Ambedkar and Jana Sangh founder Shyama Prasad Mookerjee.**
जब संविधान सभा ने वंदे मातरम को मंजूरी दी, तो इसे डॉ. बी.आर. अंबेडकर और श्यामा प्रसाद मुखर्जी सहित सभी ने स्वीकार किया
- “Questioning the form of Vande Mataram, which was accepted by the Constituent Assembly, is an insult to those great souls who took this decision with their great wisdom. It also reveals



an anti-Constitution intention,” she said.

उन्होंने कहा, "संविधान सभा द्वारा स्वीकृत वंदे मातरम के स्वरूप पर सवाल उठाना उन महान आत्माओं का अपमान है जिन्होंने यह निर्णय लिया था। यह विरोधी-संविधान भावना को दर्शाता है"

GS Paper II: Polity,

TOPICS COVERED

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1. **Democracy's paradox, the chosen people of the state**
लोकतंत्र का विरोधाभास, राज्य के चुने हुए लोग

2. **Carceral culture**
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Democracy's paradox, the chosen people of the state

GS II: Polity

MOB

The Indian passport is meant to be issued only to Indian citizens. Only citizens are supposed to be on the electoral rolls of the country. But holding an Indian passport or having one's name on the electoral rolls is no proof of citizenship, because people can, and have, forged their way to these documents. This is a conflict between evidence of status and status of evidence. This vexed question of citizenship governance has resurfaced in the context of Election Commission of India's countrywide Special Intensive Revision (SIR) of electoral rolls.

The legal challenge against the SIR is based on the following grounds. First, the ECI has no power to determine citizenship, and only the Home Ministry has. Second, there is no provision in the law for an en masse SIR and it can only be done selectively. Third, whether one is a foreigner can be determined only by the **Union Ministry of Home Affairs (MHA)** under the Citizenship Act and by quasi-judicial bodies such as Foreigners' Tribunals constituted under the Foreigners Act, 1946. The ECI has argued that its constitutional mandate to determine the eligibility of individuals to be included in the electoral rolls necessarily entails verifying their citizenship status. Its central contention is that the process of assessing eligibility for enrolment cannot be equated with a formal determination of citizenship. While these arguments may or may not be accepted by the Supreme Court of India (which is hearing the case), the issues at hand are more fundamental, political and even philosophical in nature. What is being questioned in the SIR is the presumption that all residents are citizens unless proven otherwise.

For the individual to prove

Countrywide, there is no single piece of evidence that proves Indian citizenship – a document that has the status of being evidence of citizenship status. A legal regime for a countrywide adjudication of everyone's citizenship passed by Parliament is awaiting rollout. In Parliament in August, the Centre was asked what proof there is of Indian citizenship. The Centre – the Minister of Home to be precise – said: "The Citizenship Act, 1955, as amended in 2004, provides the Central Government to compulsorily register every citizen of India and issue a National Identity Card to him.

The procedure for the same has been laid down in the Citizenship (Registration of Citizens and Issue of National Identity Cards) Rules, 2003." The rules state that national identity cards are to be issued to citizens whose particulars are entered in the National Register of Citizens (NRC), a subset of the National Population Register (NPR), which lists all residents. The NRC is mandated in the Act; the NPR is authorised by rules framed under the Act. The NRC is to include only citizens who have proved that they indeed are.



Varghese K. George

State is a creation of the people but state determines who constitute the people – a paradox, regardless of which body or Ministry does this

The law is clear that when challenged, the onus of proving citizenship lies on the individual, and not the state. Alongside the 2010 Census during the United Progressive Alliance government, data for the NPR was collected, which was updated in 2015, with details of 119 crore residents. Whether the NPR will be updated along with Census 2027 remains unclear. The Bharatiya Janata Party (BJP) dropped its promise of an NRC from the 2024 election manifesto. Any resident can be on the NPR, but to graduate to the NRC, one has to prove that they meet the requirements under the Citizenship Act.

The founders of the Republic favoured a territorial conception of citizenship, *Jus Soli* or 'Right of the Soil', though elements of blood lineage and ethnicity were also included in the original citizenship Act. *Jus Sanguinis* or 'Right of Blood/lineage' gained more prominence over the decades. Consequently, citizenship by birth in India has multiple caveats. As the law stands today, to be eligible for citizenship by birth in India, regardless of who the parents are, one has to be born before July 1, 1987. Persons born in India between July 1, 1987 and December 2, 2004 are citizens of India only if either of the parents is a citizen of the country at the time of his/her birth; and for persons born in India on or after December 3, 2004 to be eligible for citizenship, apart from at least one parent being a citizen, the other parent must not be an 'illegal migrant' at the time of birth. The Citizenship Act of 1955 has been amended multiple times, and it was in 2003 that legislation determined that a section of the residents are 'illegal immigrants' who were to be identified and deported; they and their progeny would not be eligible for Indian citizenship by birth. For a person to be eligible for Indian citizenship by birth now, either both their parents must be determined as citizens, or one of them should be a citizen and the other should not be an illegal immigrant. A section of the identified illegal immigrants qualify for Indian citizenship under the Citizenship (Amendment) Act, 2019, which turned controversial for the explicit religious test that it mandates.

In 2008, in a pilot project, a few lakh Indians were issued the Multipurpose National Identity Card (MNIC) by the Union Ministry of Home Affairs (MHA). The card, with an embedded electronic chip with 10 fingerprints, an iris scan, and photograph, along with name, date of birth, parents' names, place of birth, and place of issue had 10-year validity. The NRC for the whole country was a promise made in the BJP's 2019 manifesto. In 2024, the party went silent on it and we do not hear much about it. The SIR by the ECI comes as a proxy of this exercise.

A persisting conflict

Regardless of which Ministry or Department oversees the exercise, questions of citizenship, treason and sedition with regard to an individual are decided at the lowest level of bureaucracy

and the police. The state's authority is created by the will of the people. People are sovereign; the state is their creation and it is not supposed to be the other way around.

Therefore, the modern state apparatus which has been invested with the authority to determine who constitute the people has contradiction built in it. Whether an individual is a citizen, and whether they are not treasonous or seditious are all determined on a daily basis by the border agent, the constable, the village clerk and whoever is enlisting the voter.

This conflict persists whether or not the ECI is stopped from carrying out the SIR. The same primary schoolteacher who works for the SIR under ECI supervision would make the same determination for NPR, and then the NRC under the MHA's oversight, if things come to that. The definition, design and application of citizenship laws are such that the state decides who the people are.

The Assam exercise

The only State that has a draft NRC – Assam – is proof of this concept. To implement the Assam Accord, Parliament passed the Citizenship (Amendment) Act, 1985, which, inserted Section 6A into the Citizenship Act, 1955, effectively creating a separate citizenship regime for Assam that was different from the rest of India, and creating three different cut-offs for residents, and placing them under various citizenship status. A draft NRC was published in 2019, and it marked 19 lakh residents out of 3.29 crore as D, for Doubtful citizenship. A person whose status as a citizen could not be "ascertained beyond reasonable doubt ... to the satisfaction of the registering authority", as per the rules as applied in Assam, ends up as a doubtful citizen.

The BJP government in Assam rejected the draft because a large number of people marked D were Hindus. Once a person is marked D in the NRC and/or the electoral rolls, their voting rights can be suspended, their citizenship can be determined by a foreigner's tribunal, and they could be deported. The process relied heavily on legacy records, of possessing documents regarding parentage and residency that go back several decades, to prove the varying cut-off dates of their residency and lineage.

There can be no argument that nobody should determine the citizenship of a resident of India or voting right is delinked from citizenship status. There can be a debate on who should be making that determination, and about the fairness and transparency of the process. Discomforting as it is, the burden is on the individual to establish the eligibility for citizenship. And it is the administrative state that makes the determination of who constitutes people. That is a fundamental paradox of democracy and in the relationship between the people and the state.

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Democracy's paradox, the chosen people of the state लोकतंत्र का विरोधाभास, राज्य के चुने हुए लोग

- The **Indian passport is meant to be issued only to Indian citizens.**
भारतीय पासपोर्ट केवल भारतीय नागरिकों को ही जारी किया जाना है।
- **Only citizens are supposed to be on the electoral rolls of the country.**
मतदाता सूची में केवल नागरिकों का नाम होना चाहिए।
- **But holding an Indian passport or having one's name on the electoral rolls is no proof of citizenship, because people can, and have, forged their way to these documents.**
लेकिन भारतीय पासपोर्ट रखना या मतदाता सूची में नाम होना नागरिकता का प्रमाण नहीं है, क्योंकि लोग इन दस्तावेजों को **जालसाजी** से प्राप्त कर सकते हैं और करते रहे हैं।
- This is a **conflict between evidence of status and status of evidence.**
यह **स्थिति के प्रमाण और प्रमाण की स्थिति** के बीच का टकराव है।
- This vexed question of citizenship governance has resurfaced in the context of **Election Commission of India's Special Intensive Revision (SIR)** of electoral rolls.
नागरिकता संचालन से जुड़ा यह जटिल प्रश्न **भारतीय चुनाव आयोग के विशेष गहन पुनरीक्षण (SIR)** के संदर्भ में फिर उभर आया है।
- The legal challenge against the SIR is based on the following grounds.
SIR के खिलाफ कानूनी चुनौती निम्न आधारों पर आधारित है।
- First, the **ECI has no power to determine citizenship, and only the Home Ministry has.**
पहला, ECI के पास नागरिकता निर्धारित करने की **शक्ति नहीं** है, यह शक्ति केवल **गृह मंत्रालय** के पास है।
- Second, **there is no provision in the law for an en masse SIR, and it can only be done selectively.**
दूसरा, कानून में **सामूहिक SIR** के लिए कोई प्रावधान नहीं है, इसे केवल चयनात्मक रूप से किया जा सकता है।
- Third, **whether one is a foreigner can be determined only by the Union Ministry of Home Affairs (MHA) under the Citizenship Act and by Foreigners Tribunals under the Foreigners Act, 1946.**
तीसरा, कोई विदेशी है या नहीं, यह केवल **गृह मंत्रालय** द्वारा **नागरिकता अधिनियम** के तहत और **विदेशी अधिकरणों** द्वारा **विदेशी अधिनियम, 1946** के तहत निर्धारित किया जा सकता है।
- The ECI has argued that its **constitutional mandate to determine the eligibility of individuals for electoral rolls necessarily entails verifying their citizenship status.**
ECI ने तर्क दिया है कि मतदाता सूची में शामिल करने की संवैधानिक जिम्मेदारी में व्यक्ति की **नागरिकता स्थिति** की पुष्टि आवश्यक रूप से शामिल है।
- **Its contention is that eligibility assessment cannot be equated with a formal determination of citizenship.**
इसका तर्क है कि पात्रता का आकलन नागरिकता के **औपचारिक निर्धारण** के बराबर नहीं है।
- While the Supreme Court may or may not accept this argument, the issues are **fundamental, political, and philosophical.**
सुप्रीम कोर्ट इसे स्वीकार करे या नहीं, लेकिन मुद्दे **मूलभूत, राजनीतिक और दार्शनिक** हैं।
- What is being questioned in the SIR is the presumption that **all residents are citizens unless proven otherwise.**
SIR में जिस धारणा को चुनौती दी जा रही है वह यह है कि **जब तक साबित न हो, सभी निवासी नागरिक** हैं।

For the individual to prove व्यक्ति के लिए प्रमाण प्रस्तुत करने की स्थिति

- **Countrywide, there is no single document that proves Indian citizenship — no document that has the status of being evidence of citizenship.**
देशभर में ऐसा **कोई एक दस्तावेज नहीं** है जो भारतीय नागरिकता को प्रमाणित करे — ऐसा कोई दस्तावेज जिसकी **नागरिकता प्रमाण** के रूप में स्थिति हो।
- A legal regime for countrywide adjudication of citizenship passed by Parliament is awaiting rollout.
देशव्यापी नागरिकता निर्धारण के लिए संसद द्वारा पारित कानूनी प्रणाली अभी लागू होने की प्रतीक्षा में है।



- In Parliament in August, the Centre was asked what proof there is of Indian citizenship. अगस्त में संसद में केंद्र से पूछा गया कि भारतीय नागरिकता का प्रमाण क्या है।
- The Centre said: "The **Citizenship Act, 1955, as amended in 2004, provides compulsory registration of every citizen and issuance of a National Identity Card.**"
केंद्र ने कहा: "नागरिकता अधिनियम, 1955, जिसे 2004 में संशोधित किया गया, प्रत्येक नागरिक का अनिवार्य पंजीकरण और राष्ट्रीय पहचान पत्र जारी करने का प्रावधान करता है।"
- The procedure is given in the **Citizenship Rules, 2003.**
प्रक्रिया नागरिकता नियम, 2003 में दी गई है।
- The rules state that national identity cards are to be issued to citizens whose particulars are in the **National Register of Citizens (NRC), a subset of the National Population Register (NPR).**
नियम कहते हैं कि राष्ट्रीय पहचान पत्र उन नागरिकों को जारी किए जाएंगे जिनका विवरण राष्ट्रीय नागरिक रजिस्टर (NRC) में है, जो राष्ट्रीय जनसंख्या रजिस्टर (NPR) का subset है।
- The NRC is mandated in the Act; the NPR is authorised by rules.
NRC अधिनियम में अनिवार्य है; NPR नियमों द्वारा अधिकृत है।
- The NRC is to include only those who prove that they are citizens.
NRC में केवल वे शामिल होंगे जो यह साबित करें कि वे नागरिक हैं।
- The law is clear that when challenged, the **onus of proving citizenship** lies on the individual, not the state.
कानून स्पष्ट है कि चुनौती दिए जाने पर नागरिकता साबित करने का दायित्व व्यक्ति पर है, राज्य पर नहीं।
- During the **2010 Census**, NPR data for **119 crore residents** was collected and updated in **2015.**
2010 की जनगणना के दौरान **119 करोड़ निवासियों** के NPR डेटा को एकत्र किया गया था और **2015** में अपडेट किया गया।
- Whether the NPR will be updated with the **2027 Census** remains unclear.
2027 की जनगणना के साथ NPR अपडेट होगा या नहीं, यह स्पष्ट नहीं है।
- The **BJP** dropped its promise of an **NRC** from its **2024 manifesto.**
BJP ने अपने **2024 घोषणा-पत्र** से **NRC** के वादे को हटा दिया।
- Any resident can be on the NPR, but to be on the NRC one must **prove eligibility** under the Citizenship Act.
कोई भी निवासी NPR में हो सकता है, लेकिन NRC में आने के लिए व्यक्ति को नागरिकता अधिनियम के तहत पात्रता साबित करनी होगी।
- The founders of the Republic favoured **Jus Soli (Right of the Soil)** with elements of **Jus Sanguinis (Right of Blood).**
गणराज्य के संस्थापकों ने **जस सोली (भूमि का अधिकार)** को प्राथमिकता दी थी, हालांकि **जस सैंग्विनिस (वंश का अधिकार)** के तत्व भी शामिल थे।
- Over decades, **Jus Sanguinis** gained prominence.
दशकों में **जस सैंग्विनिस** का महत्व बढ़ता गया।
- Citizenship by birth in India now has **multiple caveats.**
अब भारत में जन्म द्वारा नागरिकता के साथ **कई शर्तें** जुड़ी हैं।
- **To be a citizen by birth, one must be born before July 1, 1987.**
जन्म से नागरिक होने के लिए व्यक्ति का जन्म **1 जुलाई 1987 से पहले** होना चाहिए।
- **For those born between July 1, 1987 and December 2, 2004, one parent must be a citizen.**
1 जुलाई 1987 से 2 दिसंबर 2004 के बीच जन्मे लोगों के लिए, कम से कम एक माता-पिता का नागरिक होना आवश्यक है।
- **For births on or after December 3, 2004, one parent must be a citizen AND the other must not be an illegal migrant.**
3 दिसंबर 2004 या उसके बाद जन्मे लोगों के लिए, एक माता-पिता नागरिक होना चाहिए और दूसरा **अवैध प्रवासी नहीं** होना चाहिए।
- The **2003 amendment** introduced the category of **illegal immigrants**, who along with their children cannot obtain citizenship by birth.
2003 संशोधन ने **अवैध प्रवासियों** की श्रेणी लागू की, जो तथा उनके बच्चे जन्म से नागरिकता प्राप्त नहीं कर सकते।
- Some identified illegal immigrants qualify under the **Citizenship (Amendment) Act, 2019**, which brought a **religious test** into citizenship.



