Terrorists fire at jawans in J&K

Three CRPF personnel injured in attack from close range at a Kulgam checkpoint; one in critical condition; condemning the attack as a 'cowardly act', Lieutenant-Governor says security forces have been given 'free hand' to crack down on terrorists

Peerzada Ashiq
SRINAGAR

Three CRPF personnel were injured in a terrorist attack at Kulgam in south Kashmir on Wednesday, a day when Jammu and Kashmir Lieutenant-Governor Manoj Sinha was scheduled to attend an event in the district.

The attack took place around 2.15 p.m. when terrorists opened fire from close range at CRPF personnel who were part of a checkpoint in Kulgam, officials said.

Officials said security agencies were investigating whether the terrorists came on a motorcycle or in any other vehicle to the attack spot. The area surrounding the attack site is being searched for clues to track the attackers.

Security was further heightened in south Kashmir after the attack.

On high alert | Security has been heightened in south Kashmir after the terrorist attack which came on the same day **J&K Lieutenant-Governor Manoj Sinha was scheduled to attend a function in Kulgam district**



*The CRPF jawans were manning a street in **Kulgam district**, about **75 km from Srinagar**, when the attack took place around **2.15 p.m.***



- Injured CRPF Personnel were from the **46 Battalion**
- Search on for **clues to track** the attackers
- Agencies looking into **how terrorists reached the attack spot**
- The injured were identified as **Head Constable Somveer Singh** from Madhya Pradesh, **Constable Rakesh Dass** from Assam, and **Constable Santosh Chandru** from West Bengal
- **One jawan airlifted to Srinagar's Badamibagh Army Hospital** for specialised treatment of critical injury

Rapid response: Security personnel stationed near the CRPF checkpoint in Kulgam after the terrorist attack on the jawans on Wednesday. ANI

The area has witnessed multiple terror incidents recently, including the killing of two migrant labourers in Kulgam and the shooting of a police constable in neighbouring Anantnag, both in July this year

The three CRPF personnel who suffered bullet injuries were from 46 Battalion and have been identified as constable Rakesh Dass, a resident of Assam; constable Santosh Chandru, a resident of West Bengal; and head constable Somveer Singh, a resident of Madhya Pradesh. They were shifted to a hospital in nearby Anantnag district.

Officials said one of the critically injured was then airlifted to Srinagar's Badamibagh Army Hospital for specialised treatment.

Mr. Sinha, who visited the injured jawan in Srinagar, condemned the attack and said it was a cowardly act of terror.

Security review

He assured the people that those responsible will be hunted down and brought to justice. The security forces have been given a free hand to crack down on terrorists, he said. Mr. Sinha reviewed the security situation with senior officials at Lok Bhavan, Srinagar.

CONTINUED ON » PAGE 10

Terrorists fire at jawans in Jammu & Kashmir

Earlier in the day, the L-G inaugurated the Veshow Festival in Kulgam as scheduled, and addressed a gathering of locals and officials. "The festival has emerged as a symbol of the intellectual, literary, and cultural consciousness of J&K.

The district represents a unique cultural tradition where spirituality, creativity, nature and humanity have long coexisted in harmony," said the L-G, who also highlighted the influence of the Rishi-Sufi tradition on the region.

The Bharatiya Janata Party (BJP) condemned the attack. "Such acts of terrorism are aimed at disturbing peace and security in J&K and will never succeed in undermining the resolve of the nation. Those responsible for the attack need to be identified and brought to justice. Terrorism and violence have no place in a peaceful society," BJP spokesperson Sajid Yousuf Shah said.

The area has witnessed multiple terror incidents recently, including the killing of two labourers from Chhattisgarh in Kulgam and the shooting of a police constable in Anantnag, both in July.

GS III – Internal Security

Key Pointers

- What are the major security challenges in Jammu and Kashmir?
- What is the role of the Central Reserve Police Force (CRPF)?
- How do terrorist attacks affect tourism, investment and local livelihoods?
- Why is public cooperation important in preventing terrorism?

City's early winter air pollution highest in 3 years, shows analysis

The Hindu Bureau
NEW DELHI

Delhi's early winter air pollution levels were higher in 2026 than in previous years, with the average PM2.5 concentration in the week preceding Deepavali reaching a three-year high, an analysis by the Centre for Science and Environment (CSE), released on Wednesday, showed.

The analysis also found that emergency traffic restrictions imposed by the government had failed to ease congestion, with evening gridlock trapping toxic nitrogen dioxide (NO_2), a marker of vehicular pollution, until midnight. The week before Deepavali recorded an average PM2.5 concentration of 236 micrograms per cubic metre. "This marks a 97% increase over the 120 micrograms per cubic metre recorded in 2025 and a 32% jump over the 179 micrograms per cubic metre seen in 2024," the CSE stated in a release.



Delhi's 24-hour AQI stood at 313 on Wednesday.
SHASHI SHEKHAR KASHYAP

'Tipping point'

"Deepavali pollution is an annual tipping point, but elevated particulate levels before the festival this year show that baseline pollution is higher than in previous years," said Anumita Roychowdhury, executive director (research and advocacy) at the CSE.

She said year-round emission control across key sources remained inadequate. "Had air quality been cleaner leading into winter, and episodic spikes from farm fires and firecrackers kept in check, seasonal weather shifts would not have triggered such severe pollution," she said.

