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5 in Top 10 | **17** in Top 25 | **34** in Top 50 | **66** in Top 100 | **633+** Selections From all courses



GS Foundation Course Duration : 10-12 Months Course Type : Paid*	GS Mains Advance Course Duration : 3-4 Months Course Type : Paid*	Essay Guidance Program Duration : 3-4 Months Course Type : Paid*
GS Mains Test Series Duration : 3-15 Months Course Type : Paid*	Optional Subject Test Series Duration : 3-6 Months Course Type : Paid*	Interview Guidance Program Duration : 1-4 Months Course Type : Paid*
GS Prelims Test Series Duration : 3-8 Months Course Type : Paid*	Optional Advance Course Duration : 3-4 Months Course Type : Paid*	Weekly Current Affairs Duration : 12-16 Months Course Type : Paid*
Mentorship Program (AIM) Duration : 15 Months Course Type : Paid*	Note: * NEXT IAS also provides fee sponsorship for meritorious/economically weaker students.	

Course details of all the selected candidates are available on our website.

*We have taken due care in publishing the result after proper verification from our database. However if any candidate finds discrepancy/ misprint in name/ photograph/ course etc, then kindly reach out to us through email info@nextias.com

GS Foundation Course : CSE 2025-26

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6 th May	23 rd May	2 nd May	16 th May	6 th May
8:00 AM - 11:00 AM	5:30 PM to 8:30 PM	5:00 PM to 8:00 PM	5:00 PM to 8:00 PM	5:30 PM to 8:30 PM
16 th May	6 th May	16 th May	6 th May	6 th May
6:00 PM - 9:00 PM	6:00 PM - 9:00 PM	6:00 PM - 9:00 PM	6:00 PM - 9:00 PM	8:00 AM - 11:00 AM
20 th May				16 th May
11:30 AM - 2:30 PM				6:00 PM - 9:00 PM
3 rd June				3 rd June
6:00 PM - 9:00 PM				6:00 PM - 9:00 PM
4 th June				4 th June
8:00 AM - 11:00 AM				8:00 AM - 11:00 AM

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सायं 6:00 - 9:00 बजे	सुबह 11:30 - 2:30 बजे	सुबह 8:00 - 11:00 बजे	सायं 6:00 - 9:00 बजे
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NEWS » PAGE 12



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WORLD » PAGE 14



DOWNTURN Core sectors slid to 5.2% in March

BUSINESS » PAGE 13

Come clean on timing of Kejriwal arrest: SC to ED

Bench tells the agency that 'life and liberty' is very important; Delhi Chief Minister's petition argues that the action came just before Lok Sabha election in order to crush the Opposition

Krishnadas Rajagopal
NEW DELHI

The Supreme Court on Tuesday said the Directorate of Enforcement (ED) would have to justify the timing of the arrest of Delhi Chief Minister Arvind Kejriwal in the excise policy case on March 21, barely a week after the Model Code of Conduct for the Lok Sabha election came into force.

A Bench of Justices Sanjiv Khanna and Dipankar Datta wound up the second consecutive day of hearings in a petition filed by Mr. Kejriwal, on his fifth furlough of remand till May 7, with a parting shot at the Central agency.

"Life and liberty is very important. We cannot deny that," Justice Khanna reminded Additional Solicitor



Calling on: Punjab Chief Minister Bhagwant Mann leaves after meeting Delhi CM Arvind Kejriwal in Tihar Jail on Tuesday. ANI

General S.V. Raju, who will open the ED's counter arguments on May 3.

Justice Khanna said the Central agency has to address the court "on the timing of his [Mr. Kejriwal's] arrest before the elections".

The court's insistence that the agency should ad-

dress the issue was significant as the Delhi Chief Minister has based his petition on the argument that his arrest was timed to crush the Opposition ahead of the general election.

Mr. Kejriwal and the Aam Aadmi Party (AAP) he heads have portrayed the ED as a "tool" for the ruling BJP.

"What was so imminent about my arrest? Was I a hardened criminal or a terrorist who would run away... So, did you leave a guilty Chief Minister to roam free all these years?" senior advocate A.M. Singhvi, appearing for the Chief Minister, had argued on Monday.

The ED has maintained that the arrest was based on material evidence. "Criminal" politicians cannot expect immunity from arrest on the grounds that they want to campaign for elections, the agency had retorted in an 87-page affidavit.

CONTINUED ON
» PAGE 10
POLL TIME, PRISON TIME
» PAGE 6

SC slams IMA chief's remarks about court

The Hindu Bureau
NEW DELHI

Patanjali case: SC chides State body

NEW DELHI
The Supreme Court on Tuesday expressed dissatisfaction at the Uttarakhand State Licensing Authority, saying it only "woke up" and moved against Patanjali Ayurved and its co-founder Baba Ramdev after the top court intervened and passed orders. » PAGE 10

Tables turned on Tuesday when the Supreme Court took stern exception to comments reportedly made by Indian Medical Association (IMA) president R.V. Asokan in an interview about the court's criticism of practices of private doctors.

"After all this, you do this? The IMA has not covered itself with glory... How can you decide which way we [Supreme Court] should go?" Justice Hima Kohli asked the IMA lawyers.

The media interview of Mr. Asokan was brought to the attention of a Bench of Justices Hima Kohli and Ahsanuddin Amanullah by Patanjali Ayurved's lawyer, senior advocate Mukul Rohatgi.

The contempt proceedings against Patanjali Ayurved, its co-founder Baba Ramdev and his close associate Acharya Balkrishna

were initiated in a petition filed by the IMA.

Meanwhile, the court "appreciated" the second round of unconditional apologies published by Patanjali, Ramdev and Balkrishna in over 300 newspapers.

However, the court ordered them to file the original pages of the newspapers in which the apology was published.

CONTINUED ON
» PAGE 10

IN BRIEF



2 more held over doctored video of Amit Shah

NEW DELHI
Two more persons, political functionaries from AAP and the Congress, were arrested on Tuesday in Gujarat for allegedly posting a doctored video of Union Minister Amit Shah's April 23 speech. A day ago, Assam Police arrested Reetam Singh, a lawyer at the Gauhati HC working as the Congress's Assam war room coordinator. » Page 10

OPPORTUNITIES » PAGE 5

JD(S) suspends Prajwal; SIT issues notices to him, father

The Hindu Bureau
BENGALURU

The Janata Dal (Secular) on Tuesday suspended Prajwal Revanna, the party's MP in Hassan who has been accused of sexually exploiting several women. In the letter announcing his suspension, the party stated that the videos of the Hassan MP doing the rounds have "caused considerable damage to party's dignity and leadership".

The decision was announced after party's core committee meeting in Hubballi which was scheduled to chalk out the poll strate-



Protesters burn a poster of JD(S) MP Prajwal Revanna in Bengaluru on Tuesday. PTI

gy for the second phase of elections in Karnataka. The meeting was attended by State JD(S) president H.D. Kumaraswamy, his uncle.

The Special Investigation Team (SIT) probing the alleged sex scandal also issued notices to Mr. Prajwal and his father, former Mi-

nister H.D. Revanna. The father and son have been asked to appear before the SIT. Sources said they may move court seeking anticipatory bail. The notice has been issued in the sexual harassment case registered on April 28 in which a former cook at the Revanna household lodged a complaint that the father-son duo had sexually harassed her while she worked there.

The notice attains significance as Mr. Prajwal is not in the country and is said to have flown to Europe on April 27, hours before the State government decided to form an SIT.

BJP govt. eliminates terrorists on their home turf, says PM Modi

Shoumojit Banerjee
PUNE

For the second time in two days, Prime Minister Narendra Modi on Tuesday said that his Bharatiya Janata Party (BJP)-led Union government eliminated terrorists by entering their home turf, in stark contrast to the previous Congress-led UPA regime. The UPA government, he said, had merely compiled and sent dossiers on the terror attacks to neighbouring Pakistan.