कुछ पहचाने गए अवैध प्रवासी नागरिकता (संशोधन) अधिनियम, 2019 के तहत योग्य होते हैं, जिसने नागरिकता में धार्मिक परीक्षण शामिल किया।

- In 2008, a pilot project issued the **Multipurpose National Identity Card (MNIC)** to a few lakh Indians, containing biometrics and personal details with **10-year validity**.
2008 में एक पायलट प्रोजेक्ट के तहत कुछ लाख भारतीयों को बहुउद्देश्यीय राष्ट्रीय पहचान पत्र (MNIC) जारी किया गया, जिसमें बायोमेट्रिक्स और व्यक्तिगत जानकारी थी और 10 वर्ष की वैधता थी।
- The nationwide NRC was a **2019 BJP manifesto** promise.
देशव्यापी NRC 2019 BJP घोषणा-पत्र का वादा था।
- In 2024, the party went silent on it, and we no longer hear about it.
2024 में पार्टी इस पर चुप हो गई और अब इसके बारे में कुछ सुनाई नहीं देता।
- The **SIR** by the ECI comes as a **proxy** for this larger exercise.
ECI का SIR इस बड़े अभ्यास का एक प्रतिनिधि (proxy) बनकर उभरा है।

A persisting conflict एक स्थायी संघर्ष

- Regardless of which Ministry or Department oversees the exercise, questions of **citizenship**, **treason** and **sedition** with regard to an individual are decided at the lowest level of bureaucracy and the police.
चाहे कोई भी मंत्रालय या विभाग इस अभ्यास की निगरानी करे, किसी व्यक्ति से संबंधित **citizenship**, **treason** और **sedition** के प्रश्न नौकरशाही और पुलिस के सबसे निचले स्तर पर तय किए जाते हैं।
- **The state's authority is created by the will of the people. People are sovereign; the state is their creation and it is not supposed to be the other way around.**
राज्य का अधिकार **will of the people** से निर्मित होता है। लोग संप्रभु हैं; राज्य उनकी रचना है और यह उल्टा नहीं होना चाहिए।
- Therefore, the modern state apparatus which has been invested with the authority to determine who constitutes the people has contradiction built in it.
इसलिए, आधुनिक राज्य तंत्र जिसे यह निर्धारित करने का अधिकार दिया गया है कि लोग कौन हैं, अपने भीतर **contradiction** लिए हुए है।
- Whether an individual is a **citizen**, and whether they are not **treasonous** or **seeditious** are all determined on a daily basis by the **border agent**, the **constable**, the **village clerk** and whoever is enlisting the voter.
कोई व्यक्ति **citizen** है या नहीं, और वे **treasonous** या **seeditious** नहीं हैं, यह प्रतिदिन **border agent**, **constable**, **village clerk** और मतदाता का पंजीकरण करने वालों द्वारा तय किया जाता है।
- This conflict persists whether or not the **ECI** is stopped from carrying out the **SIR**.
यह conflict तब भी बना रहता है चाहे **ECI** को **SIR** करने से रोका जाए या नहीं।
- The same primary schoolteacher who works for the **SIR** under ECI supervision would make the same determination for **NPR**, and then the **NRC** under the **MHA's** oversight, if things come to that.
वही प्राथमिक स्कूल शिक्षक जो **ECI** की निगरानी में **SIR** के लिए काम करता है, वही **NPR** के लिए, और फिर आवश्यकता पड़ने पर **MHA** की निगरानी में **NRC** के लिए भी वही निर्धारण करेगा।
- **The definition, design and application of citizenship laws are such that the state decides who the people are.**
citizenship laws की परिभाषा, डिजाइन और अनुप्रयोग ऐसे हैं कि राज्य ही तय करता है कि लोग कौन हैं।

The Assam exercise असम अभ्यास

- The only State that has a draft **NRC — Assam —** is proof of this concept.
एकमात्र राज्य जिसके पास **draft NRC — Assam —** है, वह इस अवधारणा का प्रमाण है।
- To implement the **Assam Accord**, Parliament passed the **Citizenship (Amendment) Act, 1985**, which inserted **Section 6A** into the **Citizenship Act, 1955**, effectively creating a separate citizenship regime for Assam that was different from the rest of India, and creating three different cut-offs for residents, and placing them under various citizenship status.
Assam Accord को लागू करने के लिए, संसद ने **Citizenship (Amendment) Act, 1985** पारित किया,



जिसने **Citizenship Act, 1955** में **Section 6A** जोड़ा, जिससे असम के लिए एक अलग नागरिकता व्यवस्था बनी जो भारत के बाकी हिस्सों से अलग थी, और निवासियों के लिए तीन अलग-अलग **cut-offs** बनाई, तथा उन्हें विभिन्न नागरिकता स्थिति में रखा।

- **A draft NRC was published in 2019, and it marked 19 lakh residents out of 3.29 crore as D, for Doubtful citizenship.**
draft NRC 2019 में प्रकाशित हुआ, और इसमें 3.29 करोड़ में से 19 लाख निवासियों को D (Doubtful citizenship) के रूप में चिह्नित किया गया।
- **A person whose status as a citizen could not be “ascertained beyond reasonable doubt ... to the satisfaction of the registering authority”, as per the rules as applied in Assam, ends up as a doubtful citizen.**
असम में लागू नियमों के अनुसार कोई व्यक्ति जिसकी नागरिकता स्थिति “beyond reasonable doubt ... registering authority की संतुष्टि तक” स्थापित नहीं हो पाती, वह doubtful citizen बन जाता है।
- **The BJP government in Assam rejected the draft because a large number of people marked D were Hindus.**
असम की **BJP सरकार** ने मसौदा खारिज कर दिया क्योंकि D चिह्नित लोगों में बड़ी संख्या **Hindus** की थी।
- **Once a person is marked D in the NRC and/or the electoral rolls, their voting rights can be suspended, their citizenship can be determined by a foreigner’s tribunal, and they could be deported.**
जब कोई व्यक्ति NRC और/या मतदाता सूची में D के रूप में चिह्नित हो जाता है, तो उसके **voting rights** निलंबित हो सकते हैं, उसकी **citizenship** का निर्धारण **foreigner’s tribunal** द्वारा किया जा सकता है, और उसे **deported** भी किया जा सकता है।
- The process relied heavily on **legacy records**, of possessing documents regarding parentage and residency that go back several **decades**, to prove the varying **cut-off dates** of their residency and lineage.
प्रक्रिया **legacy records** पर अत्यधिक आधारित थी, जिसमें अभिभावकों और निवास से संबंधित ऐसे दस्तावेज़ होने चाहिए जो कई **decades** पुराने हों, ताकि निवास और वंश की विभिन्न **cut-off dates** सिद्ध की जा सकें।
- There can be no argument that nobody should determine the citizenship of a resident of India or voting right is delinked from citizenship status.
इस पर कोई तर्क नहीं हो सकता कि भारत के निवासी की नागरिकता का निर्धारण कोई न करे या मतदान अधिकार नागरिकता स्थिति से अलग हो।
- There can be a debate on who should be making that determination, and about the **fairness** and **transparency** of the process.
इस पर बहस हो सकती है कि यह निर्धारण कौन करे, और प्रक्रिया की **fairness** व **transparency** क्या हो।
- Discomforting as it is, the **burden is on the individual** to establish the eligibility for citizenship.
असहज होते हुए भी, नागरिकता पात्रता साबित करने का **burden व्यक्ति पर** ही है।
- And it is the **administrative state** that makes the determination of who constitutes people.
और यह **administrative state** ही तय करता है कि लोग कौन हैं।
- That is a **fundamental paradox of democracy** and in the relationship between the people and the state.
यह **fundamental paradox of democracy** है और लोगों व राज्य के बीच संबंध का मूल विरोधाभास है।



GS II: Polity

Carceral culture

Prison manuals must mandate disability-related facilities

The Supreme Court of India's directions last week to provide disability-related support in prisons arose from a petition seeking to implement the existing disability law in places of detention, drawing on the experiences of G.N. Saibaba and Stan Swamy. Both men had serious physical conditions and asked for allowances that would have allowed them to cope with prison life; the state delayed or refused them these accommodations, with grave consequences. Dovetailing to the constitutional guarantees of equality and life with dignity for prisoners, the Rights of Persons with Disabilities Act 2016 obligates governments to ensure support for all services in their control. Many failures in implementing the Act are structural, however: prisons are a State subject whereas the Union government shapes policy through a model prison manual, laws and advisories. Recent national guidelines on prisoners with disabilities acknowledged special needs and called for accessible infrastructure and procedures whereas many State prison manuals still reflect older assumptions about a prisoner who is physically able. In a separate matter, the Court has held that caste-based segregation in jails is unconstitutional and *suo motu* said that it would monitor discrimination in prisons along caste, gender, and disability lines.

Colonial and postcolonial prison rules encoded social hierarchies, resulting in a routine assignment of sanitation tasks to Dalit and Adivasi prisoners, who are also over-represented among prisoners relative to their population, and the absence of specific obligations on prison authorities to support prisoners who cannot move or use sanitary facilities without assistance. The NCRB also records a nontrivial number of inmates with mental illness. While the Court had already censured it – in *Muruganantham* (2025), whose mandates the new order expands nationwide – for not disaggregating data by disability, it is reasonable to assume that many prisoners experience the intersection of caste bias and disability together. Yet, prison rules and oversight mechanisms have repeatedly normalised the idea that the discomfort faced by some bodies is part of the sentence rather than something the state needs to prevent. Following on from the new order, the Centre and States need to amend prison manuals to include clear duties about disability-related accommodation, and screen for disability at admission and support individuals. These measures require more funds, which means the state also needs to confront its carceral austerity, wherein it expands the punitive and security capacity of prisons at the expense of dispensing rights-related functions. Prison budgets have to be redesigned to treat accessibility and non-discrimination as core obligations. Finally, independent inspections and routine publication of disaggregated data on caste and disability inside prisons should support public oversight, or the Court's directions will remain paper tigers.

Carceral culture कार्सरल संस्कृति

- Prison manuals must mandate disability-related facilities
जेल मैनुअल में विकलांगता-संबंधी सुविधाओं को अनिवार्य करना चाहिए
- The Supreme Court of India's directions last week to provide disability-related support in prisons arose from a petition seeking to implement the existing disability law in places of detention, drawing on the experiences of **G.N. Saibaba and Stan Swamy**.
भारतीय सर्वोच्च न्यायालय के पिछले सप्ताह के निर्देश, जो कारागारों में दिव्यांग-सम्बंधित सहायता प्रदान करने के लिए थे, एक याचिका से उत्पन्न हुए जिसमें **G.N. साईबाबा** और **स्टेन स्वामी** के अनुभवों के आधार पर निरुद्ध स्थानों में दिव्यांगता कानून लागू करने की मांग की गई थी।
- Both men had serious physical conditions and asked for allowances that would have allowed them to cope with prison life; the state delayed or refused them these accommodations, with **grave consequences**.
दोनों व्यक्तियों को गंभीर शारीरिक समस्याएँ थीं और उन्होंने ऐसी सुविधाओं की मांग की थी जो उन्हें कारागार जीवन का सामना करने में सक्षम बनातीं; राज्य ने इन सुविधाओं में देरी की या उन्हें अस्वीकार कर दिया, जिसके **गंभीर परिणाम** हुए।
- Dovetailing to the constitutional guarantees of equality and life with dignity for prisoners, the **Rights of Persons with Disabilities Act 2016** obligates governments to ensure support for all services in their control.
कैदियों के लिए समानता और गरिमा के साथ जीवन के **संवैधानिक अधिकारों** के अनुरूप, **दिव्यांग व्यक्तियों के अधिकार अधिनियम 2016** सरकारों पर अपने नियंत्रण में आने वाली सभी सेवाओं में सहायता सुनिश्चित करने का दायित्व डालता है।
- Many failures in implementing the Act are structural, however: **prisons are a State subject whereas the Union government shapes policy through a model prison manual, laws and advisories**.
हालाँकि, अधिनियम को लागू करने में कई विफलताएँ संरचनात्मक हैं: कारागार **राज्य विषय** हैं जबकि केंद्र सरकार **मॉडल प्रिजन मैनुअल**, कानूनों और सलाहों के माध्यम से नीति बनाती है।
- Recent **national guidelines on prisoners with disabilities** acknowledged special needs and called for accessible infrastructure and procedures whereas many **State prison manuals** still reflect older assumptions about a physically able prisoner.
दिव्यांग कैदियों पर हाल के राष्ट्रीय दिशानिर्देश विशेष आवश्यकताओं को स्वीकार करते हैं और सुलभ ढाँचे व प्रक्रियाओं की मांग करते हैं, जबकि कई **राज्य कारागार मैनुअल** अब भी शारीरिक रूप से सक्षम कैदी की पुरानी धारणाओं को दर्शाते हैं।
- In a separate matter, the **Court has held that caste-based segregation in jails is unconstitutional and suo motu** said that it would monitor discrimination in prisons along caste, gender, and disability lines.



एक अलग मामले में, अदालत ने कहा कि जेलों में जाति-आधारित पृथक्करण असंवैधानिक है और स्वतः संज्ञान लेकर कहा कि वह जाति, लिंग और दिव्यांगता के आधार पर होने वाले भेदभाव की निगरानी करेगी।

- Colonial and postcolonial prison rules encoded social hierarchies, resulting in a routine assignment of sanitation tasks to Dalit and Adivasi prisoners, who are also over-represented relative to their population.
औपनिवेशिक और उत्तर-औपनिवेशिक कारागार नियमों ने सामाजिक पदानुक्रम को संस्थागत किया, जिसके परिणामस्वरूप दलित और आदिवासी कैदियों को नियमित रूप से सफाई कार्य सौंपा जाता है, और वे अपनी जनसंख्या अनुपात से अधिक संख्या में कारागारों में उपस्थित हैं।
- and the absence of specific obligations on prison authorities to support prisoners who cannot move or use sanitary facilities without assistance.
और कारागार अधिकारियों पर ऐसे कैदियों की सहायता करने का कोई विशिष्ट दायित्व नहीं है जो बिना सहायता के चल नहीं सकते या शौचालय सुविधाओं का उपयोग नहीं कर सकते।
- The NCRB also records a nontrivial number of inmates with mental illness.
NCRB भी मानसिक बीमारी वाले कैदियों की एक महत्वपूर्ण संख्या दर्ज करता है।
- While the Court had already censured it — in Muruganatham (2025), whose mandates the new order expands nationwide — for not disaggregating data by disability, it is reasonable to assume that many prisoners experience the intersection of caste bias and disability together.
अदालत पहले ही Muruganatham (2025) में इसकी आलोचना कर चुकी है क्योंकि यह दिव्यांगता के आधार पर डेटा विभाजित नहीं करता; और यह मानना उचित है कि कई कैदी जातिगत पूर्वाग्रह और दिव्यांगता के सम्मिलित प्रभाव का अनुभव करते हैं।
- Yet, prison rules and oversight mechanisms have repeatedly normalised the idea that the discomfort faced by some bodies is part of the sentence rather than something the state needs to prevent.
फिर भी कारागार नियम और निगरानी तंत्र बार-बार इस विचार को सामान्य करते हैं कि कुछ शरीरों द्वारा झेला जाने वाला कष्ट सज़ा का हिस्सा है, न कि कुछ ऐसा जिसे राज्य को रोकना चाहिए।
- Following on from the new order, the Centre and States need to amend prison manuals to include clear duties about disability-related accommodation, and screen for disability at admission and support individuals.
नए आदेश के बाद, केंद्र और राज्य सरकारों को कारागार मैनुअल संशोधित करने चाहिए ताकि दिव्यांग-सम्बंधित सुविधाओं पर स्पष्ट दायित्व शामिल हों, तथा प्रवेश पर दिव्यांगता की जांच कर individuals को सहायता दी जाए।
- These measures require more funds, which means the state also needs to confront its carceral austerity, wherein it expands punitive and security capacity at the expense of rights-related functions.
इन उपायों के लिए अधिक धन की आवश्यकता है, जिसका अर्थ है कि राज्य को अपनी कारागार कठोरता का सामना करना होगा, जहाँ दंडात्मक और सुरक्षा क्षमता बढ़ाई जाती है लेकिन अधिकार-संबंधी कार्यों की उपेक्षा होती है।
- Prison budgets have to be redesigned to treat accessibility and non-discrimination as core obligations.
कारागार बजट को पुनः डिज़ाइन किया जाना चाहिए ताकि सुगम्यता और गैर-भेदभाव को मूल दायित्वों के रूप में शामिल किया जा सके।
- Finally, independent inspections and routine publication of disaggregated data on caste and disability inside prisons should support public oversight, or the Court's directions will remain paper tigers.
अंततः, स्वतंत्र निरीक्षण और जाति तथा दिव्यांगता पर विभाजित डेटा का नियमित प्रकाशन जन निगरानी को सक्षम करना चाहिए, अन्यथा अदालत के निर्देश केवल कागज़ी बनकर रह जाएंगे।



GS Paper II: International Relations

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09 December

1. **The real story of the India-Russia summit**
भारत-रूस शिखर सम्मेलन की वास्तविक कहानी
2. **A new step in the dragon-elephant tango**
ड्रैगन-एलिफैंट टैंगो में एक नया कदम

The real story of the India-Russia summit

GS II: IR: India Russia

MOB

The 23rd India-Russia Summit, which was held in New Delhi last week, once again brought to the fore the treacherous geopolitical terrain that defines today's world. The Ukraine war has pitted India's most important partners against each other. Navigating this quagmire is no easy task, but India has led the way for the world.

The signal sent, the timing

The red carpet treatment given to Russian President Vladimir Putin on his first visit to India since the Ukraine war began, and his decision to bring a large high-powered Russian delegation, were significant. The delegation included Kirill Dmitriev, the face of peace efforts (who has been functioning along with special U.S. envoy Steve Witkoff, and the U.S. President Donald Trump's son-in-law Jared Kushner). In diplomacy, optics matter. For India, it was meant to remove any ambiguity about the Russia relationship, thereby signalling confidence in dealing with the world. For Russia, it signalled the importance of India in its foreign policy priorities.