The CSE stated that severe smog persisted during the period even as the contribution of stubble burning declined. It also highlighted the role of non-farm sources, particularly transport, the largest contributor to pollution among city's local sources.

Meanwhile, experts told *The Hindu* that the Central Pollution Control Board (CPCB) should stop capping particulate matter readings at 1,000 micrograms per cubic metre and make actual peak values publicly available. Responding to reports of missing pollution data on Deepavali night, the CPCB had said readings exceeding 1,000 micrograms per cubic metre were excluded, resulting in gaps in the data.

GS III – Environment & Ecology

Key Pointers

- Why were Delhi's early winter pollution levels higher in 2026 than in previous years?
- What is PM2.5, and how does it affect human health?
- How do vehicles, industries, construction dust and stubble burning contribute to Delhi's air pollution?
- Why do low wind speeds and temperature inversion trap pollutants near the ground during winter?
- What is the role of the Central Pollution Control Board (CPCB) in monitoring air pollution?
- What is the role of CAQM in mitigating air pollution in NCR?

Turning battery waste into strategic mineral wealth



Shyamasis Das
Fellow at the Centre for Social and Economic Progress

In his concluding remarks at the 18th BRICS Summit in New Delhi on September 13, 2026, Prime Minister Narendra Modi warned against the "weaponisation of technology and critical minerals". His remarks assume significance amid rising global demand for critical minerals such as lithium, nickel and cobalt. As transport and other energy-intensive sectors increasingly shift towards electrification, the demand for electricity, lithium-ion batteries and electrical conductors is also growing.

Their ores are either scarce or their supply chains geographically concentrated, leaving these critical minerals vulnerable to geopolitical tensions, resource nationalism, trade restrictions and other disruptions. China currently dominates critical mineral processing. For India, which is heavily dependent on imports, securing reliable supplies has therefore become a strategic priority.

A resource closer to home

The Government of India is pursuing international partnerships and domestic exploration to secure critical mineral supplies. It must also tap a growing resource available in its backyard: minerals recovered through recycling. End-of-life (EoL) lithium-ion batteries, which contain economically valuable minerals, can be treated either as waste or as a "waste-to-wealth" resource. The opportunity is considerable if a proper recycling system is put in place.

India already uses lithium-ion batteries extensively in mobile phones and other electronic devices. Yet, when these products reach EoL, their batteries often end up in landfills or informal recycling channels run by *kabadiwalas*. While the informal sector plays an important role in waste management, its manual methods are often inefficient and unsafe. Material recovery rates are reportedly just 10%-20%, compared with over 90% in formal recycling facilities. Consequently, significant quantities of critical-mineral-bearing e-waste continue to flow through informal channels. As India shifts towards electric vehicles (EVs), can it afford to lose the economic value locked in these waste streams?

A circular battery economy can help secure India's critical mineral supplies

With more than 8.7 million EVs running on Indian roads by FY 2025-26, the volume of spent batteries is expected to rise as numbers grow. This should be viewed as a waste-management challenge and resource security opportunity.

Analysis shows recycling could meet about 10% to 12% of India's lithium demand for EV battery manufacturing. While this will not make India self-sufficient in minerals, recycled materials can serve as a strategic secondary source alongside mining and overseas sourcing. Recycling can also help build India's critical minerals processing capability, which the country currently lacks, while China has a stranglehold over critical mineral processing.

India's Battery Waste Management Rules, 2022, provide an important foundation through extended producer responsibility, but the ecosystem needs to mature. The current low volume of EoL batteries should not create complacency. "Just in time" investment in recycling facilities and logistics may not be realistic; capacity needs to be planned ahead of the expected surge in spent batteries. This creates a business risk, as plants may operate below optimal utilisation initially and face uncertainty in generating enough revenue to cover financing costs.

The strategy to adopt

India therefore needs a holistic strategy. First, recycled critical minerals should be incorporated into strategic resource planning. The proposed national critical mineral stockpile should include a mandated share of recycled minerals, creating predictable demand for domestic secondary resources and encouraging recyclers to recover minerals rather than produce only the intermediate product known as black mass.

Second, industry and research labs should intensify research and development in mineral recycling technologies. Diverse battery chemistries make recovery challenging and recycling economics can be unattractive. Technologies delivering higher mineral recovery and purity with no environmental impact will be critical.

Third, India needs standards for battery characterisation, recycled mineral quality and second-life applications, supported by testing infrastructure and a "design for repurposing and recycling" approach at the manufacturing stage.

Fourth, retired-battery collection must become easier for EV users. EV manufacturers and their dealer and service networks should offer remunerating take-back or buy-back options. Without active *aam aadmi* participation, scaling a circular economy will be difficult.

Finally, battery recyclers need patient capital to establish facilities with long gestation periods. The opportunity is significant, but battery recycling is not an immediate windfall for businesses.

Preparing for the battery surge

India should not wait for millions of retired EV batteries to accumulate before deciding what to do with them. The country is still early enough in its EV transition to build circularity into the system. Done well, battery recycling can turn an EoL liability into a domestic resource, create a new industrial ecosystem and provide a modest but meaningful buffer against critical mineral supply shocks. The EV revolution should not end when a battery leaves a vehicle. That is where India's circular-economy opportunity begins.