Addressing a poll rally in Latur district in the Maharashtra region, Mr. Modi mocked the alleged ineffectiveness of previous Congress-led governments. "During the Congress regime, news headlines used to be about India handing over another dossier to Pa-



Narendra Modi being felicitated by Eknath Shinde and Devendra Fadnis at Latur in Maharashtra on Tuesday. ANI

kistan about terror activities and terrorists. It used to be big news. Some of our friends in the media used to clap after any such dossier was sent," he remarked, commenting on the situation after the 2008 Mumbai terror attacks.

Claiming that it was his government that had made the country safe and secure, the PM said: "Today, India does not dispatch

dossiers, but we eliminate terrorists on their home turf. The headlines in the 'New Bharat' read: 'Mission LoC, India punishes Pakistan through surgical strikes.'

Mr. Modi was campaigning for NDA candidates for the Latur, Dharashiv (formerly Osmanabad), and Madha (in Solapur) Lok Sabha seats, which go to the polls on May 7 in the

third phase. The PM resurrected the issue of the Opposition Congress's alleged plan to introduce an inheritance tax if it comes to power. A political row erupted recently after Sam Pitroda, chairman of the Indian Overseas Congress, mentioned about inheritance tax, a system similar to an existing tax structure in the U.S., and described it as an "interesting law".

Addressing a rally at Malshiras in Madha, the PM launched a broadside against Nationalist Congress Party (SP) president Sharad Pawar, saying that the time had come "to punish him" for not keeping his promise made in 2009 to bring water to Solapur district, which faces acute scarcity. Mr. Pawar had contested and won the Madha seat in 2009.

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- AIR 23 SAURABH SHARMA IGP
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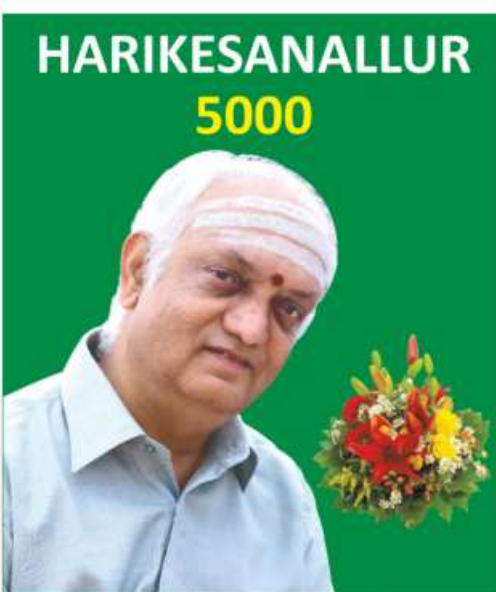
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Excise case: court denies bail to Sisodia

CBI terms former Delhi Deputy Chief Minister 'architect' of alleged scam; court says 'stage not right' for relief to AAP leader

The Hindu Bureau NEW DELHI

A court here on Tuesday rejected bail pleas of former Deputy Chief Minister and senior Aam Aadmi Party (AAP) leader Manish Sisodia in the corruption and money laundering cases linked to the now-scrapped Delhi excise policy.

Special Judge Kaveri Bajwa declined both the pe-

Sisodia has been in jail for over 14 months, and was denied bail earlier too

titions, saying the "stage was not right" for it.

Mr. Sisodia was arrested by the Central probe agencies in February last year. This is the second time that the trial court has rejected the bail pleas of Mr. Siso-

dia. His bail was first rejected on March 31, 2023.

The Delhi High Court and the Supreme Court had upheld the trial court's order.

'Mastermind of scam' During the hearing on his bail applications, the CBI had submitted in the court that Mr. Sisodia is the "mastermind" and "architect" of the alleged scam. Zoheb Hossain, the ED

counsel, told the court that the Delhi excise policy was meant to be an "evergreen vehicle" to accumulate illegal gains.

The counsel representing the AAP leader argued that he has been in jail for over 14 months now and the trial going on for an indefinite time.

The case against Mr. Sisodia is based on an FIR registered by the CBI on the complaint of the Delhi

Lieutenant-Governor, alleging irregularities in the excise policy for 2021-22, which was subsequently withdrawn.

After the CBI case, the ED lodged a case under the Prevention of Money Laundering Act, alleging that the money earned through the policy was diverted through "hawala" channels for the AAP's campaign in the 2022 Goa Assembly poll.

2020 riots case: charges framed against Ishrat Jahan

Press Trust of India NEW DELHI

A Delhi court has formally framed charges, including that of attempt to murder, against former Congress councillor Ishrat Jahan, activist Khalid Saifi, and 11 others in a 2020 north-east Delhi riots case, paving the way for a trial.

The case pertains to an alleged rioting incident during the communal violence on February 26, 2020, in Jagat Puri.

According to the chargesheet, a riotous mob, including the 13 accused, refused to follow the Delhi police's direction to disperse, threw stones, and assaulted police officers while obstructing them in performing their duties, and also fired a gunshot at a head constable.

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THE HINDU THE INFORMED VOTER QUIZ 1. Who among the following is not eligible to vote? 2. Which law stipulates that businesses and establishments within the voting area must declare a paid holiday on polling day? 3. According to Article 324(2) of the Constitution of India, who has the authority to appoint the Chief Election Commissioner and the Election Commissioners?

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NATIONAL BOARD OF EXAMINATIONS IN MEDICAL SCIENCES (Autonomous body of the Mo, Health & Family Welfare, Govt. of India) NAMS Building, Medical Enclave, Ansari Nagar, New Delhi - 110029 FOREIGN MEDICAL GRADUATE EXAMINATION - JUNE 2024 NOTICE National Board of Examinations in Medical Sciences (NBEMS) shall conduct the next FMGE on 6th July 2024.

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AAP, Cong. leaders hold first strategy meet after declaring LS poll tie-up

Joint poll road map to be fixed over next 2 days; more interactions among party leaders on cards; Mann meets Kejriwal, says AAP chief told him to ensure party workers attend all INDIA bloc events

The Hindu Bureau
NEW DELHI

Senior leaders of the Aam Aadmi Party (AAP) and Congress on Tuesday held their first campaign strategy meeting after announcing their alliance in Delhi in February this year. As part of their seat-sharing arrangement, AAP is fighting on four seats, while Congress is contesting on the other three. Voting for Delhi's seven Lok Sabha seats is scheduled for May 25. AAP and Congress have also joined forces in Haryana, where they are fighting on one and nine seats, respectively. A senior Delhi Congress leader said both parties had agreed to finalise a joint poll road map over the next two days. The leaders also agreed to meet regularly to take stock of the ground situation and "fully activate ground-level workers to defeat the BJP in all seven Lok Sabha seats of Delhi and 10 seats



Punjab CM Bhagwant Mann said AAP chief Arvind Kejriwal asked him to actively campaign for all INDIA bloc candidates. FILE PHOTO

of Haryana".

Leaders who attended the meeting included Deepak Babaria, All India Congress Committee general secretary and party in-charge of Delhi and Haryana; Sandeep Pathak, AAP's general secretary (organisation); and Devender Yadav, newly appointed Delhi Congress interim chief. Sources said the prospects of the candidates in Delhi and Haryana were discussed at the meeting. The meeting comes two

days after former Delhi Congress chief Arvinder Singh Lovely, in his resignation letter, said local party workers were not in favour of a tie-up with AAP, which, he said, was "formed on the sole basis of levelling fabricated corruption charges against the Congress party".