On matters of war and peace, timing is no less important. The India-Russia summit took place at a time when Russia's stranglehold on the battlefield is very tight, Ukraine is staring at military defeat and the U.S. has, for all practical purposes, turned its back on Ukraine. Since the only peace effort in town is the one being driven by Mr. Trump, Mr. Modi's unambiguous support to the peace efforts on Ukraine in general should rightly be read as being a full and strong endorsement of the Trump initiative, and should be welcomed by the U.S.

India and the U.S. are on the same page here. If there is anyone who has a stake in the success of Mr. Trump's efforts, it is India. The outlier at this point is Europe and India's challenge will be to



Pankaj Saran

is Convener, NatStrat, a former Deputy National Security Adviser and a former Ambassador to Russia

There has been a re-engineering of the relationship between Moscow and New Delhi

preserve the major gains with Europe.

The pillars of ties

On the bilateral front, the Summit's adoption of a Programme for the **Development of Strategic Areas of India-Russia Economic Cooperation till 2030 (Programme 2030)** and the enabling decisions to strengthen arrangements for bilateral settlements and trade in national currencies are steps in the right direction. This together with removal of non-tariff barriers, diversification of the trade basket and investments in non-energy sectors can enable the achievement of the \$100 billion trade target by 2030. Areas such as fertilizers, railways, pharmaceuticals, mineral resources and critical raw materials are essential for India's growth needs, for which Russia's huge untapped potential is an invaluable fit.

On the energy front, India is the second largest importer of fossil fuel globally. Assured and affordable availability of energy is quite simply a national security imperative. Russia's resources dwarf the rest of the world. China understood this early on, and has worked, with single-minded purpose, to capture a large chunk of them. Today, companies in the United States are waiting in the wings to do so for energy and all critical minerals. If India does not play its cards right, it risks being pushed out from what is its natural preserve, and at great cost to its economic security. Therefore, the focus on energy cooperation is likely to be a foundational pillar of the relationship going forward.

Three new areas that are maturing well are maritime connectivity involving the Chennai-Vladivostok Maritime Corridor, the Northern Sea Route and, relatedly, the shipbuilding sector; second, cooperation in the Arctic, especially the Russian offer to train Indian seafarers; and third, and most importantly, the

export of Indian skilled workers to Russia. The last agreement has come about after years of negotiation. The structural demographic crisis in Russia, including in its Far East, hastened by war losses, curtailment of workers from Central Asia and unease over a growing Chinese presence have contributed to making this agreement a reality. The agreement to ease tourist visas is another quick yielding and long overdue initiative.

Science and technology, and space, nuclear and defence cooperation are all areas of long-standing cooperation built over generations. Russia has been a generous partner in all these areas, with much less strings attached than the West. The Indo-Russian BrahMos has emerged as one of the mainstays of India's missile force, while the S400 air defence system proved its indispensability during Operation Sindoor (May 2025). Due to persistent Indian efforts, levels of localisation, technology transfer and joint production have increased significantly. India still needs support to maintain its Russian origin military inventory even as it shifts to indigenisation. Future defence cooperation is likely to be concentrated on niche technologies and systems.

In perspective

The real story of the summit is the re-engineering of the relationship, the determination to move ahead despite many hurdles, and the eye being kept on the geopolitical shifts underway between the U.S. and China which draw India and Russia closer. As far as Europe is concerned, the road to peace does not lie through New Delhi. It lies in dialogue between Europe and Russia. India's point is that history contains enough examples to emulate and mistakes to avoid. India believes it is, and can be a valuable partner and friend to both.

The real story of the India-Russia summit

भारत-रूस शिखर सम्मेलन की वास्तविक कहानी

The 23rd India-Russia Summit

भारत-रूस 23वाँ शिखर सम्मेलन

- The 23rd India-Russia Summit, which was held in **New Delhi** last week, once again brought to the fore the treacherous geopolitical terrain that defines today's world.
New Delhi में पिछले सप्ताह आयोजित 23वाँ भारत-रूस शिखर सम्मेलन ने एक बार फिर आज की दुनिया को परिभाषित करने वाले खतरनाक **geopolitical terrain** को प्रमुखता से सामने ला दिया।
- The **Ukraine war** has pitted India's most important partners against each other.
Ukraine war ने भारत के सबसे महत्वपूर्ण साझेदारों को एक-दूसरे के खिलाफ खड़ा कर दिया है।



- Navigating this quagmire is no easy task, but India has led the way for the world.
इस quagmire में आगे बढ़ना आसान नहीं है, लेकिन भारत ने दुनिया के लिए मार्ग प्रशस्त किया है।

The signal sent, the timing

भेजा गया संकेत और समय का महत्व

- The red carpet treatment given to **Russian President Vladimir Putin** on his first visit to India since the Ukraine war began, and his decision to bring a large high-powered Russian delegation, were significant.
Russian President Vladimir Putin को यूक्रेन युद्ध शुरू होने के बाद भारत में पहली यात्रा पर दिया गया **red carpet** स्वागत और उनके साथ उच्चस्तरीय रूसी प्रतिनिधिमंडल लाने का निर्णय महत्वपूर्ण था।
- The delegation included **Kirill Dmitriev**, the face of peace efforts (who has been functioning along with special **U.S. envoy Steve Witkoff**, and the **U.S. President Donald Trump's son-in-law Jared Kushner**).
प्रतिनिधिमंडल में **Kirill Dmitriev** शामिल थे, जो शांति प्रयासों का चेहरा हैं (जो **U.S. envoy Steve Witkoff** और **U.S. President Donald Trump** के दामाद **Jared Kushner** के साथ काम कर रहे हैं)।
- In diplomacy, **optics matter**. For India, it was meant to remove any ambiguity about the Russia relationship, thereby signalling **confidence** in dealing with the world.
कूटनीति में **optics matter** करते हैं। भारत के लिए यह रूस संबंधों पर किसी भी अस्पष्टता को दूर कर दुनिया से निपटने में अपनी **confidence** दर्शाने का संकेत था।
- For Russia, it signalled the **importance of India** in its foreign policy priorities.
रूस के लिए, यह उसकी विदेश नीति की प्राथमिकताओं में भारत के **importance** को दर्शाता है।
- On matters of war and peace, **timing is no less important**.
युद्ध और शांति के मामलों में **timing भी अत्यंत महत्वपूर्ण** होती है।
- The India-Russia summit took place at a time when Russia's **stranglehold** on the battlefield is very tight, Ukraine is staring at **military defeat** and the **U.S.** has, for all practical purposes, **turned its back on Ukraine**.
भारत-रूस शिखर सम्मेलन ऐसे समय में हुआ जब युद्धक्षेत्र पर रूस की **stranglehold** अत्यंत मजबूत है, यूक्रेन **military defeat** के कगार पर है, और **U.S.** ने व्यावहारिक रूप से यूक्रेन से **पीठ मोड़ ली है**।
- Since the only peace effort in town is the one being driven by **Mr. Trump**, Mr. Modi's unambiguous support to the peace efforts on Ukraine in general should rightly be read as a full and strong endorsement of the **Trump initiative**, and should be welcomed by the U.S.
क्योंकि वर्तमान में एकमात्र शांति प्रयास **Mr. Trump** द्वारा संचालित है, इसलिए यूक्रेन पर शांति प्रयासों के प्रति **Mr. Modi** का स्पष्ट समर्थन **Trump initiative** का पूर्ण और मजबूत समर्थन माना जाना चाहिए और इसे **U.S.** द्वारा स्वागत किया जाना चाहिए।
- India and the U.S. are **on the same page** here.
भारत और **U.S.** इस मुद्दे पर **on the same page** हैं।
- If there is anyone who has a stake in the success of Mr. Trump's efforts, it is **India**.
यदि **Mr. Trump** के प्रयासों की सफलता में किसी का सबसे बड़ा हित है, तो वह **India** है।
- The **outlier at this point is Europe**, and **India's challenge will be to preserve the major gains with Europe**.
इस समय **Europe** एक outlier है, और भारत की चुनौती यूरोप के साथ हुए अपने **major gains** को सुरक्षित रखना होगी।

The pillars of ties

संबंधों के स्तंभ

- On the bilateral front, the Summit's adoption of a **Programme for the Development of Strategic Areas of India-Russia Economic Cooperation till 2030 (Programme 2030)** and the enabling decisions to strengthen arrangements for **bilateral settlements and trade in national currencies** are steps in the right direction.
द्विपक्षीय मोर्चे पर, शिखर सम्मेलन द्वारा **Programme 2030** (Programme for the Development of Strategic Areas of India-Russia Economic Cooperation till 2030) को अपनाना और **bilateral settlements तथा trade in national currencies** की व्यवस्थाओं को मजबूत करने के निर्णय सही दिशा में कदम हैं।



- This together with **removal of non-tariff barriers**, diversification of the **trade basket** and investments in **non-energy sectors** can enable the achievement of the **\$100 billion trade target by 2030**.
इसके साथ **non-tariff barriers** को हटाना, **trade basket** का विविधीकरण और **non-energy sectors** में निवेश **2030 तक \$100 billion trade target** हासिल करने में सक्षम बना सकता है।
- Areas such as **fertilizers, railways, pharmaceuticals, mineral resources and critical raw materials** are essential for India's growth needs, for which Russia's huge untapped potential is an invaluable fit.
fertilizers, railways, pharmaceuticals, mineral resources और critical raw materials जैसे क्षेत्र भारत की विकास आवश्यकताओं के लिए आवश्यक हैं, जिनके लिए रूस की विशाल **untapped potential** एक अमूल्य योगदान है।
- **On the energy front, India is the second largest importer of fossil fuel globally.**
ऊर्जा क्षेत्र में, भारत वैश्विक स्तर पर **second largest importer of fossil fuel** है।
- **Assured and affordable availability of energy is quite simply a national security imperative.**
ऊर्जा की **assured और affordable availability** एक **national security imperative** है।
- Russia's resources dwarf the rest of the world.
रूस के संसाधन दुनिया के बाकी हिस्सों की तुलना में विशाल हैं।
- China understood this early on, and has worked, with **single-minded purpose**, to capture a large chunk of them.
चीन ने इसे पहले ही समझ लिया था और **single-minded purpose** के साथ इन संसाधनों के बड़े हिस्से पर कब्जा करने के लिए काम किया है।
- **Today, companies in the United States are waiting in the wings to do so for energy and all critical minerals.**
आज **United States** की कंपनियां ऊर्जा और **critical minerals** के लिए ऐसा करने के लिए तैयार खड़ी हैं।
- **If India does not play its cards right, it risks being pushed out from what is its natural preserve, and at great cost to its economic security.**
यदि भारत ने सही तरीके से कदम नहीं उठाए, तो उसका अपने **natural preserve** से बाहर धकेला जाना तय है, और यह उसकी **economic security** के लिए भारी कीमत पर होगा।
- Therefore, the focus on **energy cooperation** is likely to be a foundational pillar of the relationship going forward.
इसलिए, **energy cooperation** पर ध्यान भविष्य में संबंधों का एक **foundational pillar** बनने की संभावना है।
- Three new areas that are maturing well are maritime connectivity involving the **Chennai-Vladivostok Maritime Corridor, the Northern Sea Route** and, relatedly, the **shipbuilding sector**; second, cooperation in the **Arctic**, especially the Russian offer to train Indian seafarers; and third, and most importantly, the **export of Indian skilled workers to Russia**.
तीन नए क्षेत्र जो अच्छी तरह परिपक्व हो रहे हैं: **Chennai-Vladivostok Maritime Corridor, Northern Sea Route** और संबद्ध **shipbuilding sector**; दूसरा, **Arctic** में सहयोग, विशेष रूप से भारतीय नाविकों को प्रशिक्षित करने की रूसी पेशकश; और तीसरा, सबसे महत्वपूर्ण, **Indian skilled workers** का रूस को **export**।
- The last agreement has come about after **years of negotiation**.
अंतिम समझौता **years of negotiation** के बाद संभव हो पाया है।
- The structural **demographic crisis** in Russia, including in its **Far East**, hastened by war losses, curtailment of workers from Central Asia and unease over a growing Chinese presence have contributed to making this agreement a reality.
रूस में संरचनात्मक **demographic crisis**, विशेषकर उसके **Far East** में, युद्ध हानि, Central Asia से श्रमिकों की कमी और चीन की बढ़ती उपस्थिति से उत्पन्न असहजता ने इस समझौते को वास्तविकता में बदलने में योगदान दिया है।
- The agreement to ease **tourist visas** is another quick yielding and long overdue initiative.
tourist visas को सरल बनाने का समझौता एक और त्वरित और लंबे समय से लंबित पहल है।
- Science and technology, and **space, nuclear and defence cooperation** are all areas of long-standing cooperation built over generations.
विज्ञान और प्रौद्योगिकी, तथा **space, nuclear और defence cooperation** ऐसे क्षेत्र हैं जिनमें पीढ़ियों से सहयोग चला आ रहा है।



- Russia has been a **generous partner** in all these areas, with much fewer strings attached than the West.
रूस इन सभी क्षेत्रों में एक **generous partner** रहा है, और पश्चिम की तुलना में बहुत कम शर्तें लगाता है।
- The **Indo-Russian BrahMos** has emerged as one of the mainstays of India's missile force, while the **S-400 air defence system** proved its indispensability during **Operation Sindoor (May 2025)**.
Indo-Russian BrahMos भारत की मिसाइल शक्ति के मुख्य आधारों में उभरा है, जबकि **S-400 air defence system** ने **Operation Sindoor (May 2025)** के दौरान अपनी अनिवार्यता साबित की।
- Due to persistent Indian efforts, levels of **localisation, technology transfer and joint production** have increased significantly.
भारत के लगातार प्रयासों के कारण **localisation, technology transfer और joint production** के स्तर में उल्लेखनीय वृद्धि हुई है।
- India still needs support to maintain its **Russian origin military inventory** even as it shifts to **indigenisation**.
भारत को अपने **Russian origin military inventory** को बनाए रखने के लिए अभी भी समर्थन की आवश्यकता है, भले ही वह **indigenisation** की ओर बढ़ रहा हो।
- Future defence cooperation is likely to be concentrated on **niche technologies and systems**.
भविष्य का रक्षा सहयोग **niche technologies और systems** पर केंद्रित रहने की संभावना है।

In perspective परिप्रेक्ष्य में

- The real story of the summit is the **re-engineering of the relationship**, the determination to move ahead despite many hurdles, and the eye being kept on the **geopolitical shifts** underway between the **U.S. and China** which draw India and Russia closer.
शिखर सम्मेलन की वास्तविक कहानी **relationship के re-engineering**, अनेक बाधाओं के बावजूद आगे बढ़ने के संकल्प, और **U.S. और China** के बीच चल रहे **geopolitical shifts** पर नजर रखने की है, जो भारत और रूस को और करीब लाते हैं।
- As far as Europe is concerned, the **road to peace** does not lie through New Delhi.
जहाँ तक Europe का संबंध है, **road to peace** नई दिल्ली से होकर नहीं जाती।
- It lies in dialogue between **Europe and Russia**.
यह **Europe और Russia** के बीच संवाद में है।
- India's point is that history contains enough examples to emulate and mistakes to avoid.
भारत का कहना है कि इतिहास में अनुकरण करने योग्य उदाहरण और बचने योग्य गलतियाँ भरपूर हैं।
- India believes it is, and can be a **valuable partner and friend to both**.
भारत मानता है कि वह दोनों के लिए एक **valuable partner और friend** है और बना रह सकता है।

A new step in the dragon-elephant tango

GS II: IR

Recently, at the Fourth Plenary Session of the 20th Central Committee of the Communist Party of China (CPC) in Beijing, the proposal for the 15th Five-Year Plan was approved. It not only charts China's course for the next five years but also unlocks broad development opportunities for the world.

As two ancient civilisations awakening to new horizons, China and India are not just neighbours, but partners in shaping the future. They are now at a critical stage of national development. China is advancing the great rejuvenation of the nation on all fronts through Chinese modernisation, while India is striving towards its 'Viksit Bharat 2047' vision. Development is the most significant common ground and a shared priority for both countries.

China's growth

During the 14th Five-Year Plan period (2021-2025), China has achieved historic milestones. Its economy grew at an average annual rate of 5.5% and is projected to reach RMB 140 trillion (about \$20 trillion) this year. Per capita GDP has remained above \$13,000 for two consecutive years, placing China among the leading upper-middle-income countries. China now ranks among the top 10 in the Global Innovation Index. Renewable energy now accounts for about 60% of the total installed power generation capacity, and air, water, and soil quality continue to improve. China is one of the top three trading partners for 157 countries and regions, including India. Contributing approximately 30% to global economic growth, China remains an anchor and engine for the world economy.

The fundamental reason for China's success lies in the centralised and unified leadership of the CPC, and in its adherence to "drawing a blueprint until it becomes a reality" – scientifically formulating and successively implementing five-year plans. As President Xi Jinping noted, "From

MOE



Xu Wei

Chinese Consul
General in Kolkata

the 1st Five-Year Plan to the 14th Five-Year Plan, the consistent theme has been to build China into a modern socialist country." Throughout this process, China has combined an effective market with a well-functioning government, integrated top-level design with public consultation, maintained policy stability and continuity, and kept pace with the people's growing aspirations.

The proposal for the 15th Five-Year Plan sends a strong signal that China will continue to promote high-quality development and high-level opening up, offering stable cooperation opportunities for countries worldwide. As fellow emerging economies and major developing nations, China and India have broad prospects and great potential for cooperation across various fields.