The views expressed are personal

Govt. bars export of lithium-ion battery waste

Saptaparno Ghosh
NEW DELHI

In a positive for India's mineral recycling industry, the Directorate General of Foreign Trade (DGFT) barred the export of waste and scrap of primary cells and batteries as well as electric accumulators containing lithium-ion battery black mass. The order would be implemented with immediate effect.

Black mass refers to the particulate powdered mixture containing lithium, nickel, manganese, cobalt and graphite that is recovered during the recycling of lithium-ion batteries.

The minerals are particularly essential for India's electronics and electric vehicles as well as the renewable energy storage ecosystem.

In a statement, the Union Ministry of Commerce and Industry stated the move seeks to ensure that the black mass generated in India is recycled and refined within the country.

"The measure is expected to assure feedstock availability for domestic recycling and refining units, improve their capacity utilisation and encourage further investment and employment in the sector," it stated.

GS III – Environment | Science & Technology | Indian Economy

Key Pointers

- What is black mass obtained from battery recycling?
- Which critical minerals are recovered from lithium-ion batteries?
- Why has India restricted the export of battery waste and black mass?
- How can battery recycling reduce India's dependence on mineral imports?
- What is a circular economy?
- What are the key provisions of the Battery Waste Management Rules, 2022?
- What are the major challenges in battery recycling?

Across India, 70% of stations reported 'severe' PM2.5 readings

Apart from Delhi, at least seven States reported peak PM2.5 levels during Deepavali

DATA POINT

Pon Vasanth B.A

While Delhi and a few other major cities have been the key focus of the alarming spike in air pollution during Deepavali, analyses of data from all the 634 Continuous Ambient Air Quality Monitoring Stations (CAAQMS) in the Central Pollution Control Board's (CPCB) network showed that nearly 70% of the stations across the country recorded peak PM2.5 readings in the 'severe' category of 250 micrograms per cubic metre or above.

Moreover, data showed that many stations partially or fully stopped reporting PM2.5 values during Deepavali even before they were recording values closer to 1,000 micrograms per cubic metre in the preceding hour. This raises questions on whether CPCB's clarification fully explains why some of the stations went silent during Deepavali. In its statement on Tuesday, CPCB had said that the particulate matter analysers were calibrated for a measurement range of 1,000 micrograms per cubic metre. As its system of automated data validation ignores values outside this range, the same "may appear as a data gap" during "extreme episodes" when the values exceed 1,000 micrograms per cubic metre. To begin with, only 571 of the 634 stations were live and reporting data during Deepavali, as per the CPCB's data portal.

Widespread increase

Chart 1 shows the stations that reported peak PM2.5 readings in different bands during the pre-Deepavali and Deepavali window. The period from 5 p.m. on November 1 to 5 a.m. on November 5 was considered for the pre-Deepavali window, while 5 p.m. on November 7 to 5 a.m. on November 9 was considered for the Deepavali window.

Only 551 stations that reported PM2.5 at least once in the hourly window during Deepavali were shown in the chart. Of these 551 stations, 375, which is nearly 70%, recorded PM2.5 value of 250 micrograms per cubic metre or more at least once during Deepavali. Only 96 had recorded PM2.5 in this range in the pre-Deepavali window. This, expectedly, included all the 59 stations in Delhi. Among other States with at least 20 stations, more than two-thirds of the stations in the following States were reporting peak PM2.5 levels in the 'severe' category : Maharashtra, Uttar Pradesh, Rajasthan, Haryana, Madhya Pradesh, Gujarat and Andhra Pradesh. Tamil Nadu stood out, not for reduced pollution levels, but absence of data. Despite having 37 stations, only nine reported PM2.5 levels at least once during the hourly windows during Deepavali.

Chart 2 shows tier-2 cities, excluding State capitals and cities in the National Capital Region, which saw the highest PM2.5 readings during Deepavali, when the median value reported during the hourly window was considered.

Chart 3 shows the SO2 readings measured by stations in Delhi, Kolkata, Mumbai and Chennai during Deepavali. The push towards 'green crackers' was expected to bring down the particulate matter emissions, especially pollutants such as SO2. However, as the chart shows, Delhi, Mumbai and Kolkata have not shown any drop in SO2 values in the last five years. Though Chennai has shown a sharp decline this year, it is unclear whether it is due to the absence of accurate readings as mentioned above.

Table 1 shows the number of CAAQMS stations in Delhi and across India that did not report any PM2.5 readings for at least one hour during Deepavali. While the number of stations that did not report clearly went up during Deepavali, the table also shows that the last reported reading of majority of the stations did not exceed 500 micrograms per cubic metre.