'Campaign actively'
Punjab Chief Minister Bhagwant Mann met his Delhi counterpart and AAP chief Arvind Kejriwal in Ti-

har Jail on Tuesday. This was Mr. Mann's second visit to see the jailed Delhi CM in a fortnight. Speaking to mediapersons after his visit, Mr. Mann said the AAP chief had asked him to actively campaign for all Indian National Developmental, Inclusive Alliance (INDIA) bloc candidates in the general election. "He told me that wherever there is an INDIA bloc programme, be it in Assam, Gujarat, Maharashtra, U.P. or Bihar, our leaders must attend it," Mr. Mann added.

Meanwhile, senior AAP leader Saurabh Bharadwaj on Tuesday said the party's Rajya Sabha member Raghav Chadha will join the election campaign as soon as he recovers from an eye operation. "It is said that his [Mr. Chadha's] condition was serious and there was a possibility of blindness. As soon as he gets better, he will come back to India and join us," Mr. Bharadwaj told a news agency.

Vacancies at rights panel: HC seeks govt. response

The Hindu Bureau
NEW DELHI

The High Court on Tuesday asked the Delhi government to respond to a plea seeking directions to fill the vacant positions of the chairperson and other members of the Delhi Commission for Protection of Child Rights (DCPCR). The court also issued notices to the DCPCR and the Union Ministry of Women and Child Development on the petition filed by the National Child Development Council, which said that the DCPCR has been functioning without a chief since July 2, 2023 illegally. It said that as per rules, a vacancy caused by death, resignation or any other reason must be filled by nomination within 90 days from the date of such occurrence. The court listed the matter for further hearing on July 16.

Cong. picks Devender Yadav as interim chief of Delhi unit; party a 'sinking ship', says BJP

The Hindu Bureau
NEW DELHI

Congress president Mallikarjun Kharge on Tuesday appointed Devender Yadav as the interim chief of the party's Delhi unit, two days after Arvinder Singh Lovely resigned from the post citing his inability to continue without a free hand. Mr. Lovely's resignation had come as a shock to the Congress, which is hoping to revive its fortunes in the Capital, where it has not been able to win any of the seven Lok Sabha seats since 2014. The resignation also brought to the fore resentment within a section of the Congress over the seat-sharing pact with the Aam Aadmi Party (AAP) and the decision to give tickets to "outsiders", such as Udit Raj, a BJP turncoat, and Kanhaiya Kumar, overlooking the local leaders.



Devender Yadav is currently the AICC in-charge of Punjab. PTI

Mr. Yadav is a former MLA from Delhi's Badli and the AICC in-charge for Punjab. Thanking the Congress leadership, Mr. Yadav said his priority will be to bridge the rift within the party.

'Will listen to all'
He said, "The only solution is to listen to everyone. There are many senior leaders in the Delhi unit who have worked hard for the party. Some of them

have spoken openly, others I will meet soon." AICC treasurer Ajay Maken termed Mr. Yadav's appointment the "right choice". In a post on X, Mr. Maken said without taking any name, "In politics, things don't always go our way. Sometimes, our desires remain unfulfilled, our voices unheard. Yet, does this justify undermining the very organisation that defines our political identity? Should we repeatedly inflict harm on our organisation for personal gains?" Delhi BJP spokesperson Praveen Shankar Kapoor said the Congress in Delhi is a "sinking ship". "The local Congress leaders want to revive the party, but its central leadership wants the Delhi unit to play second fiddle to [CM] Arvind Kejriwal, who had, in 2013, pushed the Congress out of power," he said.

LS poll: BJP's Bansuri Swaraj, AAP's Sahi Ram Pehelwan file nomination papers on Day 2

The Hindu Bureau
NEW DELHI

BJP's New Delhi candidate Bansuri Swaraj and Aam Aadmi Party's (AAP) South Delhi candidate Sahi Ram Pehelwan on Tuesday filed their nomination papers for the Lok Sabha election on Tuesday. According to the Delhi Chief Electoral Officer, over 30 candidates filed their papers on the second day of nominations for the seven Lok Sabha seats in Delhi, where voting is slated for May 25, in the sixth phase of the general election. The last day for filing papers is May 6, and the nominations can be withdrawn by May 9. The papers will be scrutinised on May 7.



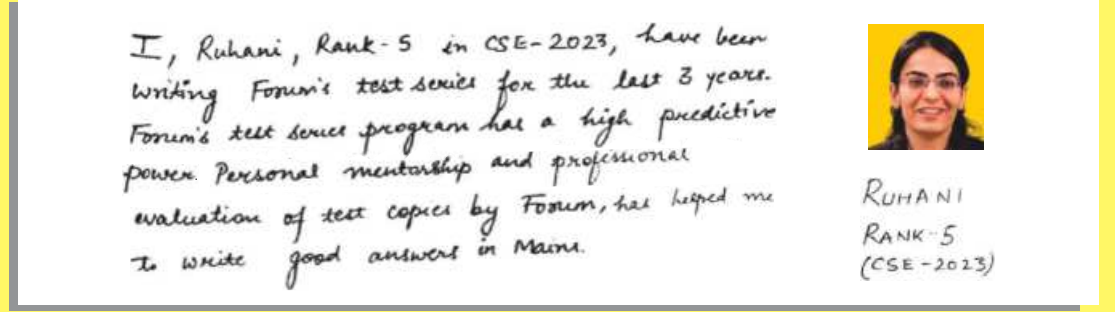
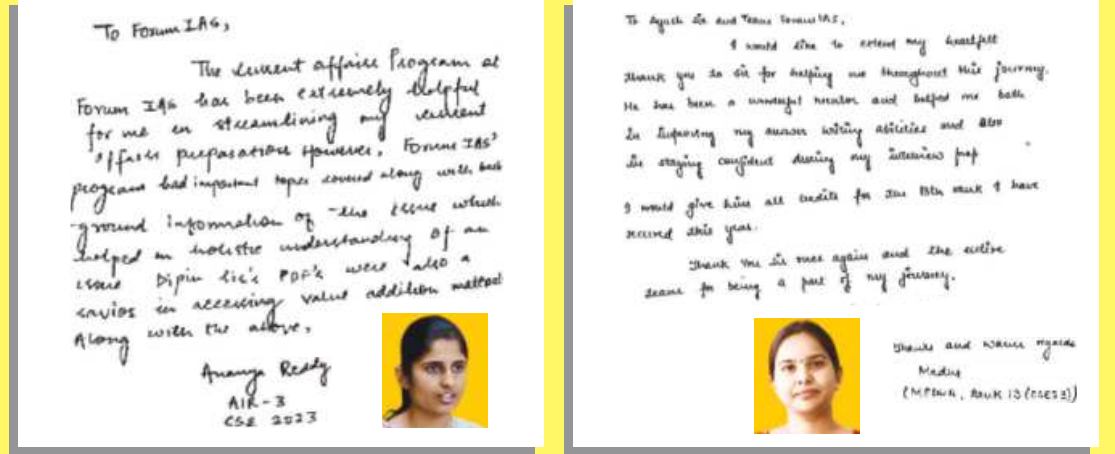
BJP candidate Bansuri Swaraj on her way to file nomination papers. SHASHI SHEKHAR KASHYAP

Before filing her nomination papers, Ms. Swaraj took part in a *havan*. Union Minister Hardeep Singh Puri and Delhi BJP president Virendra Sachdeva were among those who accompanied her to the District Magistrate's office. Ms. Bansuri, daughter of the late BJP leader Sushma

Swaraj, in her affidavit declared assets totalling over ₹19 crore, including ₹11.27 crore in movable assets and over ₹8 crore in immovable assets, in her election affidavit. Mr. Pehelwan, who is the first among the INDIA bloc candidates to file his nomination, started his day with a visit to a temple. He embarked on an 8-km "Ashirwad Yatra" that culminated at the District Magistrate's office in Mehrauli. AAP leaders Saurabh Bharadwaj and Atishi accompanied him, along with party MLAs and supporters. According to his affidavit, AAP's South Delhi candidate owns movable assets worth ₹34.80 lakh and ₹1.04 crore in immovable assets.