Potential for cooperation

First, economic and trade cooperation is built on a solid foundation. China is one of India's most important trading partners. In 2024, bilateral trade reached \$138.46 billion. From January to October this year, trade volume hit \$127.63 billion, an 11% year-on-year increase. India's exports to China have grown significantly. We welcome friends from the Indian business community to make full use of platforms such as the Canton Fair, the China International Import Expo, the China International Fair for Trade in Services, and the China International Consumer Products Fair to introduce more high-quality products and services to consumers in both countries.

Second, industrial collaboration is defined by complementary strengths. China, the world's largest manufacturing economy, boasts the most complete industrial system and strong capabilities in electronics, infrastructure, new energy, and AI. India excels in IT, software development, and biopharma. Against the backdrop of the new round of technological revolution and industrial transformation,

synergy between China and India will yield mutual benefits and enhance their positions in the global industrial and value chains.

Third, friendship, rooted in close contact between the people, is key to sound bilateral relations. China and India share a history of friendly exchanges spanning thousands of years. India's diverse culture deeply appeals to the Chinese people, with yoga, Bollywood movies, and Darjeeling tea enjoying great popularity. This year, China resumed Indian pilgrimages to the sacred mountain and holy lake in the Xizang Autonomous Region, and India reinstated tourist visas for Chinese citizens. Several direct flights between the two countries were restored. We look forward to more two-way visits by tourists, artists, scholars, and the youth.

Fourth, multilateral cooperation serves our broad common interests. In today's world, economic globalisation is facing headwinds. As important members of multilateral mechanisms such as BRICS, the SCO, and the G20, China and India should enhance communication and coordination on major international and regional issues, jointly address challenges such as climate change, food security, and public health, and work together towards an equal and orderly multipolar world, as well as a universally beneficial and inclusive economic globalisation.

One hundred years ago, when Tagore first set foot in China, he said, "I always feel that India has been one of China's extremely close relatives, and China and India have been enjoying time-honoured and affectionate brotherhood." This year marks the 75th anniversary of the establishment of our diplomatic relations. Under the strategic guidance of our leaders, China-India relations have continued to improve and develop. When the dragon and the elephant move in step, the dance not only brings stability and progress to Asia, but also adds a pivotal anchor for the world.

As fellow emerging economies and major developing nations, China and India have broad prospects and great potential for cooperation across various fields

A new step in the dragon-elephant tango ड्रैगन-एलिफैंट टैंगो में एक नया कदम

China's Five-Year Plan and India-China Development Context चीन की पंचवर्षीय योजना और भारत-चीन विकास संदर्भ

- Recently, at the Fourth Plenary Session of the 20th Central Committee of the Communist Party of China (CPC) in Beijing, the proposal for the **15th Five-Year Plan** was approved. हाल ही में बीजिंग में चीन की कम्युनिस्ट पार्टी की बीसवीं केंद्रीय समिति के चौथे पूर्ण अधिवेशन में पंद्रहवीं पंचवर्षीय योजना का प्रस्ताव स्वीकृत हुआ।



- It not only charts China's course for the next five years but also unlocks broad development opportunities for the world.
यह न केवल आगामी पाँच वर्षों के लिए चीन की दिशा निर्धारित करती है बल्कि विश्व के लिए व्यापक विकास अवसर भी प्रदान करती है।
- As two ancient civilisations awakening to new horizons, China and India are not just neighbours, but partners in shaping the future.
दो प्राचीन सभ्यताओं के रूप में नए क्षितिज की ओर अग्रसर चीन और भारत केवल पड़ोसी नहीं हैं बल्कि भविष्य के निर्माण में सहभागी हैं।
- They are now at a critical stage of national development.
दोनों देश वर्तमान में राष्ट्रीय विकास के एक महत्वपूर्ण चरण में हैं।
- China is advancing the great rejuvenation of the nation on all fronts through Chinese modernisation, while India is striving towards its 'Viksit Bharat 2047' vision.
चीन अपने देश के समग्र पुनर्जागरण को आधुनिकता के माध्यम से आगे बढ़ा रहा है, जबकि भारत अपने 'विकसित भारत 2047' के लक्ष्य की ओर प्रयासरत है।
- Development is the most significant common ground and a shared priority for both countries.
विकास दोनों देशों के लिए सबसे महत्वपूर्ण साझा आधार और प्राथमिकता है।

China's growth चीन की वृद्धि

- During the **14th Five-Year Plan period (2021–2025)**, China has achieved historic milestones.
चौदहवें पंचवर्षीय काल (2021–2025) के दौरान चीन ने ऐतिहासिक उपलब्धियाँ प्राप्त की हैं।
- Its economy grew at an average annual rate of **5.5%** and is projected to reach **RMB 140 trillion (about \$20 trillion)** this year.
उसकी अर्थव्यवस्था की औसत वार्षिक वृद्धि **5.5%** रही और इस वर्ष **आरएमबी 140 ट्रिलियन** तक पहुँचने का अनुमान है।
- **Per capita GDP has remained above \$13,000 for two consecutive years, placing China among the leading upper-middle-income countries.**
प्रति व्यक्ति आय लगातार दो वर्षों तक **तेरह हजार डॉलर** से अधिक बनी रही, जिससे चीन उच्च मध्यम आय वाले देशों में शामिल हो गया है।
- China now ranks among the top ten in the Global Innovation Index.
चीन अब वैश्विक नवाचार सूचकांक के शीर्ष दस देशों में शामिल है।
- **Renewable energy now accounts for about 60% of the total installed power generation capacity, and air, water, and soil quality continue to improve.**
नवीकरणीय ऊर्जा अब कुल स्थापित विद्युत क्षमता का लगभग **साठ प्रतिशत** हो चुकी है और वायु, जल तथा मिट्टी की गुणवत्ता में लगातार सुधार हो रहा है।
- **China is one of the top three trading partners for 157 countries and regions, including India.**
चीन **157 देशों और क्षेत्रों** के लिए, जिनमें भारत भी शामिल है, प्रमुख तीन व्यापारिक साझेदारों में से एक है।
- **Contributing approximately 30% to global economic growth, China remains an anchor and engine for the world economy.**
वैश्विक आर्थिक वृद्धि में लगभग **तीस प्रतिशत** योगदान देकर चीन विश्व अर्थव्यवस्था का आधार और प्रेरक बना हुआ है।

Reasons behind China's growth model चीन के विकास मॉडल के कारण

- The fundamental reason for China's success lies in the centralised and unified leadership of the CPC, and in its adherence to "drawing a blueprint until it becomes a reality".
चीन की सफलता का मूल कारण उसकी केंद्रीकृत और एकीकृत नेतृत्व प्रणाली तथा योजनाओं को वास्तविकता में बदलने की उसकी निरंतर नीति है।
- As President Xi Jinping noted, "From the 1st Five-Year Plan to the 14th Five-Year Plan, the consistent theme has been to build China into a modern socialist country."
जैसा कि राष्ट्रपति शी चिनफिंग ने कहा, प्रथम पंचवर्षीय योजना से लेकर चौदहवीं योजना तक चीन को एक आधुनिक समाजवादी राष्ट्र बनाने की निरंतर कोशिश होती रही है।



- Throughout this process, China has combined an effective market with a well-functioning government, integrated top-level design with public consultation, maintained policy stability and continuity, and kept pace with the people's growing aspirations.
इस पूरे दौरान चीन ने प्रभावी बाजार व्यवस्था को सक्षम शासन के साथ जोड़ा, उच्च स्तर की योजना को जन सहभागिता से जोड़ा, नीतिगत स्थिरता बनाए रखी और जनता की बढ़ती आकांक्षाओं के अनुरूप कदम बढ़ाए।

The 15th Five-Year Plan's global impact

पंद्रहवीं पंचवर्षीय योजना का वैश्विक प्रभाव

- The proposal for the 15th Five-Year Plan sends a strong signal that China will continue to promote high-quality development and high-level opening up, offering stable cooperation opportunities for countries worldwide.
पंद्रहवीं पंचवर्षीय योजना का प्रस्ताव यह संकेत देता है कि चीन उच्च गुणवत्ता वाले विकास और उच्च स्तर के खुलेपन को जारी रखेगा तथा विश्व के देशों को स्थिर सहयोग अवसर उपलब्ध कराएगा।
- As fellow emerging economies and major developing nations, China and India have broad prospects and great potential for cooperation across various fields.
उभरती अर्थव्यवस्थाओं और प्रमुख विकासशील राष्ट्रों के रूप में चीन और भारत के पास अनेक क्षेत्रों में सहयोग की व्यापक संभावनाएँ और अपार क्षमता मौजूद है।

Potential for cooperation

सहयोग की संभावनाएँ

- First, economic and trade cooperation is built on a solid foundation.
पहला, आर्थिक और व्यापारिक सहयोग एक मजबूत आधार पर आधारित है।
- China is one of India's most important trading partners.
चीन भारत का एक अत्यंत महत्वपूर्ण व्यापारिक साझेदार है।
- In 2024, bilateral trade reached **\$138.46 billion**.
वर्ष 2024 में द्विपक्षीय व्यापार **138.46 अरब डॉलर** तक पहुँच गया।
- From January to October this year, trade volume hit **\$127.63 billion**, an **11% year-on-year increase**.
इस वर्ष जनवरी से अक्टूबर के बीच व्यापार **127.63 अरब डॉलर** तक पहुँच गया, जो वार्षिक आधार पर **11 प्रतिशत** वृद्धि है।
- India's exports to China have grown significantly.
भारत का चीन को निर्यात उल्लेखनीय रूप से बढ़ा है।
- We welcome friends from the Indian business community to make full use of platforms such as the **Canton Fair**, the **China International Import Expo**, the **China International Fair for Trade in Services**, and the **China International Consumer Products Fair** to introduce more high-quality products and services to consumers in both countries.
हम भारतीय व्यापारिक समुदाय को प्रोत्साहित करते हैं कि वे विभिन्न चीनी व्यापार मंचों का उपयोग कर दोनों देशों के उपभोक्ताओं तक अधिक गुणवत्तापूर्ण उत्पाद और सेवाएँ पहुँचाएँ।
- Second, industrial collaboration is defined by complementary strengths.
दूसरा, औद्योगिक सहयोग परस्पर पूरक क्षमताओं पर आधारित है।
- China, the world's largest manufacturing economy, boasts the most complete industrial system and strong capabilities in electronics, infrastructure, new energy, and AI.
चीन, जो विश्व की सबसे बड़ी विनिर्माण अर्थव्यवस्था है, इलेक्ट्रॉनिक्स, अवसंरचना, नई ऊर्जा और कृत्रिम बुद्धिमत्ता जैसे क्षेत्रों में व्यापक और मजबूत औद्योगिक क्षमताएँ रखता है।
- India excels in IT, software development, and biopharma.
भारत सूचना प्रौद्योगिकी, सॉफ्टवेयर विकास और जैव-औषधि क्षेत्रों में उत्कृष्टता रखता है।
- Against the backdrop of the new round of technological revolution and industrial transformation, synergy between China and India will yield mutual benefits and enhance their positions in the global industrial and value chains.
तकनीकी क्रांति और औद्योगिक परिवर्तन के इस दौर में चीन और भारत के बीच सहयोग दोनों देशों के लिए लाभकारी होगा तथा उन्हें वैश्विक औद्योगिक और मूल्य श्रृंखलाओं में बेहतर स्थान प्रदान करेगा।



- Third, friendship, rooted in close contact between the people, is key to sound bilateral relations.
तीसरा, जनता के बीच घनिष्ठ संपर्क पर आधारित मित्रता स्वस्थ द्विपक्षीय संबंधों की कुंजी है।
- China and India share a history of friendly exchanges spanning thousands of years.
चीन और भारत के बीच हजारों वर्षों से मैत्रीपूर्ण संपर्क का इतिहास रहा है।
- India's diverse culture deeply appeals to the Chinese people, with yoga, cinema, and दार्जिलिंग चाय अत्यंत लोकप्रिय हैं।
भारत की विविध संस्कृति चीनी जनता को अत्यंत आकर्षित करती है, जिसमें योग, भारतीय सिनेमा और दार्जिलिंग चाय विशेष रूप से लोकप्रिय हैं।
- This year, China resumed Indian pilgrimages to the sacred mountain and holy lake in the Xizang Autonomous Region, and India reinstated tourist visas for Chinese citizens.
इस वर्ष चीन ने शिविर क्षेत्र में भारतीय तीर्थ यात्राएँ पुनः आरंभ कीं तथा भारत ने चीनी नागरिकों के लिए पर्यटन वीजा पुनः जारी किए।
- Several direct flights between the two countries were restored.
दोनों देशों के बीच कई प्रत्यक्ष उड़ानें भी पुनः शुरू की गईं।
- We look forward to more two-way visits by tourists, artists, scholars, and the youth.
हम दोनों देशों के पर्यटकों, कलाकारों, विद्वानों और युवाओं के अधिक द्विपक्षीय आदान-प्रदान की अपेक्षा करते हैं।
- Fourth, multilateral cooperation serves our broad common interests.
चौथा, बहुपक्षीय सहयोग हमारे व्यापक साझा हितों की पूर्ति करता है।
- In today's world, economic globalisation is facing headwinds.
आज की दुनिया में आर्थिक वैश्वीकरण अनेक चुनौतियों का सामना कर रहा है।
- As important members of multilateral mechanisms such as BRICS, the SCO, and the G20, China and India should enhance communication and coordination on major international and regional issues.
ब्रिक्स, शंघाई सहयोग संगठन और बीस देशों के समूह जैसे बहुपक्षीय मंचों के महत्वपूर्ण सदस्य होने के नाते चीन और भारत को प्रमुख अंतरराष्ट्रीय और क्षेत्रीय मुद्दों पर संवाद और समन्वय बढ़ाना चाहिए।
- Jointly address challenges such as climate change, food security, and public health, and work together towards an equal and orderly multipolar world.
दोनों देशों को जलवायु परिवर्तन, खाद्य सुरक्षा और सार्वजनिक स्वास्थ्य जैसी चुनौतियों का संयुक्त रूप से समाधान करना चाहिए तथा एक न्यायपूर्ण और संतुलित बहुध्रुवीय विश्व की दिशा में सहयोग करना चाहिए।
- One hundred years ago, when Tagore first set foot in China, he said, "I always feel that India has been one of China's extremely close relatives, and China and India have been enjoying time-honoured and affectionate brotherhood."
एक सौ वर्ष पूर्व, जब रवीन्द्रनाथ टैगोर चीन पहुँचे, उन्होंने कहा था कि भारत और चीन के बीच अत्यन्त घनिष्ठ और स्नेहपूर्ण संबंध रहे हैं।
- This year marks the 75th anniversary of the establishment of our diplomatic relations.
इस वर्ष हमारे राजनयिक संबंधों की पचहत्तरवीं वर्षगांठ है।
- Under the strategic guidance of our leaders, China-India relations have continued to improve and develop.
हमारे नेतृत्व के मार्गदर्शन में चीन-भारत संबंध निरंतर बेहतर हुए हैं और विकसित हो रहे हैं।
- When the dragon and the elephant move in step, the dance not only brings stability and progress to Asia, but also adds a pivotal anchor for the world.
जब दोनों देशों का विकास संतुलित रूप से आगे बढ़ता है, तो यह एशिया में स्थिरता और प्रगति लाता है तथा विश्व के लिए भी एक महत्वपूर्ण आधार प्रदान करता है।



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GS III: Economy

Prudent action

The RBI needs to be ready for a quick policy pivot as it cuts rates

The decision made by the Reserve Bank of India's Monetary Policy Committee (MPC) to cut interest rates once again, by 25 basis points to 5.25%, is both an assessment of India's current economy and also of what to expect over the next few months. Cumulatively, interest rates have been cut by 125 basis points in calendar year 2025. The last time such large cuts had been implemented was in 2019 when rates had been cut by 135 basis points, in reaction to a plummeting growth rate. India's quarterly GDP growth rate had fallen from 8.9% in the March 2018 quarter to 3.3% by the quarter-ended December 2019. Growth is currently seeing the opposite trajectory. It has steadily been accelerating from 5.6% in Q2 of last year to the recently released 8.2% in Q2 of this year. From a growth perspective, there are at least two ways to look at the MPC's interest rate moves. The first is that the central bank is not convinced that growth is currently as robust as the numbers suggest, and so feels monetary policy needs to be as supportive as possible. After all, it could have left rates unchanged at 5.5%. The second is that the MPC feels that Indian companies are still sitting on excess capacity, and so the risks of overheating the economy are slim. So, it might as well push for more growth. The reality is probably a combination of the two: real growth looks higher due to an unusually low deflator, and companies can certainly afford to invest more, even if this is fuelled by debt. A rate cut addresses both issues.

The MPC also possibly feels that the economic impact of the U.S.'s 50% tariffs have not yet fully played out. Supply chains take some time to realign, and so there might still be a further shift away from Indian exporters. Cheaper credit going ahead is something Indian MSMEs, especially exporters, will welcome. On the inflation front, the MPC has lowered its outlook for the year to a benign 2%. However, a jump in food prices or oil prices, for whatever reason, will undo all its calculations. The MPC must be ready to raise rates at the first sign of inflation rising faster than expected. The 2019 rate cut episode saw inflation jumping from 2% in January 2019 to 7.6% in about a year. Taken together, the rate cut suggests that the MPC feels that India's seemingly robust growth could do with further help, while inflationary worries are a thing of the past. Its decision to retain its neutral stance is a prudent one. Global uncertainty is such that growth and inflation trajectories could reverse direction suddenly, which would need a quick policy pivot.