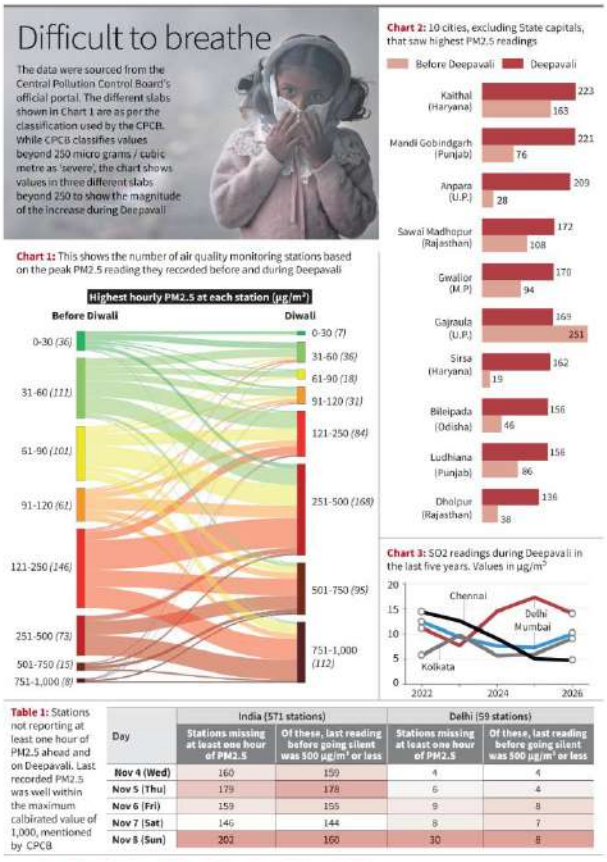


Table 1: Stations not reporting at least one hour of PM2.5 ahead and on Deepavali. Last recorded PM2.5 was well within the maximum calibrated value of 1,000, mentioned by CPCB

Day	India (571 stations)		Delhi (59 stations)	
	Stations missing at least one hour of PM2.5	Of these, last reading before going silent was 500 µg/m³ or less	Stations missing at least one hour of PM2.5	Of these, last reading before going silent was 500 µg/m³ or less
Nov 4 (Wed)	160	159	4	4
Nov 5 (Thu)	179	178	6	4
Nov 6 (Fri)	159	155	9	8
Nov 7 (Sat)	146	144	8	7
Nov 8 (Sun)	202	160	30	8

GS III – Environment & Ecology

Key Pointers

- What are PM2.5 and PM10? How do they affect human health?
- What is the Air Quality Index (AQI), and how is it measured?
- How do firecrackers, vehicles, industries and stubble burning cause air pollution?
- How do low wind speeds and temperature inversion increase pollution?
- How do missing monitoring data affect AQI calculations?
- What are the roles of CPCB, State Pollution Control Boards and CAQM?
- What is the Graded Response Action Plan (GRAP)?

SC and the OBC creamy layer test

What did the Supreme Court rule on OBC creamy layer status? Why can parental salary alone not determine creamy layer exclusion? What did the 1993 Office Memorandum stipulate? Why did the Centre seek clarification on the March ruling? How will the ruling affect CSE 2025 service allocation?

EXPLAINER

Rizmi Lia M.

The story so far:

The Supreme Court on November 6 reaffirmed its March 11, 2026 judgment, upholding a 1993 Office Memorandum which excluded parental salary and agricultural income from the income/wealth test for determining OBC non-creamy layer status. The Centre has sought clarifications and appropriate directions from the Supreme Court on the liability of its March 11 judgment on the considerations of claims by OBC candidates who were selected for the Civil Services Examination (CSE).

A Bench of Justices P.S. Narasimha and R. Mahadevan, in its order, said the Union government, represented by Solicitor General Tushar Mehta, had erred in assuming that a "retrospective implementation of the March 11 judgment would have far-reaching consequences for recruitment, service and cadre allocation, seniority and admissions to Higher Educational Institutions".

What was the March 11 Judgment?

On March 11, the Supreme Court upheld a 1993 Office Memorandum which excluded parental salary and agricultural income from the income/wealth test for determining OBC non-creamy layer status. It clarified the years-long confusion over how to calculate wealth or income to determine the creamy layer status of OBC candidates for reservation purposes. Justice Narasimha and Justice Mahadevan were hearing an appeal by the Union government against lower court rulings in favour of such OBC candidates.

The March 11 judgment concerned the manner in which creamy-layer status is determined for candidates belonging to the Other Backward Classes (OBC). The case arose after candidates who had cleared the Civil Services Examination were denied consideration under the OBC-NCL category because the Department of Personnel and Training (DoPT) had taken into account the salary earned by their parents, who were employed in public sector undertakings and other organisations.



The November 6 judgment was delivered on applications filed by the Union government seeking clarification of the March 11 ruling. FILE PHOTO

The court rejected the mechanical exclusion of candidates based solely on their parents' salary income. It examined the 1993 Office Memorandum governing the creamy-layer criteria and the subsequent clarification issued in 2004. The court held that parental salary cannot, by itself, determine whether an OBC candidate falls within the creamy layer. The status and category of the post held by the parent are also relevant to the determination.

The court therefore dismissed the appeals filed by the Union government and directed it to reconsider the claims of the respondent candidates and intervenors in accordance with the principles laid down in the judgment. It also directed that the exercise be implemented within six months. The judgment recorded the government's assurance that supernumerary posts could be created to accommodate candidates who satisfied the non-creamy-layer criteria.

At the heart of the judgment was the interpretation of the 1993 Office Memorandum and the 2004 clarification. The court held that the 2004 clarification could not be used to introduce a substantive condition that was absent from the original 1993 framework. It also cautioned against treating employees of public sector undertakings differently merely by using their salary income as the basis for exclusion.