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COHORT-4

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RISE 05:40 SET 18:58

RISE 01:50 SET 12:45

FRIDAY, MAY. 03

RISE 05:39 SET 18:58

RISE 02:27 SET 13:52

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Safdarjang 36 22

Palam 37 22

Delhi Palam Today 39°C A dry weather to prevail. Morning will be pleasant. Day will be hot and uneasy with gusty winds. Night also will be comfortable.

Delhi Palam Tomorrow 40°C The weather will be dry. Morning will be pleasant. Day will be hot with uneasy. Night will be comfortable.

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THE HINDU

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IN BRIEF



Piyush Goyal files nomination from Mumbai North LS seat

Union Minister Piyush Goyal on Tuesday filed his nomination papers from the Mumbai North Lok Sabha seat. Accompanied by Maharashtra Chief Minister Eknath Shinde, Mr. Goyal submitted his papers before the returning officer in Bandra. This is the first time that Mr. Goyal is contesting the Lok Sabha poll. He is currently the Leader of House in the Rajya Sabha. Talking to reporters, Mr. Goyal claimed the Congress is a "failed" party without any leadership or policy. The Congress has so far not announced any candidate from the Mumbai North seat. Mr. Shinde said Mr. Goyal's victory is assured. PTI

U.P. govt. to establish cyber police stations in 57 districts

The Uttar Pradesh government will establish cyber police stations in 57 districts after the Lok Sabha poll with each police station having 25 posts for officers and employees. The government plans to create a total of 1,425 posts in the designated 57 police stations. "The State government, in response to the rising incidents of cybercrime nationally and globally, has decided to establish cyber police stations across all 75 districts. While cyber stations are already operational in 18 divisions, it will be established in the remaining 57 districts following the Lok Sabha poll," reads a U.P. govt. statement.

Raj Babbar is Cong. LS candidate from Gurgaon, Anand Sharma from Kangra

The Hindu Bureau
GURUGRAM/CHANDIGARH

The Congress on Tuesday named actor-turned politician Raj Babbar as its candidate for the Gurgaon Lok Sabha seat. In its latest list of candidates for the ongoing parliamentary election, the party has named former Union Minister Anand Sharma as the candidate from Kangra in Himachal Pradesh, while former Una MLA Satpal Raizada will contest from Hamirpur. Congress leader Bhushan Patil is the party's candidate from Mumbai North (Maharashtra).

Mr. Babbar, who has earlier been the party's Lok Sabha and Rajya Sabha MP from Uttar Pradesh, is pitted against Ahirwal leader Rao Inderjit Singh, who had quit the Congress to join the Bharatiya Janata Party (BJP) in 2014.



Raj Babbar

Soon after the announcement, All India Congress Committee Other Backward Classes department chairman Capt. Ajay Singh Yadav, who was also in the race for this seat, posted on X that "there is a deep-rooted conspiracy of a few Haryana Congress leaders to crush the senior Congress leaders", hinting at infighting within the party. The former Minister, however, added that he would abide by the decision of the party leadership.

Of the 10 Lok Sabha seats



Anand Sharma

in Haryana, the Congress is contesting on nine. The candidates for the rest of the eight seats were announced last week. In the remaining seat of Kurukshetra, AAP's State unit president Sushil Gupta is the joint INDIA bloc candidate.

The Kangra call

In Himachal Pradesh, the party's decision to field Mr. Sharma from Kangra is being seen as a strategic move to unite the State unit as it is likely to paper over the cracks that deepened fol-

lowing the defeat of Abhishek Singhvi - the official Congress candidate in the recent Rajya Sabha elections - due to cross-voting by six MLAs.

Party insiders are optimistic that with Mr. Sharma in the fray against the BJP's Rajeev Bhardwaj, the Congress cadre and State unit leaders will be united.

The former Union Minister is seen as a 'tall leader' who can bond with both party workers and leaders. "The decision to field Anand Sharma will strengthen the party across the State," said Naresh Chauhan, principal media adviser to Himachal Pradesh Chief Minister Sukhvinder Singh Sukhu. Mr. Raizada, meanwhile, will take on Union Minister Anurag Thakur of the BJP.

In Maharashtra, Mr. Patil will take on Union Minister Piyush Goyal of the BJP.



If there is a legate to Chandigarh, it is me, says Manish Tewari, the Congress candidate from this LS seat. FILE PHOTO

which resonates very strongly with the people because they have seen it unfolding right before their eyes... this was only a trailer of what is in store for us.

Why Chandigarh?

I have represented Ludhiana (Punjab) in the past, I represent the adjoining constituency of Sri Anandpur Sahib; I think I have acquitted myself fairly over the five years. It was the party's decision to shift me to

Chandigarh. I too wanted to serve the city where I was born, went to school, college, and university, where my father was assassinated by terrorists on April 3, 1984, and where my mother spent her entire working life. There is an intrinsic connection that I have with the city. And incidentally, I am perhaps the only candidate since 1967, when Chandigarh started having a Lok Sabha election, who was actually born in this ci-

'Was democracy not under threat when Cong. candidates were elected unopposed?'

Mehul Malpani
MORENA

The Congress will "become extinct like the dinosaurs" in the coming years, Union Defence Minister and senior BJP leader Rajnath Singh said in Madhya Pradesh on Tuesday.

"Just as dinosaurs became extinct from all over the world, I think the Congress will also become extinct. After years, if their names are mentioned in front of children, then the children will also ask what is Congress," Mr. Singh said at a rally in Badwani of the Khargone Lok Sabha constituency.

The Minister's remarks came a day after Congress candidate from Indore, Akshay Kanti Bam, withdrew his nomination and



Defence Minister and senior BJP leader Rajnath Singh.

joined the BJP. Mr. Singh rubbished the Congress' allegations that democracy in the country was "under threat" and said Congress candidates had been elected unopposed about 20 times in the past.

"The Surat Lok Sabha BJP candidate has been elected unopposed. The Congress candidate from

Tejashwi accuses BJP of protecting JD(S) MP Prajwal

Amit Bhelari
PATNA

Rashtriya Janata Dal (RJD) leader Tejashwi Yadav on Tuesday accused the BJP of protecting Prajwal Revanna, the Janata Dal (Secular) MP from Hassan, who is embroiled in the Karnataka sexual harassment case. Videos, allegedly recorded by the MP, had been doing rounds in Hassan ahead of the election.

Attacking the JD(S), which is the BJP's ally in Karnataka, Mr. Yadav said the BJP provided a safe passage to Mr. Revanna to escape to Germany. The former Deputy Chief Minister of Bihar questioned the silence of Prime Minister Narendra Modi on the issue saying Mr. Modi also remained silent on the Manipur violence and protest by women wrestlers against alleged sexual abuse.

"Our 2,500 sisters were exploited in Karnataka. Who is the one responsible for it, the alliance partner of the BJP. We came to know that he has escaped to Germany now," Mr. Yadav said at Patna airport.

The JD(S) has suspended Mr. Revanna from the



RJD leader Tejashwi Yadav.

party. The Hassan MP is the grandson of former Prime Minister H.D. Deve Gowda and the nephew of former Karnataka Chief Minister H.D. Kumaraswamy.