Prudent action

सावधानीपूर्ण कार्रवाई

- The RBI needs to be ready for a quick policy pivot as it cuts rates

आरबीआई को दरें कम करते समय एक तेज़ नीति परिवर्तन के लिए तैयार रहने की आवश्यकता है

The decision made by the Reserve Bank of India's Monetary Policy Committee (MPC)

भारतीय रिज़र्व बैंक की मौद्रिक नीति समिति (MPC) द्वारा लिया गया निर्णय

- The decision made by the Reserve Bank of India's Monetary Policy Committee (MPC) to cut interest rates once again, by **25 basis points to 5.25%**, is both an assessment of India's current economy and also of what to expect over the next few months.

भारतीय रिज़र्व बैंक की MPC द्वारा ब्याज दरों को एक बार फिर **25 बेसिस पॉइंट घटाकर 5.25%** करने का निर्णय, भारत की वर्तमान अर्थव्यवस्था का आकलन भी है और आने वाले महीनों की संभावनाओं का संकेत भी।

- Cumulatively, interest rates have been cut by **125 basis points** in calendar year **2025**.

कैलेंडर वर्ष **2025** में कुल मिलाकर ब्याज दरों में **125 बेसिस पॉइंट** की कटौती की गई है।

- The last time such large cuts had been implemented was in **2019** when rates had been cut by **135 basis points**, in reaction to a plummeting growth rate.

इतनी बड़ी कटौती आखिरी बार **2019** में हुई थी जब गिरती हुई विकास दर के कारण दरों में **135 बेसिस पॉइंट** की कमी की गई थी।

- India's quarterly GDP growth rate had fallen from **8.9% (March 2018)** to **3.3% (December 2019)**.

भारत की तिमाही GDP वृद्धि दर **मार्च 2018** में **8.9%** से घटकर **दिसंबर 2019** में **3.3%** हो गई थी।

- Growth is currently seeing the **opposite trajectory**, steadily accelerating from **5.6% in Q2 last year** to **8.2% in Q2 this year**. वर्तमान में वृद्धि दर इसका **विपरीत रुझान** दिखा रही है, जो पिछले वर्ष की **Q2** में **5.6%** से बढ़कर **इस वर्ष की Q2** में **8.2%** हो गई है।

Interpreting MPC's interest rate move

MPC की ब्याज दर में कटौती की व्याख्या



- From a growth perspective, there are two ways to look at the MPC's interest rate moves. विकास के दृष्टिकोण से, MPC की दर कटौती को दो तरीकों से देखा जा सकता है।
- The first is that the central bank is not convinced that growth is as robust as the numbers suggest, and hence monetary policy must remain supportive. पहला यह कि केंद्रीय बैंक इस वृद्धि को उतना मजबूत नहीं मानता जितना आंकड़े दिखाते हैं, इसलिए मौद्रिक नीति को सहायक रहना चाहिए।
- After all, it could have left rates unchanged at **5.5%**. आखिरकार, वह दरों को **5.5%** पर स्थिर भी रख सकता था।
- The second is that the MPC feels Indian companies still have **excess capacity**, so the risk of overheating is low, enabling more growth. दूसरा यह कि MPC मानता है कि भारतीय कंपनियों के पास अभी भी **अतिरिक्त क्षमता** है, जिससे अर्थव्यवस्था के अधिक गर्म होने का जोखिम कम है और अधिक वृद्धि संभव है।
- The reality is likely a combination of both: real growth looks higher due to an unusually low **deflator**, and companies can invest more even if it is debt-driven. वास्तविकता दोनों का मिश्रण है: असामान्य रूप से कम **डिफ्लेटर** के कारण वास्तविक वृद्धि अधिक दिख रही है, और कंपनियाँ ऋण-आधारित निवेश भी कर सकती हैं।
- A rate cut addresses both issues. ब्याज दर में कटौती दोनों मुद्दों को संबोधित करती है।

Global trade impact and MSME concerns

वैश्विक व्यापार प्रभाव और MSME चिंताएँ

- The MPC also possibly feels that the economic impact of the U.S.'s **50% tariffs** has not yet fully played out. MPC को यह भी लगता है कि अमेरिका के **50% टैरिफ** का आर्थिक प्रभाव अभी पूरी तरह सामने नहीं आया है।
- Supply chains take time to realign, so there may still be a further shift away from Indian exporters. सप्लाय चेन को पुनर्गठित होने में समय लगता है, इसलिए भारतीय निर्यातकों से और दूरी बढ़ सकती है।
- **Cheaper credit will be welcomed by Indian MSMEs, especially exporters.** भारतीय MSMEs, विशेषकर निर्यातक, सस्ते ऋण का स्वागत करेंगे।

Inflation outlook and risks

मुद्रास्फीति दृष्टिकोण और जोखिम

- On the inflation front, the MPC has lowered its outlook for the year to a benign **2%**. मुद्रास्फीति के मोर्चे पर, MPC ने वर्ष के लिए अपने अनुमान को घटाकर **2%** कर दिया है।
- However, a jump in **food or oil prices** could undo all calculations. हालाँकि, **खाद्य या तेल कीमतों** में वृद्धि उसकी सभी गणनाएँ बिगाड़ सकती है।
- The MPC must be ready to raise rates at the first sign of inflation rising faster than expected. MPC को तैयार रहना चाहिए कि यदि मुद्रास्फीति अपेक्षा से तेज़ बढ़े, तो तुरंत दरें बढ़ाई जाएँ।
- The **2019 rate cut episode** had seen inflation jump from **2% (January 2019)** to **7.6% within a year**. **2019** की दर कटौती अवधि में मुद्रास्फीति **जनवरी 2019 में 2%** से बढ़कर **एक वर्ष के भीतर 7.6%** हो गई थी।

Overall implications and policy stance

समग्र निहितार्थ और नीति रुख

- Taken together, the rate cut suggests that the MPC feels that India's seemingly robust growth still needs support, while inflation worries have faded. समग्र रूप से, दर कटौती यह दर्शाती है कि MPC मानता है कि भारत की मजबूत दिखने वाली वृद्धि को अभी भी समर्थन की आवश्यकता है, जबकि मुद्रास्फीति की चिंताएँ कम हो गई हैं।
- Its decision to retain a **neutral stance** is a prudent one. अपने **तटस्थ रुख** को बनाए रखने का निर्णय विवेकपूर्ण है।



- Global uncertainty means growth and inflation paths can reverse suddenly, requiring a quick policy pivot.
वैश्विक अनिश्चितता का अर्थ है कि वृद्धि और मुद्रास्फीति के रास्ते अचानक बदल सकते हैं, जिसके लिए त्वरित नीति बदलाव आवश्यक होगा।

| GS Paper III: S&T, | |
|--------------------|---|
| TOPICS COVERED | |
| | 09_12_2025 |
| 1. | QUIZ |
| 2. | How can India benefit from neurotechnology? भारत न्यूरोटेक्नोलॉजी से कैसे लाभ उठा सकता है? |
| 3. | What is the India Post's DHRUVA framework? इंडिया पोस्ट का DHRUVA फ्रेमवर्क क्या है? |
| 4. | On zoos and magnets: the physics behind sounds चिड़ियाघरों और चुंबकों पर: ध्वनियों के पीछे का भौतिकी |

fluid from an infected person's skin lesions. The WHO's efforts pulled down the prevalence by 95% by 1970. Fill in the blank.

Answers to December 4 quiz:

- Ink made by boiling soot from burnt beechwood - Ans: Bistre
- Black ink of carbon particles suspended in water - Ans: India ink
- Ink sold as inksticks rather than as liquid - Ans: Sumi
- Dye family that transformed 19th century ink colours - Ans: Aniline
- Ink made from brown pigment from cuttlefish - Ans: Sepia

Visual: **Cochineal**

First contact: K.N. Viswanathan | Tamal

- It is one of the **oldest known inks**, used for writing, drawing, documentation, and manuscripts for more than **2,000 years**.
- When mixed with a binder such as **shellac**, it becomes **waterproof** after drying, making it durable and suitable for archival purposes.

QUIZ

Bistre – Ink Made by Boiling Soot from Burnt Beechwood

- Bistre** is a traditional **brownish, transparent ink** made by **boiling soot obtained from burnt beechwood**.
- The soot is mixed with water, and often a natural binder like gum arabic, to create a smooth ink suitable for artistic work.
- Its warm, smoky brown tone made it a preferred material among European artists for centuries.

India Ink – Black Ink Made from Carbon Particles Suspended in Water

- India ink** (also known as **Indian ink** or **Chinese ink**) is a **deep black ink** made from extremely fine **carbon particles**, usually **lampblack**, **suspended in water**.



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Sumi – Ink Sold as Inksticks Rather Than Liquid

- Sumi is a traditional East Asian ink that is **manufactured and sold in solid inkstick form**, not as liquid ink.
- It is primarily used in **Japanese calligraphy (Shodō), Sumi-e (ink-wash painting), Chinese calligraphy, Buddhist manuscript writing, and fine arts.**
- The inkstick must be **rubbed on a wet inkstone (suzuri)** to produce liquid ink, giving the user complete control over shade, thickness, and saturation.

Historical Background of Sumi Ink

- Inkstick production began in **ancient China more than 2,000 years ago** and later spread to Japan and Korea.
- In Japan, sumi ink became central to **Heian-period manuscripts, Zen Buddhist writing, and traditional ink-wash arts.**
- Sumi inksticks were historically considered **luxury scholarly tools**, often decorated with artistic carvings and symbols.
- High-quality sumi gained cultural significance as an essential tool of the **"Four Treasures of the Study"** (brush, paper, inkstick, inkstone).

Aniline – The Dye Family That Transformed 19th Century Ink Colours

- **Aniline dyes** were the first major synthetic dye family and completely changed ink colours in the **19th century.**
- Before aniline dyes, inks were mainly limited to **black (carbon/iron-gall)** and dull natural pigments.
- **Aniline dyes introduced vivid purples, blues, reds, greens, and violets, revolutionising writing inks, printing inks, and artistic materials.**

Historical Background

- **In 1856, William Henry Perkin** accidentally created **Mauveine**, the world's first synthetic dye, while trying to synthesize quinine.
- This discovery launched the **synthetic dye industry**, which quickly spread from Britain to Germany.
- By the late 1800s, aniline dyes were widely used in **commercial inks**, transforming colour printing and writing.

Sepia – Ink Made from the Brown Pigment of Cuttlefish

- **Sepia ink** is a natural brown ink historically made from the **pigment inside the cuttlefish's ink sac, especially from the species *Sepia officinalis*.**
- The pigment is **melanin-based**, giving sepia its warm, earthy brown tone.
- It became a preferred medium for **artists, writers, naturalists, and early photographers** due to its durability and aesthetic warmth.

Historical Background

- Sepia ink has been used since **ancient Greece and Rome** for writing and artistic sketches.
- During the **Renaissance (14th–17th century)**, sepia became highly valued by artists for monochrome drawings and ink wash techniques.
- The term **"sepia"** comes from the Greek word for cuttlefish, reflecting the ink's biological origin.
- It was commonly used in manuscript illustrations and scientific drawings due to its longevity.

Leishmania – Parasitic Protozoa Carried by Sandflies

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- **Leishmania** is a genus of **parasitic protozoa** responsible for the disease **Leishmaniasis**, a major vector-borne infection in tropical and subtropical regions.
- It is transmitted to humans by the **bite of infected female sandflies**.
- In India and South Asia, the primary species is **Leishmania donovani**, which causes **visceral leishmaniasis (Kala-azar)**.

- **Only female sandflies** transmit **Leishmania** because they require **blood meals** for egg maturation.
- In India, the vector is mainly **Phlebotomus argentipes**.
- Sandflies prefer warm, humid habitats such as **mud houses, cracks in walls, cattle sheds**, and forested areas.

Kissing Bugs – Nickname of Triatomine Bugs that Transmit Chagas Disease

- **Triatomine bugs**, commonly known as **Kissing Bugs**, are hematophagous (blood-feeding) insects belonging to the family **Reduviidae**.
- They are the **primary vectors** of **Chagas disease**, a major parasitic illness in Latin America.
- The name “**Kissing Bug**” comes from **their tendency to bite humans around the lips, eyes, and face while they sleep**.

Why They Are Called “Kissing Bugs”

- These bugs are **nocturnal** and typically bite exposed soft skin areas, especially **around the mouth and eyes**.
- Their saliva contains **anesthetics**, allowing painless bites.
- Contamination occurs when humans accidentally rub **infective feces** into the bite wound, eye, or mouth.

Typhus – Disease Caused by *Rickettsia prowazekii*

Basic Overview

- **Typhus** (specifically **Epidemic Typhus**) is a severe infectious disease caused by the bacterium **Rickettsia prowazekii**.
- It is historically one of the most dangerous epidemic diseases, responsible for large outbreaks during wars, famines, and refugee crises.
- Transmission occurs primarily through the **human body louse** (*Pediculus humanus corporis*).

Microbiology of *Rickettsia prowazekii*

- It is an **obligate intracellular bacterium**, meaning it can only survive and multiply inside human host cells.
- It infects **endothelial cells** (lining of blood vessels).
- Damage to blood vessels leads to **vasculitis**, the hallmark of typhus.

Historical Background

- Typhus caused massive epidemics during:
 - **Napoleonic Wars**
 - **World War I**
 - **World War II**
- It was common in **crowded, unhygienic conditions** such as prisons, refugee camps, and war zones.
- The disease was responsible for millions of deaths in Europe before antibiotics became available.



O'nyong'nyong Virus (ONNV) – A Pathogenic Virus Borne by *Anopheles* Mosquitoes

Basic Overview

- O'nyong'nyong virus (ONNV) is a pathogenic **alphavirus** belonging to the *Togaviridae* family.
- It is one of the **very few viruses in the world transmitted by *Anopheles* mosquitoes**, unlike dengue, chikungunya, Zika, yellow fever, or West Nile virus which use *Aedes* or *Culex*.
- Known primarily in **East Africa**, ONNV causes large epidemics of **fever, rash, and severe joint pains**, similar to chikungunya.

Vector: *Anopheles* Mosquitoes

- The virus is transmitted by two major *Anopheles* species:
 - ***Anopheles funestus***
 - ***Anopheles gambiae*** (also the major malaria vector)
- These mosquitoes bite **primarily at night**, which influences prevention strategies.
- O'nyong'nyong is one of the **only known human viruses** spread by *Anopheles* mosquitoes.

How can India benefit from neurotechnology?

What is a Brain-Computer Interface? Can such technologies be used for human enhancement or military advantage? How can neurotechnology help non-communicable and injury-related neurological disorders? How are other nations advancing?

GS III S&T

MOA

EXPLAINER

Shambhavi Naik

The story so far:

The brain remains humanity's final frontier. In the decades ahead, neurotechnology will stretch the boundaries of what it means to understand, and even shape, the functioning of the human brain.

What is neurotechnology?

Neurotechnology is the use of mechanical tools to talk directly to the brain. It includes systems that can record, monitor, or even influence neural activity, opening up new ways to understand how the mind works and, consequently, how it might be repaired or enhanced. Drawing on advances in neuroscience, AI, engineering, and computing, these devices can now sense or stimulate brain signals in real time. At the heart of this revolution is the Brain-Computer Interface (BCI), a technology that blends neuroscience and computing to translate thoughts into action. BCIs can turn brain signals into digital commands that control a computer cursor, a wheelchair, or even a robotic arm. Some systems rely on non-invasive sensors, such as EEG headsets; others use implanted electrodes for more precise control.

A BCI essentially listens to the brain, decodes its signals, and can turn them into instructions for a prosthetic to follow. Some devices are purely diagnostic, helping scientists study brain disorders or cognitive function. Others go further, allowing paralysed patients to move prosthetic limbs, or stimulating certain brain regions to treat depression or Parkinson's disease.

In labs, researchers have even managed to connect the brains of two mice, transmitting simple information from one to the other. But human applications remain mostly therapeutic for now, focused on rehabilitation, neuroprosthetics, and mental health. The



Brave future: Former U.S. President Barack Obama announces the Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative in Washington on April 2, 2013. REUTERS

idea of using such interfaces for human enhancement or military advantage is technically likely but will need fierce ethical debate before its use.

Why does India need it?

India carries a significant neurological disease burden, from strokes and spinal cord injuries to Parkinson's disease and depression. Between 1990 and 2019, the share of non-communicable and injury-related neurological disorders in India's overall disease load rose steadily, with stroke emerging as the largest contributor. For those living with paralysis, neuroprosthetics could restore mobility and communication. For mental health patients, targeted neural stimulation offers the possibility of reducing long-term dependence on medication. But the opportunity extends

far beyond healthcare. Neurotechnology sits at the intersection of biotechnology, engineering, and AI, sectors where India is rapidly developing global competence.

Where does India stand today?

India is creating academic and private sector strengths in neurotechnologies. IIT Kanpur researchers recently unveiled a BCI-based robotic hand that could be useful for stroke patients. The National Brain Research Centre in Manesar, and the Brain Research Centre at IISc, Bangalore are leading research centres for neuroscience. Dognosis, a startup, is using neurotechnology to study brain signals in dogs, aiming to detect the neural patterns that occur when they recognise the scent of cancer in human breath samples. This is an application of neurotechnology used in animals but with

the potential to revolutionise cancer screening in humans.