The court noted that the creamy layer exclusion criteria are "status-based rather than purely income-based, reflecting the policy understanding that advancement within the governmental service hierarchy denotes social progression independent of fluctuating salary levels".

On the 1993 Office Memorandum of the DoPT, the Supreme Court said, "The plain language of these explanations makes it clear that salary income and agricultural income are consciously kept outside the common pool while determining exclusion under the Income / Wealth Test." Further, with regard to the 2004 clarificatory letter, the court said, "Determination of creamy layer status solely on the basis of income brackets, without reference to the categories of posts and status parameters enunciated in the 1993 OM is clearly unsustainable in law."

What did the court say now?

The November 6 judgment was delivered on applications filed by the Union government seeking clarification of the March 11 ruling.

The Centre had argued that applying the March judgment retrospectively could reopen completed selections, appointments, service and cadre allocations, promotions, seniority and admissions. It also sought two years to establish equivalence between posts in PSUs and other organisations and government posts.

The Supreme Court clarified that the March judgment does not require completed selections, appointments, promotions or service allocations to be reopened. It said the March judgment determined the rights of the candidates who were parties to the case and the intervenors whose claims were pending. Its six-month implementation direction was not a direction to undertake a general revision of all past selections.

At the same time, the legal principle laid down in March remains binding. Pending claims of similarly placed candidates can be considered by the relevant court, tribunal or authority on their own merits, taking into account the Supreme Court's interpretation of the 1993 Office Memorandum and 2004 clarification.

The court further said that selections and appointments made after March 11 in relation to OBC reservation and creamy-layer exclusion must follow the 1993 Office Memorandum as interpreted in the March judgment.

A significant consequence is that the March ruling will apply to the service allocation of OBC candidates selected through the CSE 2025. Although the results had been declared on March 6, five days before the March judgment, service allocation had not yet been finalised. The court found no justification to defer implementation in this case.

The court declined to give the Centre two years to establish equivalence of posts, holding that formulation of such policy falls within the domain of the executive and legislature. It ultimately extended the time for compliance with the March judgment by two months.

THE GIST

- The Supreme Court reaffirmed that parental salary and agricultural income cannot, by themselves, determine OBC creamy layer status; the status and category of the parent's post must also be considered
- The March 11 ruling does not require completed selections, appointments, promotions, or service allocations to be reopened, but pending claims can be assessed under the principles laid down by the court
- The ruling will apply to CSE 2025 service allocation. The court rejected the Centre's request for a two-year extension and extended the compliance deadline by two months

AMRITA IAS

GS II – Polity & Constitution | Social Justice

Key Pointers

- What is the creamy layer among Other Backward Classes (OBCs)?
- What was the importance of the Indra Sawhney judgment of 1992?
- What is the difference between income-based and status-based criteria?
- What do Articles 15(4) and 16(4) provide for?
- Why is the creamy layer principle important for social justice?

No announcement on MDR levy 'at the moment': NPCI

Last month, the payments regulator pushed back proposed additional charge on UPI transactions from its original date of October 15; NPCI had said it would be done 'immediately' after Deepavali

T.C.A. Sharad Raghavan
NEW DELHI

Two days since Deepavali, the National Payments Corporation of India (NPCI) is yet to notify a new date for the implementation of the Merchant Discount Rate (MDR) on UPI transactions and *The Hindu* has learnt that "there is no announcement on this at the moment".

When it had put the proposed additional charge on hold nearly a month ago, the NPCI had said the new date would be announced "immediately" after Deepavali.

The new rate was originally supposed to have been implemented on October 15.

"There is no announcement on this at the moment," a spokesperson at NPCI told *The Hindu* when asked whether the announcement regarding new rates was imminent.



Status quo: The decision to delay the rollout was made in the PMO following strong appeals from traders. FILE PHOTO

Merchants push back

The matter of an MDR levy on specified UPI transactions received significant pushback from merchants and petrol pump dealers alike, apart from customers who feared that merchants would pass on the extra charge on to them by way of higher prices.

The petrol pump dealers further said that the MDR charge, coupled with the fact that their dealer commission had not been revised in several years, meant that their margins would be further squeezed.

The NPCI had on October 13 announced that its UPI and Services Steering Committee had decided that "keeping in mind the festive season, Merchant Discount Rate (MDR) on select Person-to-Merchant (P2M) UPI transactions, shall be implemented immediately post Diwali at a date to be notified separately".

The Hindu had at the time reported that, according to government sources, the decision to delay the implementation of MDR on UPI was made in the Prime Minister's Office following strong appeals from traders.

Praveen Khandelwal, founder and secretary-general of the Confederation of All India Traders (CAIT) and a Bharatiya Janata Party (BJP) Lok Sabha member, had welcomed the deferment, saying that it would protect traders' interests and sustain digital payment momentum during the festive season.

GS III – Indian Economy | Digital Payments

Key Pointers

- What is the Merchant Discount Rate (MDR)?
- What is the role of the National Payments Corporation of India (NPCI)?
- How does the Unified Payments Interface (UPI) work?
- Why were MDR charges removed for certain UPI transactions?
- How can MDR charges affect small traders and merchants?
- How do zero transaction charges affect payment service providers?
- What is the difference between P2P and P2M UPI transactions?