Lashing out at the BJP, Mr. Yadav said, "The Prime Minister gave the slogan 'Beti Padhao, Beti Bachao' and he was campaigning for the same party two to three days back. What is going on? Why is the Prime Minister and Amit Shah not speaking anything over the issue? The slogan has now become *Balatkari ko bachao, balatkari ko bhagao* (save the rapist, let the rapist flee)."

Earlier in the day, RJD Rajya Sabha member Manojha released the party's theme song for the Lok Sabha election titled 'Apna Tejashwi'.

Cong. woes continue in M.P., party MLA joins BJP

Press Trust of India
BHOPAL

Senior Congress leader and sitting Madhya Pradesh MLA Ramniwas Rawat on Tuesday joined the BJP, in a fresh blow to the Opposition party a day after its Indore Lok Sabha seat candidate withdrew his nomination.

Mr. Rawat (64) joined the BJP in the presence of Chief Minister Mohan Yadav at a rally in Sheopur district, the day when Congress MP Rahul Gandhi was in neighbouring Bhind to address an election gathering.

Besides Mr. Rawat, Morena mayor Sharda Solanki also joined the BJP. Sheopur is part of the Morena Lok Sabha seat where polling will be held in the third phase on May 7.

'Sole objective of fighting this election is to save and redeem the soul of the nation'

The Congress candidate for the Chandigarh Lok Sabha seat says what happened during the recent mayoral elections was only a trailer of things to come if the BJP comes back to power at the Centre

INTERVIEW

Manish Tewari

Vikas Vasudeva
CHANDIGARH

As the Union Territory of Chandigarh, the joint capital of Punjab and Haryana, goes to poll on June 1, Congress candidate Manish Tewari, a former Union Minister and currently a Member of Parliament from Punjab's Anandpur Sahib constituency, is toiling to wrest the seat from the Bharatiya Janata Party (BJP). In an interview with *The Hindu*, Mr. Tewari, a two-time MP, says that the 2024 Lok Sabha poll is an existential election for India. Edited excerpts:

How do you see the 2024 Lok Sabha poll?

This is an existential election for India. I am firmly convinced that this could be the last election in this country, if those who are in power at the Centre were to succeed, which, given the ground reality, looks difficult at this point in time. This is an election that I am fighting to protect democracy, to protect the Constitution of India... they [the BJP leaders] have been very explicit about their intentions that they would scrap the Constitution and replace it with something of their own.

In Chandigarh, people witnessed what happened during the mayoral elections. Someone had the vote, and someone else became the Mayor. And the Supreme Court had to exercise its extraordinary jurisdiction under Article 142 to preserve democracy in general. So this is something

meeting that has sent a positive message.

Within the Congress there are contradictory voices. For example, on inheritance tax, wealth redistribution, caste census etc. What's your take?

The Congress's position is spelled out in its manifesto, which is the last authoritative word as far as the party is concerned. Yes, we don't follow a regimented-Hitlerian discipline, where people don't articulate their point of views, but those are personal views.

The Congress is fighting in alliance with AAP in Chandigarh, but contesting against it in Punjab. How difficult is it to convince people of this contradiction? It is not as much of a contradiction. Historically, we

have been fighting polls against the Left in Kerala but we have been cooperating at the national level. Even in West Bengal, we fought against the Trinamool Congress but cooperated at the national level. In north India, it's a new experiment. During my campaign, I explained to the people why we are fighting together here [in Chandigarh] and separately there [in Punjab]. The sole objective of [fighting] this election is to save and redeem the soul of the nation.

The voting percentage has been relatively low in the first phase of Lok Sabha poll...

More people need to come out and vote. But a low turnout does not necessarily reflect pro-incumbency. It is reflective of a fatigue with the incumbent national government. People who sup-

ported the government previously are not coming out in large numbers.

To strengthen the city's public transport, would you push for a metro rail service, which was offered by BJP MP Kirron Kher?

In 2019, when I was an MP from Sri Anandpur Sahib, I had written to Union Minister of Roads and Highways Nitin Gadkari, suggesting a Mass Rapid Transit System (MRTS) from Ambala to Landran to Panchkula. The reason I suggested such a wide expanse was that it would harness the created potential of the Tricity [Chandigarh-Panchkula-Mohali]. More importantly, it would bring financial viability as well for the project. The solution to exponentially growing traffic is an efficient and efficacious MRTS.

Text & Context

THE HINDU

NEWS IN NUMBERS

People of Sudan face food shortage and possible famine

18 million. The people of Sudan are facing high levels of acute food insecurity. According to estimates, at least 6% of the country's population will face famine. In the worst case, it would be 40% of people between harvests. REUTERS

Capex needed for aluminium industry to clock net-zero emission

2.2 lakh crore. The Indian aluminium industry would require an additional capital expenditure of nearly ₹2.2 lakh crore to achieve net-zero carbon emission. Renewable power sources could abate 49% of the emissions from the industry. PTI

Number of migrants from U.K. that Rwanda shall accommodate

5,700 Migrants who arrived in the U.K. between January 2022 and June 2023 are liable to have asylum claims deemed inadmissible and be removed to Rwanda. More than 57,000 people arrived in this period. AFP

Pakistan's GDP growth in second quarter ending in June

1 in percentage. The GDP of Pakistan is expected to improve in the second half of the fiscal year. Also, inflation is expected to be 18.5-19.5% in April and reduce to 17.5-18.5% in May, the country's Finance Ministry said in its monthly economic update report. REUTERS

Canada revises work hour limits for international students

24 in hours. International students, including those from India, in Canada, can work off-campus for only up to 24 hours per week from September, according to a rule that will come into effect on Tuesday. PTI

COMPILED BY THE HINDU DATA TEAM

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About the redistribution of wealth

What is the debate surrounding the redistribution of wealth that has piqued interest during the ongoing election campaigns? Where does it fit in the constitutional framework? How has the judiciary ruled on the topic from the start?

EXPLAINER

Rangarajan. R

The story so far:

There have been heated exchanges between the ruling government and the Opposition with respect to the redistribution of wealth during the ongoing election campaign. The Supreme Court has also constituted a nine-judge Bench to interpret the Directive Principles of State Policy (DPSP) with respect to ownership and control of material resources.

What does the Constitution provide?