What are other countries doing?

The U.S. is the global leader in neurotechnologies. The NIH's Brain Research Through Advancing Innovative Neurotechnologies® Initiative, or The BRAIN Initiative®, is a partnership between federal and non-federal partners to accelerate the development of innovative neurotechnologies. In May 2024, Neuralink received approval from the Food and Drug Administration for in-human trials of its BCI and has already demonstrated the ability of its BCIs to restore some prosthetic-enabled motor function in paralytic patients. The China Brain Project (2016-2030) focuses on understanding cognition, developing brain-inspired AI, and treating neurological disorders. EU and Chile are pioneering laws for BCIs and neurorights. Neurotechnologies are a set of emerging technologies with a wide set of applications in healthcare to gaming to recreation. These are important for India not only from a mental health perspective but also as an economic opportunity. Given the nascency of the field, there is much progress to be made and India's

genomic diversity, available expertise and increasing awareness about brain research positions India as a potential hub for its development.

However, if there is inadequate regulatory support, BCI development and adoption will be thwarted. A public engagement strategy to discuss the benefits and risks of BCIs would help in understanding public perception of these technologies. Instead of a singular policy for all BCIs, tailored regulatory pathways for the different types of BCIs based on their benefits and risks would help development of beneficial BCIs in the Indian context. A regulatory pathway that assesses BCI on technical and ethical aspects, including ensuring data privacy and user autonomy is of utmost need.

The author is chairperson, *Takshashila Institution's Health & Life Sciences Policy*.

THE GIST

BCIs can turn brain signals into digital commands that control a computer cursor, a wheelchair, or even a robotic arm. Some systems rely on non-invasive sensors, such as EEG headsets; others use implanted electrodes for more precise control.

India carries a significant neurological disease burden, from strokes and spinal cord injuries to Parkinson's disease and depression.

The China Brain Project (2016-2030) focuses on understanding cognition, developing brain-inspired AI, and treating neurological disorders. EU and Chile are pioneering laws for BCIs and neurorights.

How can India benefit from neurotechnology?

भारत न्यूरोटेक्नोलॉजी से कैसे लाभ उठा सकता है?



Neurotechnology and its importance for India

न्यूरोटेक्नोलॉजी और भारत के लिए इसका महत्व

- The brain remains humanity's **final frontier**.
मानव मस्तिष्क मानवता की अंतिम सीमा बना हुआ है।
- In the decades ahead, neurotechnology will stretch the boundaries of what it means to understand, and even shape, the functioning of the human brain.
आने वाले दशकों में न्यूरोटेक्नोलॉजी मस्तिष्क को समझने और उसके कार्य को प्रभावित करने की सीमाओं का विस्तार करेगी।

What is neurotechnology

न्यूरोटेक्नोलॉजी क्या है

- Neurotechnology is the use of mechanical tools to talk directly to the brain.
न्यूरोटेक्नोलॉजी मस्तिष्क से सीधे संवाद करने के लिए यांत्रिक साधनों का उपयोग है।
- It includes systems that can record, monitor, or even influence **neural activity**, opening up new ways to understand how the mind works and how it might be repaired or enhanced.
यह ऐसी प्रणालियाँ शामिल करती है जो तंत्रिका गतिविधि को रिकॉर्ड, निगरानी या प्रभावित कर सकती हैं, जिससे मन के काम करने के तरीके और उसके सुधार या संवर्धन की नई संभावनाएँ खुलती हैं।
- **Drawing on advances in neuroscience, engineering, computing, and AI**, these devices can now sense or stimulate brain signals in real time.
तंत्रिका विज्ञान, अभियांत्रिकी, संगणन और **कृत्रिम बुद्धिमत्ता** में प्रगति के आधार पर ये उपकरण अब वास्तविक समय में मस्तिष्क संकेतों को पहचान या उत्तेजित कर सकते हैं।
- At the heart of this revolution is **the Brain-Computer Interface (BCI)**.
इस परिवर्तन के केंद्र में **ब्रेन-कंप्यूटर इंटरफेस** है।
- **BCIs can turn brain signals into digital commands that control a computer cursor, a wheelchair, or a robotic arm.**
ये मस्तिष्क संकेतों को डिजिटल आदेशों में बदलकर कंप्यूटर कर्सर, व्हीलचेयर या रोबोटिक भुजा को नियंत्रित कर सकते हैं।
- **Some systems rely on non-invasive sensors such as EEG headsets; others use implanted electrodes for more precise control.**
कुछ प्रणालियाँ गैर-आक्रामक सेंसर का उपयोग करती हैं जबकि कुछ अधिक सटीक नियंत्रण के लिए प्रत्यारोपित इलेक्ट्रोड का प्रयोग करती हैं।
- A BCI listens to the brain, decodes its signals, and can turn them into instructions for a prosthetic to follow.
ब्रेन-कंप्यूटर इंटरफेस मस्तिष्क को सुनकर उसके संकेतों को डिकोड करता है और उन्हें कृत्रिम अंग के लिए निर्देशों में बदल देता है।
- Some devices are purely diagnostic, helping scientists study brain disorders or cognitive function.
कुछ उपकरण केवल निदान के उद्देश्य से होते हैं और वैज्ञानिकों को मस्तिष्क विकारों और संज्ञानात्मक कार्यों का अध्ययन करने में सहायता करते हैं।
- **Others allow paralysed patients to move prosthetic limbs, or stimulate certain brain regions to treat depression or Parkinson's disease.**
कुछ उपकरण लकवाग्रस्त रोगियों को कृत्रिम अंग हिलाने की क्षमता प्रदान करते हैं या अवसाद और पार्किंसन रोग के उपचार हेतु मस्तिष्क क्षेत्रों को उत्तेजित करते हैं।
- **Researchers have even managed to connect the brains of two mice, transmitting simple information between them.**
शोधकर्ताओं ने दो चूहों के मस्तिष्क को जोड़कर उनके बीच सरल जानकारी का आदान-प्रदान भी सफलतापूर्वक किया है।





- But human applications remain mostly therapeutic for now.
लेकिन मनुष्यों में इनका उपयोग अभी मुख्यतः चिकित्सीय ही है।
- The idea of using such interfaces for enhancement or military advantage is technically likely but needs strong ethical debate.
मानव संवर्धन या सैन्य लाभ के लिए इनके उपयोग की संभावना तकनीकी रूप से संभव है, परंतु इसके लिए कठोर नैतिक चर्चा आवश्यक होगी।

Why does India need it

भारत को इसकी आवश्यकता क्यों है

- India carries a significant neurological disease burden.
भारत में तंत्रिका संबंधी रोगों का बोझ अत्यधिक है।
- Between **1990 and 2019**, the share of neurological disorders in India's overall disease load rose steadily, with stroke becoming the largest contributor.
1990 से 2019 के बीच भारत में तंत्रिका रोगों का बोझ लगातार बढ़ा और स्ट्रोक सबसे बड़ा कारक बनकर उभरा।
- **For those living with paralysis, neuroprosthetics could restore mobility and communication.**
लकवे से पीड़ित लोगों के लिए न्यूरोप्रोस्थेटिक गतिशीलता और संचार को पुनर्स्थापित कर सकते हैं।
- For mental health patients, targeted neural stimulation may reduce long-term dependence on medication.
मानसिक स्वास्थ्य रोगियों के लिए लक्षित तंत्रिका उत्तेजना दवाओं पर दीर्घकालिक निर्भरता कम कर सकती है।
- Neurotechnology sits at the intersection of **biotechnology, engineering, and AI**, sectors where India is rapidly developing global competence.
न्यूरोटेक्नोलॉजी जैव प्रौद्योगिकी, अभियांत्रिकी और **कृत्रिम बुद्धिमत्ता** जैसे क्षेत्रों के संगम पर स्थित है, जिनमें भारत तेजी से वैश्विक क्षमता विकसित कर रहा है।

Where does India stand today

आज भारत किस स्थिति में है

- India is creating academic and private sector strengths in neurotechnologies.
भारत शैक्षणिक और निजी क्षेत्र में न्यूरोटेक्नोलॉजी की क्षमताएँ विकसित कर रहा है।
- IIT Kanpur researchers recently unveiled a **BCI-based robotic hand** that could be useful for stroke patients.
आईआईटी कानपुर के शोधकर्ताओं ने हाल ही में **रोबोटिक हाथ आधारित ब्रेन-कंप्यूटर इंटरफेस** विकसित किया है जो स्ट्रोक रोगियों के लिए उपयोगी हो सकता है।
- The **National Brain Research Centre in Manesar, and the Brain Research Centre at IISc, Bangalore** are leading research centres for neuroscience.
मानेसर स्थित राष्ट्रीय मस्तिष्क अनुसंधान केंद्र और बेंगलुरु स्थित मस्तिष्क अनुसंधान केंद्र तंत्रिका विज्ञान के प्रमुख अनुसंधान केंद्र हैं।
- **Dagnosis, a startup, is using neurotechnology to study brain signals in dogs, aiming to detect neural patterns that occur when they recognise the scent of cancer in human breath samples.**
डॉग्रीसिस नामक स्टार्टअप कुत्तों में मस्तिष्क संकेतों का अध्ययन कर रहा है ताकि वे तंत्रिका पैटर्न पहचान सकें जो मानव श्वास नमूनों में कैंसर की गंध पहचानने पर उत्पन्न होते हैं।
- This is an application of neurotechnology used in animals but with the potential to revolutionise cancer screening in humans.
यह पशुओं में प्रयुक्त न्यूरोटेक्नोलॉजी का उदाहरण है जिसका मानवों में कैंसर जाँच में क्रांति लाने का संभावित प्रभाव है।

What are other countries doing

अन्य देश क्या कर रहे हैं

- The U.S. is the global leader in neurotechnologies.
संयुक्त राज्य अमेरिका न्यूरोटेक्नोलॉजी का वैश्विक अग्रणी है।



- The NIH's **BRAIN Initiative** is a partnership to accelerate the development of innovative neurotechnologies.
एनआईएच की **ब्रेन पहल** नवीन न्यूरोटेक्नोलॉजी के विकास को तेज़ करने हेतु एक साझेदारी है।
- In **May 2024**, Neuralink received approval from the Food and Drug Administration for in-human trials of its BCI.
मई 2024 में न्यूरालिंक को अपने ब्रेन-कंप्यूटर इंटरफेस के मानव परीक्षणों हेतु अनुमति प्राप्त हुई।
- Neuralink has already demonstrated the ability of its BCIs to restore some prosthetic-enabled motor function in paralytic patients.
न्यूरालिंक के उपकरण लकवाग्रस्त रोगियों में कुछ कृत्रिम अंग आधारित मोटर क्रियाओं को पुनर्स्थापित करने की क्षमता दर्शा चुके हैं।
- The **China Brain Project (2016-2030)** focuses on understanding **cognition, developing brain-inspired AI, and treating neurological disorders**.
चीन मस्तिष्क परियोजना (2016-2030) संज्ञान समझने, मस्तिष्क-प्रेरित कृत्रिम बुद्धिमत्ता विकसित करने और तंत्रिका रोगों के उपचार पर केंद्रित है।
- EU and Chile are pioneering laws for BCIs and neurorights.
यूरोपीय संघ और चिली ब्रेन-कंप्यूटर इंटरफेस और न्यूरो-अधिकारों पर कानून बनाने में अग्रणी हैं।

Significance of neurotechnologies

न्यूरोटेक्नोलॉजी का महत्व

- **Neurotechnologies are a set of emerging technologies with wide applications from healthcare to gaming to recreation.**
न्यूरोटेक्नोलॉजी स्वास्थ्य सेवा से लेकर गेमिंग और मनोरंजन तक विविध उपयोग वाली एक उभरती हुई तकनीकी श्रेणी है।
- These are important for India not only from a mental health perspective but also as an economic opportunity.
ये भारत के लिए न केवल मानसिक स्वास्थ्य के दृष्टिकोण से बल्कि आर्थिक अवसर के रूप में भी महत्वपूर्ण हैं।
- Given the nascency of the field, there is much progress to be made and India's genomic diversity, expertise, and growing awareness position it as a potential hub.
क्षेत्र की नवोन्मेषी प्रकृति को देखते हुए बहुत प्रगति की आवश्यकता है और भारत की आनुवंशिक विविधता, विशेषज्ञता तथा बढ़ती जागरूकता इसे एक संभावित वैश्विक केंद्र बनाती है।

Regulatory needs in India

भारत में विनियामक आवश्यकताएँ

- However, if there is inadequate regulatory support, BCI development and adoption will be thwarted.
यदि पर्याप्त विनियामक समर्थन न हुआ तो ब्रेन-कंप्यूटर इंटरफेस का विकास और उपयोग बाधित हो जाएगा।
- A public engagement strategy to discuss benefits and risks of BCIs would help in understanding public perception.
लाभ और जोखिमों पर चर्चा हेतु जन-सहभागिता रणनीति इन तकनीकों के प्रति सार्वजनिक दृष्टिकोण समझने में सहायता करेगी।
- Instead of a singular policy for all BCIs, tailored regulatory pathways based on benefits and risks are needed.
सभी ब्रेन-कंप्यूटर इंटरफेस के लिए एक समान नीति के बजाय लाभ और जोखिम पर आधारित अनुकूलित विनियम आवश्यक हैं।
- A regulatory pathway must assess technical and ethical aspects, including data privacy and user autonomy.
विनियामक ढाँचे में तकनीकी और नैतिक पहलुओं का मूल्यांकन होना चाहिए, जिसमें डेटा गोपनीयता और उपयोगकर्ता स्वायत्तता सुनिश्चित की जाए।



What is the India Post's DHRUVA framework?

What will be the use cases of the Digital Hub for Reference and Unique Virtual Address (DHRUVA)?

GS III: S&T

Aroon Deep

The story so far:

The Department of Posts in May proposed a framework called Digital Hub for Reference and Unique Virtual Address, or DHRUVA, which would allow for the standardisation and sharing of physical addresses through "labels" that resemble email addresses. DHRUVA will also help with "effective governance, inclusive service delivery, and enhanced user experience," the postal department said. The government has put out a draft amendment to the Post Office Act, 2023 to enable DHRUVA. This follows the release of DIGIPIN, a 10-digit alphanumeric pin code based on location coordinates.

What is DHRUVA?

DHRUVA is being proposed as a Digital Public Infrastructure (DPI) along the lines of Aadhaar and UPI. The service would

MOB

allow a range of players – from logistics players like India Post to e-commerce and gig platforms like Amazon and Uber – to receive a "label" instead of users having to fill out an address. The label would then be authorised by the end user, which would then allow the platform in question to receive both the "descriptive" address, and the "geo-coded" DIGIPIN.

DIGIPIN is an open-sourced location pin system, which India Post developed in-house. Every 12 square metre block in India has its own unique DIGIPIN. India Post hopes that, at least within the postal network, it can be useful in rural areas where precise descriptive addresses may not always be available (or possible), and would help mail delivery personnel with a precise location as a fallback, in addition to the PIN code.

DHRUVA's ecosystem envisions entities like Address Service Providers who would generate a proxy address or label (like amit@dhruva); Address Validation

Agencies who would be able to authenticate addresses; Address Information Agents who would act as intermediaries where users would be able to manage consent for providing their addresses; and a governance entity, along the lines of the National Payments Corporation of India, that would oversee the whole framework.

How will DHRUVA be used?

India Post said that a key use case would be consent-based data sharing, where people tokenising their addresses (like UPI addresses tokenise bank accounts) can "regulate when their address information can be accessed, and the duration for which it can be accessed through a consent framework." Another useful feature will be updating addresses, allowing users to shift routine deliveries seamlessly when they move houses.

DHRUVA would thus allow users to share their addresses with digital

platforms, public and private. The Department said that this would also help users with "service discovery," by allowing intermediaries to show what doorstep services are available at their location. Since the architecture of such a framework would require data collection, Dvara Research, a non-profit policy research group focusing on issues like financial inclusion, said that a draft law would be needed to authorise it.

Will it help urban governance?

Beni Chugh, who leads Dvara's Future of Finance Initiative, argued that it was unclear if the system would be helpful in enabling urban governance, as the addresses it envisioned were linked to people, and not independently surveyed structures. "The current design relies on collecting personal information along the addresses, which, makes it necessary to have a consent-based mechanism for address sharing," Ms. Chugh pointed out.

"However, if citizens consented not to share addresses or generate address codes, it could result in incomplete datasets of built infrastructure or population. This could reduce the effectiveness of this DPI for urban planning and governance mechanisms. In most parts of the world, digitisation of addresses does not include personal information which preempts the need for users' consent and allows for richer datasets."

THE GIST

DHRUVA will help with "effective governance, inclusive service delivery, and enhance user experience," the postal department said.

The service would allow a range of players – from logistics players like India Post to e-commerce and gig platforms like Amazon and Uber – to receive a "label" instead of users having to fill out an address.

DHRUVA would allow users to share their addresses with digital platforms, public and private.

What is the India Post's DHRUVA framework? इंडिया पोस्ट का DHRUVA फ्रेमवर्क क्या है?