Stop penalising farmers for stubble burning: RSS body

Ishita Mishra
NEW DELHI

Welcoming SC's view on air pollution in Delhi-NCR, the BKS urges States to act on suggestions

The Bharatiya Kisan Sangh (BKS), a farmers' organisation affiliated with the Rashtriya Swayamsevak Sangh (RSS), on Wednesday welcomed the Supreme Court's observations and suggestions on stubble burning and air pollution in Delhi-NCR. The organisation urged State governments and administrative authorities to implement the court's recommendations and stop penalising farmers for stubble burning.

A Bench comprising Chief Justice of India Surya Kant and Justice Joymalya Bagchi, during a recent hearing, observed that stubble burning was one of several contributors to Delhi-NCR's air pollution, with vehicular emissions and industrial pollution playing a significant role.

The Bench referred to the clear skies witnessed in Delhi during the COVID-19 lockdown, despite instances of stubble burning, to highlight the need to examine other major sources of pollution.

Reacting to the Supreme Court's observations, BKS All India General Secretary Mohini Mohan Mishra said the court's remarks underscored the need to look beyond stubble burning and identify the other major sources of pollution.

"State governments should move beyond paperwork and take concrete steps to identify the actual causes of pollution rather than repeatedly blaming farmers for the deteriorating air quality in the national capital and surrounding regions," he said.

Welcoming the court's suggestion of establishing a procurement mechanism for crop residue, Mr. Mishra said the government should introduce a system similar to the Minimum Support Price (MSP) framework for agricultural produce.

GS III – Environment & Ecology

Key Pointers

- What is stubble burning, and why do farmers practise it?
- How does stubble burning contribute to air pollution in Delhi-NCR?
- What are the other major sources of air pollution in Delhi-NCR?
- How can crop residue be used for biofuel, compost and other useful products?
- How can a Minimum Support Price (MSP)-like mechanism for crop residue encourage farmers to avoid burning?

Navi Mumbai recognised as India's cleanest city in latest Swachh Survekshan

The Hindu Bureau
NEW DELHI

Navi Mumbai has been adjudged the cleanest city in India during Swachh Survekshan 2025-26, while Gujarat's Surat was second and Vijayawada in Andhra Pradesh finished third.

The awards for the latest edition of the cleanliness surveys carried out by the Centre were presented by President Droupadi Murmu at an event held here on Wednesday.

Among cities with a population between three lakh and 10 lakh, Madhya Pradesh's Ujjain emerged as the cleanest urban centre, followed by the Union Territory of Chandigarh along with Guntur in Andhra Pradesh.

Indore, which had been ranked the cleanest city in the country for the past eight years, did not figure among the toppers this year.

Rewa, another city in Madhya Pradesh, emerged as the cleanest riverfront town, followed by Bilaspur (Chhattisgarh) and Varanasi (Uttar Pradesh) in second and third place, respectively.



President Droupadi Murmu presenting awards during the Swachh Survekshan 2025-26 programme in New Delhi on Wednesday. PTI

In the 10 lakh-plus population category, Greater Visakhapatnam emerged as the cleanest city, followed by Jabalpur and Lucknow.

According to the Union Housing and Urban Affairs Ministry, in the Swachh Coastal Town category, Puri in Odisha was ranked first, followed by Kerala's Alappuzha and Maharashtra's Ratnagiri.

Rudrapur, in Uttarakhand, emerged as the cleanest Himalayan city, while Jammu secured the second position.

Last year, Indore had topped the league, followed by Surat and Navi Mumbai. Jaipur was recognised as the cleanest city in Rajasthan, while Gwalior received the distinction in Madhya Pradesh.

Swachh Survekshan is Swacch Bharat Mission-Urban's flagship cleanliness assessment, with the goal of improving urban sanitation, hygiene, and waste management. Over 4,751 cities participated in the latest edition. Swachh Survekshan made several key enhancements for the 2025-26 awards, including greater emphasis on citizen feedback.

GS II – Governance | GS III – Environment

Key Pointers

- What is Swachh Survekshan?
- Who conducts the annual cleanliness survey?
- What are the main objectives of the Swachh Bharat Mission–Urban?
- What is the role of Urban Local Bodies in waste management?
- What are the main steps in solid waste management?
- Why is waste segregation at source important under the Solid Waste Management Rules, 2016?
- How do composting and recycling support a circular economy?

Govt. extends micro credit guarantee scheme for 5 years

Press Trust of India
NEW DELHI

The Union Cabinet on Wednesday approved the continuation of the Credit Guarantee Fund for Micro Units (CGFMU) for five years up to March 2031, a move that will facilitate loans of ₹12.6 lakh crore.

As of September 2026, more than 60.36 crore loans amounting to ₹43.34 lakh crore have been sanctioned by lending institutions since the launch of the PM Mudra scheme.

Launched in 2016

The CGFMU, launched in January 2016, has acted as a major catalyst in enabling the growth of Pradhan Mantri Mudra Yojana (PMMY) loans in the country.

The Union Cabinet, chaired by Prime Minister Narendra Modi, gave its nod to a corpus of ₹5,000 crore facilitating PMMY loans amounting to ₹12.6 lakh crore, an official release said.