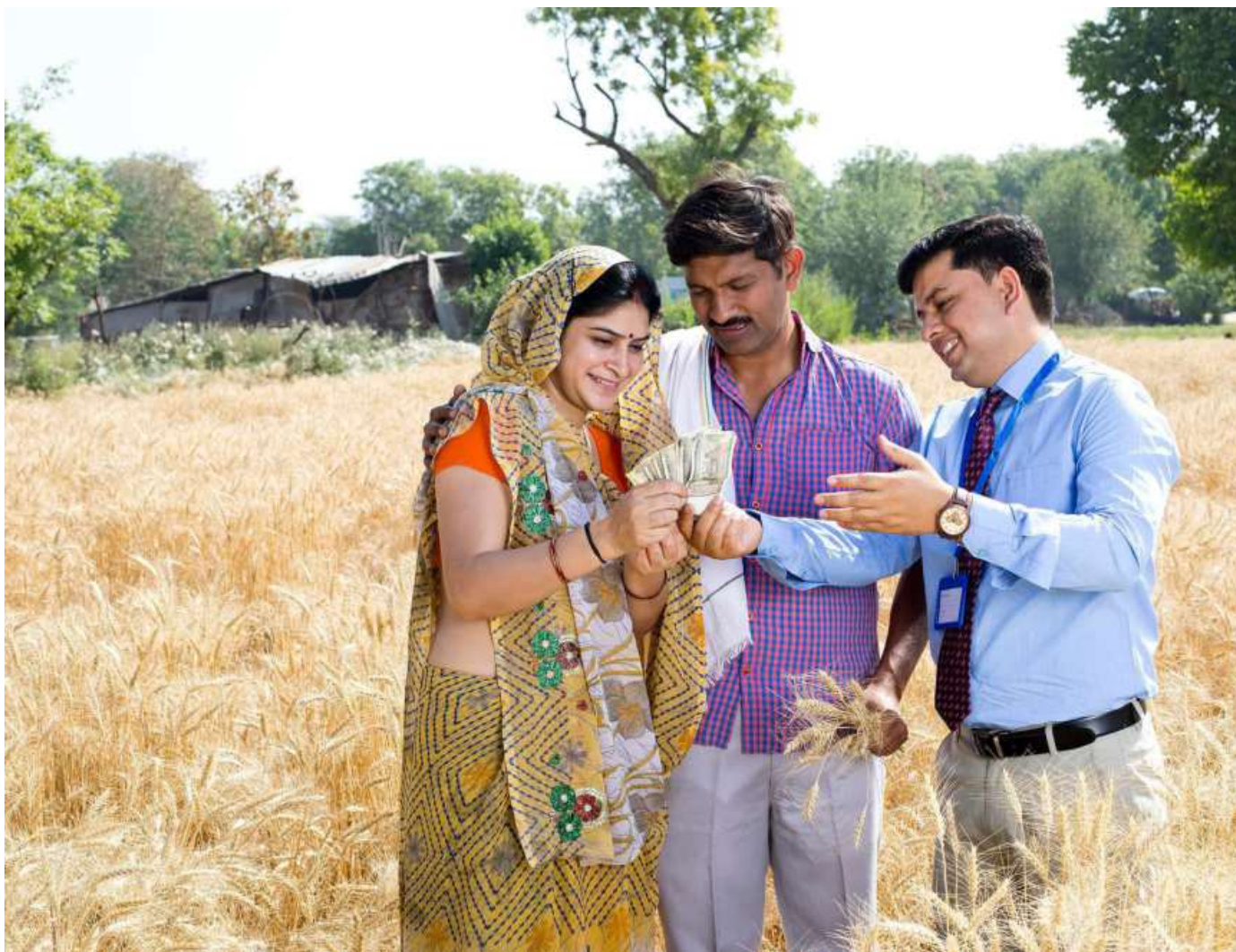
The Preamble to the Constitution aims to secure to all citizens social and economic justice, liberty and equality. Part III of the Constitution lists down the fundamental rights that guarantee liberty and equality while Part IV contains the DPSP. These are principles that the central and State governments should follow to achieve social and economic justice in our country. Unlike the fundamental rights in Part III, the DPSP is not enforceable in court. They are nevertheless fundamental in the governance of the country. Article 39(b) and (c) in Part IV contain principles that are aimed at securing economic justice. They provide that ownership and control of material resources of the society should be distributed to serve the common good and that the operation of the economic system does not result in concentration of wealth to the common detriment.

What is the historical context?

The Constitution originally guaranteed right to property as a fundamental right under Article 19(1)(f). It provided under Article 31 that the state shall pay compensation in case of acquisition of private property. It is pertinent to note that at the time of independence, the main property rights related to agricultural and other land. The government had to acquire the rights in such estates for carrying out land reforms and construction of public assets. Considering the inadequate resources with the government and in order to provide greater flexibility in acquiring land for public welfare, various amendments were carried out curtailing the right to property. Notable among them are exceptions under Articles 31A, 31B and 31C that are briefly explained in Table 1.

The Supreme Court in various cases has interpreted the relationship between fundamental rights and the DPSP. Most of these cases were against constitutional amendments made by the state that curtailed the right to property that was then a fundamental right. In the *Golak Nath* case (1967), the Supreme Court held that fundamental rights cannot be abridged or diluted to implement DPSP. Finally, in the *Kesavananda Bharati* case (1973), a thirteen-judge Bench of the Supreme Court upheld the validity of Article 31C but made it subject to judicial review. In the *Minerva Mills* case (1980), the Supreme Court ruled that the Constitution exists on a harmonious balance between fundamental rights and DPSP.

In 1978, in order to avoid excessive litigation directly in the Supreme Court by the propertied class, the 44th amendment act omitted right to property as a fundamental right and made it a constitutional right under Article 300A. The right to private property continues to be an important constitutional cum legal right. Any law to acquire private property



At the time of independence, the main property rights were related to agricultural and other land. The government had to acquire the rights in such estates for carrying out land reforms and construction of public assets. ISTOCKPHOTO

The Gist

▼ The Preamble to the Constitution aims to secure to all citizens social and economic justice, liberty and equality. Part III of the Constitution lists down the fundamental rights that guarantee liberty and equality while Part IV contains the Directive Principles of State Policy that talks about ownership and control of material resources. These are principles that the central and State governments should follow to achieve social and economic justice in our country.

▼ The Supreme Court in various cases has interpreted the relationship between fundamental rights and the DPSP. In 1978, in order to avoid excessive litigation directly in the Supreme Court by the propertied class, the 44th amendment act omitted the right to property as a fundamental right and made it a constitutional right under Article 300A.

▼ The Supreme Court has now constituted a nine-judge Bench to interpret the Directive Principles of State Policy

Exceptions to fundamental rights

Considering the inadequate resources with the government and to provide greater flexibility in acquiring land for public welfare, various amendments were carried out curtailing the right to property. Notable among them are exceptions under Articles 31A, 31B and 31C

Article	Amendment & year	Brief explanation
31A	1st amendment, 1951	Provided that laws made for acquisition of estates etc. shall not be void on the ground that it violated fundamental rights including right to property
31B	1st amendment, 1951	Made laws placed under the Ninth Schedule immune from judicial review on the grounds of violating any fundamental right. In <i>Coelho</i> case (2007), the SC held that laws placed in Ninth Schedule after April 1973 would be subject to judicial review
31C	25th amendment, 1971	Provided primacy to the DPSP under Articles 39(b) and (c). Laws made to fulfil these principles shall not be void on the ground that it violated fundamental rights including right to property

by the state should be only for a public purpose and provide for adequate compensation.

What is the current debate?

Indian governments in the first four decades after independence followed a "socialistic model" of economy. There were many laws made by the Centre and States to acquire land from zamindars and big landlords for public purpose. The economic policies resulted in the nationalisation of banking and insurance, extremely high rates of direct taxes (even up to 97%), estate duty on inheritance, tax on wealth etc. There were also regulations that placed restrictions on growth of private enterprise like The Monopolies and Restrictive Trade Practices Act, 1969 (MRTP Act). The rationale behind these measures during those times was to reduce inequality and redistribute wealth among the poorer sections who constituted majority of the population. However, such measures stifled growth and also resulted in the concealment of income/wealth. Taxes like estate duty and wealth tax generated

revenue that was much less than the cost incurred in administering them.

The nineties saw the country move from a closed economy towards liberalisation, globalisation and privatisation. A new industrial policy was unveiled in July 1991 with the objective of empowering market forces, improving efficiency and rectifying deficiencies in the country's industrial structure. The MRTP Act was repealed and replaced with the Competition Act, 2002 and income tax rates were reduced considerably. Estate duty was abolished in 1985 and wealth tax in 2016.

The market driven economy has resulted in additional resources for the government that has helped in bringing people out of abject poverty. This economic system, nonetheless, has also resulted in growing inequality. A report by the World Inequality Lab states that the top 10% of the country's population have a share of 65% and 57% of the wealth and income respectively as of 2022-23. The bottom 50% on the other hand have a meagre share of 6.5% and 15% of the wealth and income respectively.