DHRUVA Framework ध्रुव ढाँचा

- The **Department of Posts in May proposed a framework called Digital Hub for Reference and Unique Virtual Address, or DHRUVA**, which would allow for the standardisation and sharing of physical addresses through "labels" that resemble email addresses.
मई में डाक विभाग ने डिजिटल हब फॉर रेफरेंस एंड यूनिक वर्चुअल एड्रेस, या ध्रुव नामक ढाँचा प्रस्तावित किया जो भौतिक पत्तों के मानकीकरण और साझा करने की अनुमति देगा और यह "लेबलों" के माध्यम से होगा जो ईमेल पते जैसे दिखाई देते हैं।
- DHRUVA will also help with **effective governance, inclusive service delivery, and enhanced user experience**, the postal department said.
डाक विभाग के अनुसार ध्रुव सुसंगत शासन, समावेशी सेवा प्रदाय, और उन्नत उपयोगकर्ता अनुभव में भी सहायता करेगा।
- The **government has put out a draft amendment to the Post Office Act, 2023 to enable DHRUVA**.
सरकार ने डाकघर अधिनियम 2023 में संशोधन का मसौदा जारी किया है ताकि ध्रुव को सक्षम बनाया जा सके।
- This follows the release of **DIGIPIN, a 10-digit alphanumeric pin code based on location coordinates**.
यह डिजिपिन के जारी होने के बाद किया गया है जो स्थान निर्देशांकों पर आधारित 10 अंकों का अक्षरांक पिन कोड है।

What is DHRUVA ध्रुव क्या है

- DHRUVA is being proposed as a **Digital Public Infrastructure (DPI)** along the lines of Aadhaar and UPI.
ध्रुव को डिजिटल सार्वजनिक अवसंरचना के रूप में प्रस्तावित किया जा रहा है जैसा आधार और यूपीआई हैं।



- The service would allow logistics players, e-commerce, and gig platforms to receive a “label” instead of users having to fill out an address.
यह सेवा लॉजिस्टिक, ई-कॉमर्स और गिग प्लेटफॉर्मों को पते भरने की बजाय “लेबल” प्राप्त करने की अनुमति देगी।
- The label would be authorised by the end user, allowing platforms to receive both the **descriptive address** and the **geo-coded DIGIPIN**.
लेबल अंतिम उपयोगकर्ता द्वारा अधिकृत किया जाएगा जिससे प्लेटफॉर्म **वर्णनात्मक पता** और **भौगोलिक कूटित डिजिपिन** दोनों प्राप्त कर सकेंगे।
- DIGIPIN is an **open-sourced location pin system** developed in-house by India Post.
डिजिपिन एक **खुले स्रोत वाला स्थान पिन तंत्र** है जिसे भारत डाक ने स्वयं विकसित किया है।
- Every **12 square metre block** in India has its own unique DIGIPIN.
भारत के प्रत्येक **बारह वर्ग मीटर क्षेत्र** का अपना विशिष्ट डिजिपिन है।
- It aims to assist rural mail delivery where precise descriptive addresses may not be available.
यह ग्रामीण क्षेत्रों में डाक वितरण में सहायता हेतु है जहाँ सटीक वर्णनात्मक पता उपलब्ध नहीं होता।

DHRUVA's Ecosystem

ध्रुव का पारिस्थितिकी तंत्र

- The ecosystem envisions entities like **Address Service Providers** who would generate proxy labels (like amit@dhruva).
इस पारिस्थितिकी तंत्र में **पता सेवा प्रदाताओं** जैसी संस्थाएँ होंगी जो प्रॉक्सी लेबल उत्पन्न करेंगी।
- **Address Validation Agencies** would authenticate addresses.
पता सत्यापन एजेंसियाँ पतों का प्रमाणीकरण करेंगी।
- **Address Information Agents** would enable users to manage consent for providing their addresses.
पता सूचना प्रतिनिधि उपयोगकर्ताओं को अपने पते साझा करने की सहमति प्रबंधित करने की सुविधा देंगे।
- A governance entity like NPCI would oversee the framework.
एनपीसीआई जैसी एक संचालन इकाई पूरे ढाँचे की निगरानी करेगी।

How will DHRUVA be used

ध्रुव का उपयोग कैसे होगा

- India Post said a key use case would be **consent-based data sharing**, where people tokenise their addresses like UPI tokenises bank accounts.
भारत डाक ने कहा कि प्रमुख उपयोग मामला **सहमति आधारित आँकड़ा साझाकरण** होगा जहाँ लोग अपने पते को उसी प्रकार टोकन बनाएँगे जैसे यूपीआई बैंक खातों को टोकन बनाता है।
- **Users can regulate when and for how long their address information can be accessed.**
उपयोगकर्ता यह नियंत्रित कर सकेंगे कि उनके पते की जानकारी कब और कितने समय तक पहुँची जा सकती है।
- **Another feature is updating addresses to shift deliveries seamlessly when users move houses.**
एक अन्य सुविधा यह होगी कि उपयोगकर्ता घर बदलने पर वितरण को सहजता से स्थानांतरित कर सकेंगे।
- **DHRUVA will allow sharing addresses with public and private digital platforms.**
ध्रुव सार्वजनिक और निजी डिजिटल प्लेटफॉर्मों के साथ पते साझा करने की अनुमति देगा।
- The Department said it would also help users with **service discovery** by showing what **doorstep services** are available in their area.
विभाग ने कहा कि यह उपयोगकर्ताओं को **सेवा प्राप्ति जानकारी** में भी सहायता करेगा और बताएगा कि उनके क्षेत्र में कौन सी सेवाएँ उपलब्ध हैं।
- Since the framework requires data collection, Dvara Research said a draft law is needed to authorise it.
चूँकि इस ढाँचे हेतु आँकड़ा संग्रह आवश्यक है, द्वारा अनुसंधान ने कहा कि इसे अधिकृत करने हेतु एक विधेयक आवश्यक होगा।

Will it help urban governance

क्या यह शहरी शासन में सहायता करेगा



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

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

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- Beni Chugh argued that it was unclear if the system would help urban governance since addresses are linked to people, not mapped structures.
बेनी चुघ ने तर्क दिया कि यह स्पष्ट नहीं है कि यह व्यवस्था शहरी शासन में कितनी सहायक होगी क्योंकि पते व्यक्तियों से जुड़े हैं न कि सर्वेक्षित संरचनाओं से।
- The design relies on collecting personal information, making a consent mechanism necessary.
डिज़ाइन व्यक्तिगत जानकारी के संग्रह पर आधारित है जिससे सहमति तंत्र आवश्यक हो जाता है।
- **If citizens choose not to share addresses, datasets of infrastructure or population may become incomplete.**
यदि नागरिक पते साझा न करें तो अवसंरचना या जनसंख्या के आँकड़े अपूर्ण रह सकते हैं।
- **This could reduce the effectiveness of DHRUVA for urban planning.**
यह शहरी नियोजन के लिए ध्रुव की प्रभावशीलता कम कर सकता है।
- Most global address digitisation systems do not include personal information, allowing richer datasets without needing user consent.
विश्व के अधिकांश पता डिजिटलीकरण तंत्र व्यक्तिगत जानकारी नहीं जोड़ते जिससे बिना सहमति की आवश्यकता के समृद्ध आँकड़े संभव होते हैं।

PATRIOTIC IAS



On zoos and magnets: the physics behind sounds

Sounds are waves – disturbances that move by pushing and pulling air molecules. Every sound can be counted by a number measuring how fast your vocal cords need to vibrate to generate it

GS III: S&T

Adhip Agarwala

The Allen Forest Zoo in Kanpur is one of India's largest zoological parks. Located in the middle of the city, it's a vast expanse of fresh air, tall trees, and animals and birds of all shapes and sizes, and these early winter months are the best time to soak in the filtered sun when you pay a visit.

But as you walk the winding pavements, you're likely to marvel at the variety of sounds. A tiger growls from one corner, hundreds of birds perform a symphony in another. I was once pleasantly surprised to notice a deep groan: I expected to see a cow but found that it was a pelican.

Many of these sounds also bear beautiful patterns and tunes that are a delight to the ears. And they're so delightful because of the beautiful physics hiding behind them.

Disturbances in the air

The real hero behind whatever we hear is something most of us take for granted: air.

Sounds are waves – disturbances that move by pushing and pulling air molecules. When someone shouts at you in the road traffic, what they're really doing is exercising their vocal chords to vibrate periodically so that the air in between your ears and his mouth can carry the sound waves. These vibrations in the air strike your ear drums and cause them to vibrate, which the brain then interprets as sounds.

Every sound can be counted by a number measuring how fast your vocal cords need to vibrate to generate it. For example, if they could vibrate to-and-fro once in a second, we'd say they're vibrating with a frequency of one hertz (1 Hz). If they vibrated a thousand times, they'd have a frequency of 1 kilohertz (kHz). Humans can generate, and hear, sounds mostly in the range from 20 Hz to 20 kHz. There are many sounds around us beyond this range, generated by machines, nature, and animals and we remain blissfully unaware of them. When we hear some animal, we're really hearing only those frequencies generated by their vocal chords that fall in our audible range.

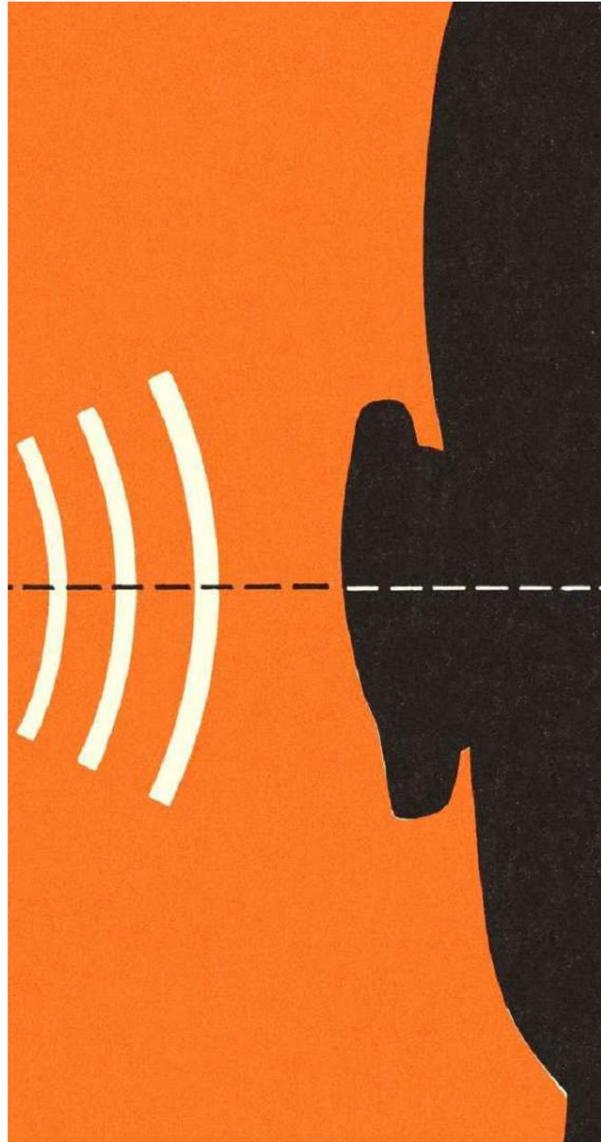
Different frequencies sound different to us. For instance, when you hum deeply, that's about 200 Hz. The metallic sound of a spoon falling on the floor is sharp and contains frequencies about as high as 8 kHz. A cat may meow at about 4 kHz and a cow moos at around 1 kHz.

Usually, frequency is what we think of as sharpness or the pitch of a sound. If you've learnt to sing or heard people practising music, you might be aware of the sa-re-ga-ma-pa-dha-ni-sa at the start. Each of these syllables is a way to memorise a frequency. If the first sa is 260Hz, the last one is at about 520 Hz – double the frequency of the first one. The ones in between are placed at specific intervals.

The absolute value of the first sa can also be changed, and which people do when they're going to sing in a different key.

Guitars and flutes

Now that we know sounds are simply ways to create vibrations in the air, we



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can generate them and also switch between them. A simple way is to use strings. Of course we can't use the cotton strings we use to make clothes. They need to be strong and able to vibrate fast. Strings made of metal are a better idea.

It turns out that if the string is shorter, the higher the frequency of sound it makes. This is how a guitar works. When you use one of the hands to put your fingers in specific positions, you're essentially changing the length of the string that can vibrate. And thus you can change the frequency of the sound.

Often in hollow tubes the air inside can vibrate and generate sounds of a specific frequency. The longer the air column, the lower the frequency. This is how a flute

works. When you place your fingers at different points, you're changing the length of the air column and thus creating different musical notes.

You may have experienced this effect even if you haven't played a flute. Often when you fill a water bottle, as the bottle gets filled up to the brim, you can hear the sound of water filling up become sharper and sharper. That's because the air column is becoming shorter and shorter. Now, even as we understand why we hear animals and musical instruments the way we do, how is it that we hear sounds from our earphones/ speakers?

Magnetic vocal chords

If you have ever broken open a speaker

(deliberate or otherwise), you will find a magnet inside.

Magnets are wonderful materials, like iron and nickel, that have magnetic properties due to the way electrons are arranged in their atoms. That is, they generate magnetic fields and can attract or repel other magnets. Every magnet has two poles: north and south, just like our earth.

Every magnetic field starts from the north pole and ends at the south pole. Poles of the same type repel while opposite poles attract.

In the speaker, you'll also see a copper coil in front of the magnet. It will be wound and attached to a net-like sheet.

The copper coil can carry a current supplied by the electrical circuitry.

Now, one of the most fundamental wonders of nature – something you learn in early classes of physics – is that when a coil carries a current, it can itself behave like a magnet. And if the current changes its direction, the magnetic field also changes its direction. So the copper coil is a magnet made not out of magnetic materials but due to electric currents, and is called an 'electromagnet'.

Electromagnets were invented in the early 1800s.

So now we have the magnet and an electromagnet (which is stuck to a drum) next to each other. To create sound, we need to vibrate the air molecules at some frequency.

Now comes the trick: as the current flows through the wires, you can switch its direction at will, at any frequency. Since the current creates a magnetic field, the electromagnet will switch its magnetic fields at the same frequency, as if continuously changing the north and south poles of the electromagnet.

Whenever the electromagnet's pole is opposite to that of the magnet, the two are pulled towards each other; whenever their poles line up, they're pushed apart. But since the magnetic is static, the electromagnet is the one that moves.

Its push and pull vibrates the drum sheet, creating the disturbance in the air molecules.

This is how, whether you're away on some corner of an island or on a metro train travelling underground, the speaker's magnetic vocal chords bring you music right to your ears.

Sounds around

If you want to know which sound frequencies are around you, you can use your smartphone quite effectively.

Teachers from Aachen University in Germany have made an app called phyphox that you can download. It has an audio analyser that allows you to read the frequency of any sound. Play any sound around it and check which frequency it is.

Another wonderful app is called Merlin ID, made by researchers in Cornell University in the U.S., with which your phone can 'hear' the call of any bird and identify the species.

If you're even more curious, however, you might wonder: why do materials even behave like magnets? Do electrons rotate around an axis just like the earth to create a magnetic field? Turns out that this spin of an electron is nothing like that of the earth and one can't really understand it without learning quantum mechanics.

This is a subject taught in physics programmes, which some of us do here in IIT Kanpur.

Next time you have a free weekend, instead of stepping into the cacophony of a mall, consider going for a walk in a zoo or a garden in your town. In the middle of a quiet patch, as everything else falls silent, don't forget to appreciate the music nature is playing for you, reaching you through millions of vibrating air molecules.