In a briefing on the decisions taken at the Cabinet meeting, Information and Broadcasting Minister Ashwini Vaishnaw said that the Credit Guarantee Fund for Micro Units provides credit guarantee coverage to lending institutions through National Credit Guarantee Trustee Company Limited (NCGTC) against default risk.

The release said collateral-free loans under Pradhan Mantri Mudra Yojana have created a whole new generation of entrepreneurs who previously could not avail loans from the formal banking system.

GS III – Indian Economy

Key Pointers

- What is the Credit Guarantee Fund for Micro Units (CGFMU)?
- What is the role of the Pradhan Mantri MUDRA Yojana (PMMY)?
- How does a credit guarantee help small businesses get loans?
- What is the difference between secured and collateral-free loans?
- What are the different loan categories under the MUDRA scheme?

BJP to mark birth anniversary of Birsa Munda with special programmes across the country

The Hindu Bureau
NEW DELHI

The Bharatiya Janata Party will celebrate Janjatiya Gaurav Divas from November 11 to 18, organising over 1,000 programmes across 240 tribal-dominated districts and 568 Assembly constituencies to mark the birth anniversary of Bhagwan Birsa Munda.

BJP national general secretary and Lok Sabha member Gajendra Patel said on Wednesday that the special week-long initiative will highlight the positive transformations in the lives of tribal and Adivasi communities.

Bhagwan Birsa Munda was born on November 15, 1875, in Ulihatu village, Khunti district, Jharkhand.

'Fought the British'

"At that time, the British subjected the tribal community to various forms of oppression over issues relating to land and religious conversion. Young Birsa Munda fought against the British in resistance to these atrocities. At the young age of just 25, he became revered as Bhagwan," he said.

The initiative will highlight the positive transformations in the lives of tribal and Adivasi communities

"He advocated abstaining from intoxicants, protecting one's religion and culture, and fighting for land rights. Through this struggle, he secured a place of honour for the Adivasi community across the country. He led the Ulgulan that he initiated as a great revolution. He gave the slogan, 'Abua Dishum, Abua Raj', meaning 'Our Country, Our Rule'. On June 9, 1900, at the young age of just 25, the British poisoned him to death in Ranchi Jail," he added.

Other leaders

The senior BJP leader recounted the contributions of other prominent tribal revolutionaries, including Tilka Manjhi, Sidhu-Kanhu, Chand-Bhairav, Phulo-Jhano, Shaheed Veer Narayan Singh, Telangana Kharia, Budhu Bhagat, Tantya Mama Bhil, Rani Durgavati, Alluri Sitarama Raju, Komaram Bheem, and Rani Gaidinliu.

The BJP leader noted that the Union Government declared November 15 as Janjatiya Gaurav Divas in 2021. "Under the leadership of Prime Minister Narendra Modi, Droupadi Murmu became the country's first tribal President in 2022," he said.

He also highlighted key initiatives of the Narendra Modi-led government and cited tribal welfare spending and political representation, and accused previous Congress governments of neglecting tribal communities.

GS I – Modern Indian History

Key Pointers

- Who was Birsa Munda, and what was his role in the freedom struggle?
- What was the Ulgulan movement?
- Why did tribal communities oppose British rule in the Chotanagpur region?
- What was the Khuntkatti system of land ownership?
- How did Birsa Munda mobilise tribal communities?
- What was the importance of the Chotanagpur Tenancy Act, 1908?
- Who were other important tribal freedom fighters, such as Sidhu, Kanhu and Rani Gaidinliu?

Kedarnath shrine closes for winter after drawing over 19 lakh pilgrims

The Hindu Bureau
NEW DELHI

Amid the chanting of Vedic hymns and traditional rituals, the portals of the Kedarnath temple were ceremoniously closed for the winter on Wednesday.

According to data shared by the Uttarakhand government, the shrine, situated at an altitude of over 11,700 feet, received more than 19 lakh devotees during the pilgrimage season, which began in April.

Preparations for the annual closure began in the early morning, with priests conducting special prayers and religious ceremonies.

Following the rituals, the ceremonial palanquin carrying the deity was taken to the Omkareshwar Temple in Ukhimath, the winter abode of Lord Shiva, where devotees can offer prayers over the next six months. The portals of the Gangotri and Yamunotri temples were also closed for the winter. The two shrines together recorded more than 18 lakh pilgrims.



Devotees throng Kedarnath during winter closure rituals at the Himalayan shrine in Uttarakhand on Tuesday. PTI

Badarinath-Kedarnath Temple Committee (BKTC) president Hemant Dwivedi told the media that more than 60 lakh devotees had visited the Char Dham shrines – Badrinath, Kedarnath, Gangotri and Yamunotri – this year.

"This is a record footfall witnessed by the Char Dham Yatra, which will conclude with the closure of the Badrinath temple on November 16," he said.

Beyond its religious significance, the pilgrimage is a major contributor to Uttarakhand's economy, supporting the livelihoods of a large section of its population.

The State government makes elaborate arrangements every year for the yatra, which supports more than 10 lakh people through direct and indirect employment in sectors such as hotels, restaurants, tour operations, taxi services, guiding, priestly services, mule operations, portering and handicrafts.