The manifesto for the current Lok Sabha elections of the Congress, the principal Opposition party, promises various measures for the poorer sections including payment of ₹1 lakh per annum to a woman from every poor family. Rahul Gandhi had also mentioned in his campaign that there would be a financial survey to ascertain the distribution of wealth among the people in the country and address the issue of inequality. The ruling party campaigners led by the Prime Minister have targeted the Opposition on this matter. They claim that the Opposition, if voted to power, would bring back inheritance tax laws that would tax even the poorer sections. The Supreme Court meanwhile has constituted a nine-judge Bench to interpret whether material resources under Article 39(b) include private resources as well.

What can be the way forward?

It is not just in India, but growing inequality is a worldwide problem of a liberalised open-market economic system. However, it is the responsibility of the government to protect the interest of the poorer classes who are most dependant on the state machinery for their livelihood. At the same time past policies of extremely high tax rates, estate duty, wealth tax etc., did not achieve their desired goals. Instead, they only led to concealment of income and wealth. Innovation and growth should not be curtailed but the benefits of growth should reach all sections especially the marginalised. The policies may vary and need to be framed after adequate debate in line with current economic models. The underlying principle to be achieved nevertheless remains the same – economic justice for all as enshrined in our Constitution.

Rangarajan R is a former IAS officer and author of 'Polity Simplified'. He currently trains civil service aspirants at 'Officers IAS Academy'. Views expressed are personal.

Senna Sempre

Thirty years after a horrifying crash left the world stunned and took the life of a man who was, and remains arguably, the best racer the sport has seen, here's how the world of motorsport still bears his indelible mark



GETTY IMAGES

S. Dipak Ragav

There are moments in time, however tragic they may be, that change the course of history and even force changes for the good.

May 1, 1994, was one of those seminal moments in the history of Formula One. Arguably the greatest driver to have graced the sport until then, Ayrton Senna da Silva suffered a fatal crash on the seventh lap of the San Marino Grand Prix while leading the race at the now-infamous Tamburello corner of the Autodromo Enzo e Dino Ferrari circuit in Imola.

It marked one of the darkest chapters in the championship since its inception in 1950. Senna's crash on Sunday was the second fatality of that weekend after Roland Ratzenberger had lost his life during qualifying on Saturday. The Austrian driver hit a wall at high speed when his Simtek Ford suffered a front-wing failure. In fact, it was F1's weekend from hell. On Friday, another Brazilian, Rubens Barichello, had a severe crash during practice when he hit a kerb and got launched into the barriers. Only the timely intervention of F1 doctor Sid Watkins saved his life.

The three-time World champion moved to the all-conquering Williams F1 team for the '94 season after his long stint with McLaren, where he had won all his titles. In 1992 and 1993, Williams dominated the sport after mastering the Active Suspension Technology, powering Nigel Mansell and Alain Prost to the driver's crown. However, in 1994, the FIA banned electronic driver aids like active suspension, traction control and launch control. And Williams struggled during the initial part of the season.

Senna did not score points in the first two races when he crashed out in his home race in Brazil before being taken out by Mika Hakkinen in the second one in Aida, Japan. In Imola, the Brazilian took pole position. There was a massive crash on the opening lap. Pedro Lamy, in his Lotus, hit the rear of JJ Lheto's Benetton, which stalled on the grid. The Safety Car was brought in to clear the debris for the next five laps before racing resumed on lap six.

On lap seven, Senna's car veered straight into the concrete barrier as it approached the fast left-hander Tamburello corner. The driver suffered severe injuries when one of the tyres hit his helmet while a piece of suspension also pierced past his visor. There have been many theories surrounding the reason for the crash, from a driver mistake or a puncture to a steering column failure and even a drop in tyre pressure due to running behind a very



World Championships: 3 (1988, 1990-91)
Number of races: 161
Number of wins: 41
Number of pole positions: 65
Career points: 610

slow Safety Car. Senna was given emergency treatment at the track before being airlifted to a hospital in Bologna, where he was pronounced dead three hours later.

Prior to the events in Imola, F1 had not seen a casualty during a race meeting since Riccardo Paletti's fatal crash at the 1982 Canadian Grand Prix. The deaths of Ratzenberger and Senna sent shockwaves across the world and illustrated the dangerous nature of motorsport.

It was the kind of rude awakening the sport needed. Leading up to Imola 1994, there were apprehensions that cars were getting faster and safety needed to be improved. The fact that one of the best, if not THE best, the sport has seen succumbed woke the powers that be out of their slumber.

Immediately, the FIA sprung into action, and a slew of safety measures have been enforced since then, making F1 one of the safest categories of motorsport.

Some changes to the car included raised cockpit sides to protect the head, better headrest protection, and wheel tethers.

One of the most significant advances was the introduction of the Head and Neck Support (HANS) device in the early 2000s. The HANS device is attached to the driver's helmet and, as the name suggests, significantly reduces the impact on the head and neck. Many drivers have avoided severe impacts since then. Though drivers initially resisted it as it restricted their movement, it has become

ubiquitous across most categories.

More recently, the Halo device - a wishbone-like structure around the cockpit was introduced in 2018 to protect a loose wheel or, at times, even the wheels of another airborne car from hitting the driver's helmet. The wheel tethers ensure the tyres don't come loose quickly in case of a big crash or suspension damage.

Apart from the changes to the car, much work has been done on circuit safety in terms of barriers, run-offs, and fences. F1 has constantly reviewed safety measures and updated tyre and TechPro barriers to find ways to reduce the impact on the driver during violent crashes. Modern circuits have many asphalt run-off areas, which helps drivers avoid crashes even if they run wide.

However, the flip side of these has been that there is a perception that drivers don't pay the penalty for going off, which has taken the challenge out of the sport. It is a tricky balance between safety and fairness, but begrudgingly, safety has been prioritised.

The fact that Formula One did not see another driver fatality for another 21 years showed the sport's remarkable progress since that fateful weekend in Imola in 1994. In 2015, Jules Bianchi became the first driver since Senna to die because of an accident at an F1 race. During the 2014 Japanese Grand Prix, the Marussia driver hit a recovery vehicle attending to another stricken car away from the race track. But in damp conditions, Bianchi ran wide and hit the recovery vehicle, and his car slid under the wheel-loader, causing a significant head injury. In a way, the accident further accelerated

the need for a device like a halo to protect the cockpit without losing the essence of what F1 is - an open-wheel, open-cockpit racing series.

A lot of credit also has to go to the Grand Prix Drivers' Association (GPDA), which has worked closely with circuit promoters, the FIA and F1 to advance safety measures. Incidentally, on the morning of May 1, Senna proposed reviving the GPDA - which was disbanded between 1982 and 1994 - after Ratzenberger's death and offered to lead the organisation. The modern version of GPDA came into being immediately after the events of Imola. While Senna's blinding speed, mastery of wet conditions, and ability to be hard-nosed in battle are what people will remember him for, the Brazilian left an indelible mark even from the beyond, ensuring the sport he lorded over is safer even if it required his ultimate sacrifice.

THE GIST

Senna, known for his talent in rainy races, did not have a good result in his first kart race on a wet track. Because of that, he trained every day until he became a master in this condition

The Brazilian's favourite track was Spa in Belgium, a circuit where he won five times in F1

Senna always dreamed of, but never raced for, Ferrari. But Luca di Montezemolo, then president of the Italian team, revealed that there were strong negotiations as early as 1994 to make this happen. "He wanted to come to Ferrari and I wanted him on the team," said the manager

The striking helmet worn by Senna throughout his career was inspired by the design used by the Brazilian delegation at the 1979 Karting World Championship



Microbes, not fossil fuels, produced most new methane: study

A modelling study has found methane emissions from fossil fuels declined between 1990 and the 2000s and have been stable since, whereas microbes have been producing more methane of late. One reason could be an increase in cattle-rearing in Latin America and more emissions from waste in South and Southeast Asia

Monika Mondal

For the last three years, Naveen Chandra has been spending most of his days running simulations at the Research Institute for Global Change in Japan. He is trying to recreate the last 50 years of the earth's atmosphere on a supercomputer roughly the size of an auditorium.