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



On zoos and magnets: the physics behind sounds चिड़ियाघरों और चुंबकों पर: ध्वनियों के पीछे का भौतिकी

- The Allen Forest Zoo in Kanpur is one of India's largest zoological parks.
कानपुर का एलेन फ़ॉरेस्ट चिड़ियाघर भारत के सबसे बड़े प्राणी उद्यानों में से एक है।
- Located in the middle of the city, it's a vast expanse of fresh air, tall trees, and animals and birds of all shapes and sizes, and these early winter months are the best time to soak in the filtered sun when you pay a visit.
शहर के मध्य स्थित यह ताज़ी हवा, ऊँचे पेड़ों तथा विविध आकार और प्रकार के जीवों से भरपूर एक विशाल क्षेत्र है और शुरुआती सर्दियों के महीने यहाँ आने पर छनकर आती धूप का आनंद लेने का सर्वोत्तम समय होते हैं।
- But as you walk the winding pavements, you're likely to marvel at the variety of sounds.
जब आप घुमावदार पथों पर चलते हैं तो आप ध्वनियों की विविधता पर आश्चर्य कर सकते हैं।
- A tiger growls from one corner, hundreds of birds perform a symphony in another.
एक कोने से बाघ की गर्जना आती है और दूसरे से सैकड़ों पक्षी स्वर मिलाते हैं।
- I was once pleasantly surprised to notice a deep groan: I expected to see a cow but found that it was a pelican.
एक बार मुझे गहरी कराह सुनकर लगा कि कोई गाय है पर वह एक पेलिकन निकला।
- Many of these sounds also bear beautiful patterns and tunes that are a delight to the ears.
इनमें से कई ध्वनियों में सुंदर पैटर्न और लय होती है जो कानों को आनंद देती है।
- And they're so delightful because of the beautiful **physics** hiding behind them.
और ये ध्वनियाँ इसलिए आकर्षक हैं क्योंकि इनके पीछे छिपा हुआ सुंदर **भौतिक विज्ञान** है।

Disturbances in the air

वायु में उत्पन्न विक्रोभ

- The real hero behind whatever we hear is something most of us take for granted: **air**.
हम जो कुछ भी सुनते हैं उसके पीछे वास्तविक नायक — जिसे हम अक्सर सामान्य मान लेते हैं — **वायु** है।
- Sounds are waves — disturbances that move by pushing and pulling air molecules.
ध्वनि तरंगें होती हैं — जो वायु के अणुओं को धकेलकर और खींचकर आगे बढ़ने वाले विक्रोभ हैं।
- When someone shouts at you in the road traffic, what they're really doing is exercising their **vocal chords to vibrate periodically so that the air in between your ears and his mouth can carry the sound waves**.
जब कोई सड़क पर शोर करता है तो वह अपने स्वर यंत्रों को कंपन कर रहा होता है ताकि आपके कान और उसके मुख के बीच की वायु ध्वनि तरंगों को पहुँचा सके।
- **These vibrations in the air strike your ear drums and cause them to vibrate, which the brain then interprets as sounds**.
वायु में ये कंपन आपके कान के पर्दे से टकराकर उसे कंपित करते हैं और आपका मस्तिष्क इन्हें ध्वनि के रूप में समझता है।
- Every sound can be counted by a number measuring how fast your vocal cords need to vibrate to generate it.
हर ध्वनि को एक संख्या से मापा जा सकता है जो बताती है कि उसे उत्पन्न करने हेतु आपके स्वर यंत्र कितनी तेज़ी से कंपन करते हैं।
- For example, if they could vibrate to-and-fro once in a second, we'd say they're vibrating with a frequency of one **hertz (1 Hz)**.
उदाहरण के लिए यदि वे एक सेकंड में एक बार आगे-पीछे हों तो कहा जाता है कि उनकी आवृत्ति एक **हर्ट्ज** है।
- If they vibrated a thousand times, they'd have a frequency of **1 kilohertz (kHz)**.
यदि वे एक सेकंड में एक हजार बार कंपन करें तो उनकी आवृत्ति **एक किलोहर्ट्ज** होगी।
- **Humans can generate, and hear, sounds mostly in the range from 20 Hz to 20 kHz**.
मनुष्य सामान्यतः **बीस हर्ट्ज से बीस किलोहर्ट्ज** तक की ध्वनियाँ उत्पन्न और सुन सकते हैं।
- There are many sounds around us beyond this range, generated by machines, nature, and animals and we remain unaware of them.
हमारे आसपास मशीनों, प्रकृति और जीवों से उत्पन्न कई ध्वनियाँ इस सीमा से बाहर होती हैं जिन्हें हम नहीं सुन पाते।



- When we hear some animal, we're really hearing only those frequencies generated by their vocal chords that fall in our audible range.
जब हम किसी जीव की आवाज़ सुनते हैं तो हम वास्तव में केवल उन आवृत्तियों को सुन पाते हैं जो हमारे श्रव्य क्षेत्र में होती हैं।

Different frequencies sound different विभिन्न आवृत्तियाँ भिन्न सुनाई देती हैं

- For instance, when you hum deeply, that's about **200 Hz**.
उदाहरण के लिए गहरा गुनगुनाना लगभग **दो सौ हर्ट्ज** होता है।
- The metallic sound of a spoon falling on the floor is sharp and contains frequencies about as high as **8 kHz**.
फर्श पर चम्मच गिरने की धात्विक टनकार तेज़ होती है और उसमें लगभग **आठ किलोहर्ट्ज** तक की आवृत्तियाँ होती हैं।
- A cat may meow at about **4 kHz** and a cow moos at around **1 kHz**.
बिल्ली लगभग **चार किलोहर्ट्ज** पर म्याऊँ कर सकती है और गाय लगभग **एक किलोहर्ट्ज** पर रंभाती है।
- Usually, frequency is what we think of as **sharpness or the pitch of a sound**.
सामान्यतः आवृत्ति को ही हम ध्वनि की तीक्ष्णता या पिच के रूप में महसूस करते हैं।
- If you've learnt to sing or heard people practising music, you might be aware of the **sa-re-ga-ma-pa-dha-ni-sa** at the start.
यदि आपने गायन सीखा है या अभ्यास सुना है तो आप प्रारंभ के **सरगम** से परिचित होंगे।
- Each of these syllables is a way to memorise a frequency.
इनमें से प्रत्येक अक्षर एक आवृत्ति को याद रखने का तरीका है।
- If the first **sa** is **260 Hz**, the last one is about **520 Hz** — double the frequency of the first one.
यदि पहला **सा दो सौ साठ हर्ट्ज** है तो अंतिम लगभग **पाँच सौ बीस हर्ट्ज** होता है — पहले का दोगुना।
- The ones in between are placed at specific intervals.
बीच वाले विशिष्ट अंतराल पर रखे जाते हैं।
- The absolute value of the first sa can also be changed, and which people do when they're going to sing in a different key.
पहले सा का वास्तविक मान बदला भी जा सकता है और लोग अलग सुर में गाने के लिए ऐसा करते हैं।

Guitars and Pianos गिटार और बाँसुरियाँ

- Now that we know sounds are simply ways to create vibrations in the air, we can generate them and also switch between them.
अब जब हम जानते हैं कि ध्वनियाँ मूलतः वायु में कंपन उत्पन्न करने के तरीके हैं, तो हम उन्हें उत्पन्न कर सकते हैं और उनके बीच परिवर्तन भी कर सकते हैं।
- A simple way is to use strings.
एक सरल तरीका तारों का उपयोग करना है।
- Of course we can't use the cotton strings we use to make clothes.
बिल्कुल, हम कपड़े बनाने वाली सूती डोरियों का उपयोग नहीं कर सकते।
- They need to be strong and able to vibrate fast.
उन्हें मज़बूत होना चाहिए और तेज़ी से कंपन करने में सक्षम होना चाहिए।
- Strings made of metal are a better idea.
धातु से बने तार बेहतर विकल्प होते हैं।
- It turns out that if the string is shorter, the higher the frequency of sound it makes.
यह पाया जाता है कि यदि तार छोटा हो तो वह ध्वनि की अधिक आवृत्ति उत्पन्न करता है।
- This is how a guitar works.
इसी प्रकार गिटार काम करता है।
- When you use one of the hands to put your fingers in specific positions, you're essentially changing the length of the string that can vibrate.
जब आप एक हाथ से अपनी उंगलियाँ विशेष स्थानों पर रखते हैं तो वास्तव में आप कंपन करने वाले तार की लंबाई बदल रहे होते हैं।



- And thus you can change the frequency of the sound.
और इस प्रकार आप ध्वनि की आवृत्ति बदल सकते हैं।
- Often in hollow tubes the air inside can vibrate and generate sounds of a specific frequency.
अक्सर खोखली नलियों के भीतर की वायु कंपन कर सकती है और किसी विशेष आवृत्ति की ध्वनियाँ उत्पन्न कर सकती है।
- The longer the air column, the lower the frequency.
जितना लंबा वायु स्तंभ होगा, ध्वनि की आवृत्ति उतनी ही कम होगी।
- This is how a flute works.
इसी सिद्धांत पर बाँसुरी काम करती है।
- When you place your fingers at different points, you're changing the length of the air column and thus creating different musical notes.
जब आप अपनी उंगलियाँ विभिन्न स्थानों पर रखते हैं, तो आप वायु स्तंभ की लंबाई बदलकर अलग-अलग संगीत स्वरों का निर्माण करते हैं।
- You may have experienced this effect even if you haven't played a flute.
आपने यह प्रभाव तब भी अनुभव किया होगा यदि आपने कभी बाँसुरी न भी बजाई हो।
- Often when you fill a water bottle, as the bottle gets filled up to the brim, you can hear the sound of water filling up become sharper and sharper.
अक्सर जब आप पानी की बोतल भरते हैं तो जैसे-जैसे बोतल ऊपर तक भरती जाती है, पानी भरने की ध्वनि और तीक्ष्ण होती जाती है।
- That's because the air column is becoming shorter and shorter.
ऐसा इसलिए होता है क्योंकि भीतर का वायु स्तंभ लगातार छोटा होता जाता है।
- Now, even as we understand why we hear animals and musical instruments the way we do, how is it that we hear sounds from our earphones/ speakers?
अब जबकि हम समझते हैं कि हम पशुओं और वाद्य यंत्रों की आवाज़ें जिस तरह सुनते हैं, वह क्यों है, तब प्रश्न उठता है कि हम अपने कानों में लगाए जाने वाले उपकरणों और वाद्य पेटियों से ध्वनि कैसे सुनते हैं?

Magnetic vocal chords

चुंबकीय स्वर-तंत्री

- If you have ever broken open a speaker (deliberate or otherwise), you will find a magnet inside.
यदि आपने कभी किसी वाद्य पेटि को खोला है, तो आपने उसके भीतर एक चुंबक अवश्य देखा होगा।
- Magnets are wonderful materials, like iron and nickel, that have magnetic properties due to the way electrons are arranged in their atoms.
चुंबक अद्भुत पदार्थ होते हैं, जैसे लोहा और निकेल, जिनमें उनके परमाणुओं में इलेक्ट्रॉनों की विशेष व्यवस्था के कारण चुंबकीय गुण होते हैं।
- That is, they generate magnetic fields and can attract or repel other magnets.
अर्थात् वे चुंबकीय क्षेत्र उत्पन्न करते हैं और अन्य चुंबकों को आकर्षित या विकर्षित कर सकते हैं।
- Every magnet has two poles: north and south, just like our earth.
हर चुंबक के दो ध्रुव होते हैं — उत्तर और दक्षिण — बिलकुल हमारी पृथ्वी की तरह।
- Every magnetic field starts from the north pole and ends at the south pole.
प्रत्येक चुंबकीय क्षेत्र उत्तर ध्रुव से शुरू होकर दक्षिण ध्रुव पर समाप्त होता है।
- Poles of the same type repel while opposite poles attract.
समान प्रकार के ध्रुव एक-दूसरे को विकर्षित करते हैं जबकि भिन्न प्रकार के ध्रुव एक-दूसरे को आकर्षित करते हैं।
- In the speaker, you'll also see a copper coil in front of the magnet.
वाद्य पेटि में आप चुंबक के सामने ताँबे की कुंडली भी देखेंगे।
- It will be wound and attached to a net-like sheet.
यह कुंडली लिपटी हुई होती है और जाली जैसी चादर से जुड़ी होती है।
- The copper coil can carry a current supplied by the electrical circuitry.
ताँबे की यह कुंडली परिपथ से प्राप्त विद्युत धारा वहन कर सकती है।
- Now, one of the most fundamental wonders of nature — something you learn in early classes of physics — is that when a coil carries a current, it can itself behave like a magnet.
अब प्रकृति के सबसे बुनियादी चमत्कारों में से एक, जिसे आप भौतिकी की शुरुआती कक्षाओं में सीखते हैं, यह है कि जब किसी कुंडली में विद्युत धारा प्रवाहित होती है तो वह स्वयं चुंबक की तरह व्यवहार कर सकती है।



- And if the current changes its direction, the magnetic field also changes its direction. और यदि धारा की दिशा बदल दी जाए तो चुंबकीय क्षेत्र की दिशा भी बदल जाती है।
- So the copper coil is a magnet made not out of magnetic materials but due to electric currents, and is called an 'electromagnet'. इस प्रकार ताँबे की कुंडली चुंबकीय पदार्थों से नहीं बल्कि विद्युत धारा के कारण बना चुंबक होती है, जिसे वैद्युतचुंबक कहा जाता है।
- Electromagnets were invented in the early 1800s. वैद्युतचुंबकों का आविष्कार अठारहवीं शताब्दी के प्रारंभिक दशकों में हुआ था।
- So now we have the magnet and an electromagnet (which is stuck to a drum) next to each other. अब हमारे पास एक स्थायी चुंबक और उसके पास एक वैद्युतचुंबक होता है जो ड्रम से जुड़ा रहता है।
- To create sound, we need to vibrate the air molecules at some frequency. ध्वनि उत्पन्न करने के लिए हमें वायु कणों को किसी आवृत्ति पर कंपन कराना होता है।
- Now comes the trick: as the current flows through the wires, you can switch its direction at will, at any frequency. अब युक्ति यह है कि जब विद्युत धारा तारों में बहती है तो आप उसकी दिशा किसी भी आवृत्ति पर अपनी इच्छा से बदल सकते हैं।
- Since the current creates a magnetic field, the electromagnet will switch its magnetic fields at the same frequency, as if continuously changing the north and south poles of the electromagnet. चूँकि धारा चुंबकीय क्षेत्र उत्पन्न करती है, वैद्युतचुंबक भी उसी आवृत्ति पर अपना क्षेत्र बदलता है, मानो अपने उत्तर और दक्षिण ध्रुवों को लगातार अदला-बदली कर रहा हो।
- Whenever the electromagnet's pole is opposite to that of the magnet, the two are pulled towards each other; whenever their poles line up, they're pushed apart. जब भी वैद्युतचुंबक का ध्रुव स्थायी चुंबक के विपरीत होता है तो दोनों एक-दूसरे की ओर खिंचते हैं; और जब उनके ध्रुव एक जैसे होते हैं तो वे एक-दूसरे से दूर धकेले जाते हैं।
- But since the magnetic is static, the electromagnet is the one that moves. लेकिन चूँकि स्थायी चुंबक स्थिर होता है, इसलिए वैद्युतचुंबक ही गति करता है।
- Its push and pull vibrates the drum sheet, creating the disturbance in the air molecules. उसका यह खिंचाव और धक्का ड्रम की चादर में कंपन उत्पन्न करता है और वायु कणों में विकोभ पैदा करता है।
- This is how, whether you're away on some corner of an island or on a metro train travelling underground, the speaker's magnetic vocal chords bring you music right to your ears. इसी प्रकार, चाहे आप किसी द्वीप के कोने पर हों या भूमिगत रेल में यात्रा कर रहे हों, वाद्य पेटी की ये चुंबकीय स्वर-तंत्रियाँ संगीत को सीधे आपके कानों तक पहुँचा देती हैं।

Sounds around आसपास की धनियाँ

- If you want to know which sound frequencies are around you, you can use your smartphone quite effectively. यदि आप जानना चाहते हैं कि आपके आसपास कौन-कौन सी ध्वनि आवृत्तियाँ मौजूद हैं, तो आप अपने स्मार्टफोन का बहुत प्रभावी उपयोग कर सकते हैं।
- Teachers from Aachen University in Germany have made an app called phyphox that you can download. जर्मनी की Aachen University के शिक्षकों ने phyphox नामक एक ऐप बनाया है जिसे आप डाउनलोड कर सकते हैं।
- It has an audio analyser that allows you to read the frequency of any sound. इसमें एक ऑडियो विश्लेषक होता है जो आपको किसी भी ध्वनि की आवृत्ति पढ़ने की अनुमति देता है।
- Play any sound around it and check which frequency it is. इसके आसपास कोई भी ध्वनि बजाएँ और देखें कि उसकी आवृत्ति क्या है।
- Another wonderful app is called Merlin ID, made by researchers in Cornell University in the U.S., with which your phone can 'hear' the call of any bird and identify the species. एक और अद्भुत ऐप Merlin ID है जिसे अमेरिका की Cornell University के शोधकर्ताओं ने बनाया है, जिसके द्वारा आपका फोन किसी भी पक्षी की आवाज़ 'सुन' सकता है और उसकी प्रजाति पहचान सकता है।



- If you're even more curious, however, you might wonder: why do materials even behave like magnets?
यदि आप और भी जिज्ञासु हैं, तो आप सोच सकते हैं: वस्तुएँ चुंबकों की तरह व्यवहार क्यों करती हैं?
- Do electrons rotate around an axis just like the earth to create a magnetic field?
क्या इलेक्ट्रॉन पृथ्वी की तरह किसी अक्ष के चारों ओर घूमते हैं ताकि **चुंबकीय क्षेत्र** उत्पन्न करें?
- Turns out that this spin of an electron is nothing like that of the earth and one can't really understand it without learning quantum mechanics.
यह पता चलता है कि इलेक्ट्रॉन का यह **स्पिन** पृथ्वी के स्पिन जैसा बिल्कुल नहीं होता और इसे **क्वांटम मैकेनिक्स** सीखे बिना वास्तव में समझा नहीं जा सकता।
- This is a subject taught in physics programmes, which some of us do here in IIT Kanpur.
यह एक विषय है जिसे भौतिकी कार्यक्रमों में पढ़ाया जाता है, जिसे हममें से कुछ लोग यहाँ **IIT Kanpur** में पढ़ते हैं।
- Next time you have a free weekend, instead of stepping into the cacophony of a mall, consider going for a walk in a zoo or a garden in your town.
अगली बार जब आपका सप्ताहांत खाली हो, तो किसी मॉल के शोर-शराबे में जाने के बजाय अपने शहर के किसी चिड़ियाघर या बगीचे में टहलने पर विचार करें।
- In the middle of a quiet patch, as everything else falls silent, don't forget to appreciate the music nature is playing for you, reaching you through millions of vibrating air molecules.
किसी शांत जगह पर, जब आसपास की सारी चीज़ें शांत हो जाती हैं, तो प्रकृति द्वारा आपके लिए बजाए जा रहे उस संगीत की सराहना करना न भूलें, जो लाखों कंपन करती हुई वायु कणों के माध्यम से आप तक पहुँचता है।

PATRIOTIC IAS