Mr. Chandra has been trying to answer a question that came out of his team's research. During 2019-2020, these researchers examined the concentration of methane in the atmosphere and how it changed with time. Until the 1990s, the concentration increased, then stabilised for a bit, and then started to increase again around 2007. According to recent estimates, the atmospheric concentration of methane today is three-times what it was 300 years ago.

Where is this methane coming from? That's what they wanted to know.

Evolving understanding

Methane is the second most abundant anthropogenic greenhouse gas after carbon dioxide (CO₂) but it warms the planet more. Over a century, methane has a global warming potential 28-times greater than CO₂, and even higher over shorter periods like two decades.

It wasn't until recently that policymakers began to focus on methane vis-a-vis addressing global warming. At the U.N. climate talks in 2021, member countries launched the 'Global Methane Pledge' to cut the gas's emissions and slow the planet's warming. Yet our understanding of methane also continues to evolve.

For instance, Mr. Chandra and his team recently reported that microbes have been the biggest sources of methane in the atmosphere, not the burning of fossil fuels.

The sources of methane

Scientists are increasingly recognising various sources of methane, most of which fit in two categories: biogenic and thermogenic. When fossil fuels such as natural gas or oil are extracted from deep within the earth's crust, thermogenic methane is released. Biogenic methane comes from microbial action.

The microbes that produce methane are archaea – single-celled microorganisms distinct from bacteria and eukaryotes – and are called methanogens. They thrive in oxygen-deficient environments, such as the digestive tracts of animals, wetlands, rice paddies, landfills, and the sediments of lakes and oceans.

Methanogens play a crucial role in the



A cow walks through a field as an oil pumpjack and a flare burn off methane and other hydrocarbons in the background in the Permian Basin, Texas. Methanogenic bacteria thrive in oxygen-deficient environments, including the digestive tracts of animals. AP

global carbon cycle by converting organic matter into methane. While methane is a potent greenhouse gas, its production by methanogens is an essential part of natural ecosystems. But human activities like agriculture, dairy farming, and fossil fuel production have further increased methane emissions.

Both biogenic and thermogenic activities produce different isotopes of methane. Tracking the isotopes is a way to track which sources are the most active.

Modelling with a supercomputer

According to Prabir Patra, principal scientist at the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) and one of the lead authors of the study, carbon-13 is key. (Atoms of this carbon isotope have 13 nucleons: 6 protons + 7 neutrons.)

If there are fewer carbon-13 atoms than a certain level in a group of 1,000 methane molecules, the methane is from a biological source. If the methane is from thermogenic sources, such as trapped



According to recent estimates, the atmospheric concentration of methane today is three-times what it was 300 years ago

fossil fuels or geological activities, there will be more carbon-13 atoms in 1,000 molecules.

Mr. Chandra and Mr. Patra worked with scientists from Austria, Japan, the Netherlands, and the U.S. to collect data from the 12 monitoring sites worldwide tracking atmospheric parameters since the 1990s. Then they sorted the methane isotope data by year and ran it through a program they had developed to recreate the atmosphere from 1980 to 2020 on a supercomputer.

"One year of data analysis takes about four to five hours," Mr. Chandra said.

Data mismatch

Finally, the team compared their own

results with two emissions inventories, called EDGAR and GAINS, and found some discrepancies. EDGAR had reported that methane emissions from oil and natural gas exploration had increased between 1990 and 2020. GAINS had recorded a large "unconventional" rise in emissions since 2006. Their findings disagreed with both inventories.

Mr. Patra said combining the numbers for all biogenic and thermogenic isotopes should match the total emissions in a year. They also took insights from other available data like, number of rice fields, wetlands, dairy farms, biomass burning and likewise sources of methane emissions, and estimated the emissions from those sources. But when they ran their atmosphere models with this data, the year-wise total methane emissions overshoot the total production.

In fact, the models said methane emissions from fossil fuels declined between 1990 and the 2000s and that they've been stable since. They also found microbes were producing more methane than fossil fuels.

Need for local data

One possible reason could be an increase in cattle-rearing in Latin America and more emissions from waste in South and Southeast Asia, Latin America, and Africa, the study's authors wrote in their paper. They added that the number of wetlands worldwide had increased as well.

Studies in the past have pointed to microbes like anaerobic archaea as potentially top contributors of atmospheric methane using satellite data. But according to Mr. Patra, "Most studies that use satellites cannot measure the actual [changes over time] of methane." Satellite data is interpreted using models "and thus are prone to uncertainties." He said ground models are required to confirm these interpretations.

He added that their own atmospheric model was also only the beginning. The data for it came from observatories located in far-flung places. "If you really want to ask what is from the wetland, what is from the rice fields, we need measurements in those exact locations," per Mr. Patra. "We don't have that kind of observation at all anywhere in the world to make that kind of measurement. We can only speak for global emissions."

But what we do know is: "If you want to reduce methane, anthropogenic activity should be first controlled. And we can clearly outline what is anthropogenic here. Waste and landfills, rice fields, enteric fermentation, oil and gas, and coal," he said.

(Monika Mondal is a freelance science and environment journalist.)

THE GIST

Methane is the second most abundant anthropogenic greenhouse gas after carbon dioxide but it warms the planet more. Over a century, methane has a global warming potential 28-times greater than CO₂

Methane is released by two main processes: biogenic and thermogenic. When fossil fuels are extracted from the earth's crust, thermogenic methane is released. Biogenic methane comes from microbial action

Studies in the past have pointed to microbes like anaerobic archaea as potentially top contributors of atmospheric methane using satellite data, but this information contains gaps that ground-based models can bridge

BIG SHOT



Mount Ruang seen erupting from Tagulandang island in Sitaro, North Sulawesi, on Tuesday. Ruang's eruption prompted authorities to order an evacuation and forced a nearby airport to close. The remote Indonesian volcano sent a tower of ash spewing into the sky on April 19. AFP

QUESTION CORNER

Shivering produces heat to keep you warm



Q: Why do we shiver when it is cold?

A: Shivering (physical thermogenesis) occurs when the tension of the

skeletal muscles rises beyond a critical level or when the body temperature falls below the critical level of 37.1 degrees C.

Shivering is actually an involuntary contraction of muscles to maintain body temperature during fever and in cool environments. It involves oscillating skeletal-muscle contractions that occur at 10-20 per second. The movement is at first irregular, then assumes quick involuntary movements during which small groups of muscles contract asynchronously. Due to the asynchronous movement, they do not move the parts associated with them in a coordinated manner.

The posterior hypothalamus region in the brain harbours the primary motor centre responsible for shivering. When the body temperature falls below 37.1 degrees C, the skin sends cold signals to the spinal cord. These are picked by the hypothalamus, which takes advantage of the fact that increased skeletal-muscle activity generates heat. Acting through descending pathways that terminate on the motor neurons controlling the body's skeletal muscles, the hypothalamus gradually increases



EGOR IVLEV/UNSPLASH

skeletal-muscle tone (constant level of tension within muscles).

Thus shivering begins throughout the body when the tension of the skeletal muscles rises beyond the critical level, producing heat and increasing the temperature of the body within a matter of seconds. Studies reveal that shivering may produce as much as 42.5 cal/hr, almost seven times greater than man's normal resting metabolism at room temperature. In a resting person, most body heat is produced by the thoracic and abdominal organs due to ongoing metabolic activities. Generally, shivering is seen only in birds and mammals.

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