According to official estimates, the pilgrimage generates approximately ₹7,500 crore in revenue over six months.

However, the season also witnessed 287 pilgrim deaths due to health-related reasons at the high-altitude shrines. The yatra was suspended for brief periods during the monsoon as heavy rainfall, and landslides blocked roads, disrupting pilgrim movement.

GS I – Indian Geography | Art & Culture | GS III – Environment & Disaster Management

Key Pointers

- Where is the Kedarnath Temple located, and why is it important?
- What are the four shrines of the Char Dham Yatra?
- Why do Himalayan temples close during winter?
- How does high altitude affect travel and pilgrimage in the Himalayas?
- Why is the Himalayan region prone to landslides, floods and cloudbursts?
- How does pilgrimage tourism support the local economy?
- What environmental problems are caused by mass tourism in the Himalayas?

India raises fertilizer subsidy by 64%, overshoots Budget estimates

Prabhudatta Mishra
Shishir Sinha
NEW DELHI

The Union Cabinet approved a ₹62,370.02 crore subsidy for different types of fertilizers for the 2026-27 Rabi season, which is ₹24,417.73 crore more than the ₹37,952 crore budgeted for 2025-26 Rabi season.

With ₹41,533.81 crore subsidy allocated for Kharif 2026, the total outgo and P & K subsidy in FY27 exceeded ₹1 lakh crore mark against budgetary allocation of ₹54,000 crore.

As the government had budgeted ₹1.71 lakh crore total fertilizer subsidy including ₹1.17 lakh crore for urea for FY27, the overall outgo may top ₹3 lakh crore as global prices of both urea and LNG (key input for manufacturing) had also shot up after the Iran war and continued for a longer period. The Centre had cut fertilizer subsidy by over 8% in FY27 from ₹1.86 lakh crore in FY26. But Iran war upended expectations of global easing of prices and the result is a ballooning subsidy.


A farmer spreads fertilizer on a paddy field in Haryana.

Total spending on fertilizer subsidy in six months till September had crossed 70% of FY27 budget estimates, as per Controller General of Accounts (CGA). It is estimated total spending for FY27 could touch as high as ₹3.50 lakh crore. When the budget for fertilizer subsidy was lowered, it was said that there would be "reduced requirement for imported urea and P&K fertilizers leading to balanced use of fertilizer nutrients for better soil health and productivity."

"The higher subsidy bill was expected given global developments on gas. With food inflation rising sharply it is essential to check input costs like fertilizers. It is against this background we should look at higher subsidies. We believe fiscal deficit ratio will be higher up to 0.3% if GDP and this rise has already been factored," said Madan Sabnavis, chief economist, Bank of Baroda.

(The writers are with The Hindu businessline)

GS III – Indian Economy | Agriculture

Key Pointers

- Why does the government provide fertiliser subsidies to farmers?
- What is the difference between the Nutrient Based Subsidy (NBS) scheme and the urea subsidy system?
- How do fertiliser subsidies support food security and farm productivity?
- How do global prices of gas and fertiliser raw materials affect subsidy spending?
- How does rising subsidy expenditure affect the fiscal deficit?
- How does excessive fertiliser use affect soil health and water quality?
- What is the role of the Soil Health Card Scheme?

KINSHASA

DR Congo Ebola outbreak exceeds 11,000 cases, causes 5,387 deaths



AP

The Democratic Republic of Congo's worst-ever outbreak of Ebola has now reached 11,042 confirmed cases and caused 5,387 deaths, official Congolese figures showed on Wednesday. No approved vaccines or treatments exist currently for the Bundibugyo species of Ebola behind the latest outbreak. AFP

Prelims Pointers

- What is Ebola Virus Disease (EVD)?
- How does the Ebola virus spread among humans?
- Why do different Ebola virus species require different vaccines or treatments?
- What is the role of the World Health Organization (WHO) during an outbreak?
- What is the role of the International Health Regulations (IHR), 2005 in controlling disease outbreaks?

Gravitational-wave astronomy is entering its statistical era

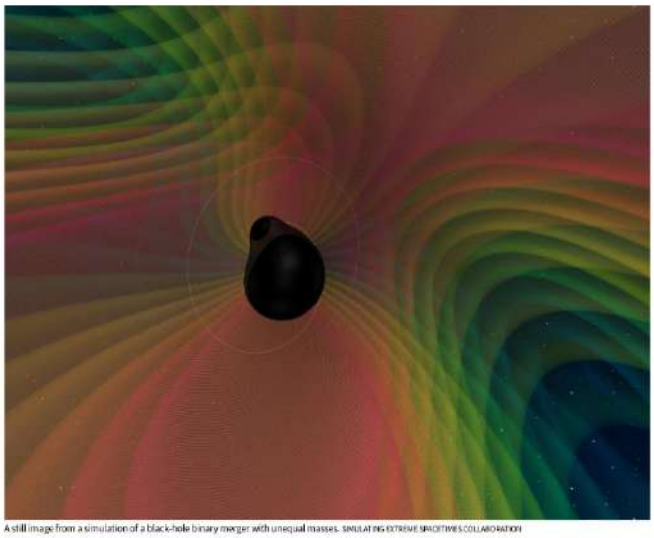
Humankind has a stake in understanding the universe simply, but no less importantly, because it can; and gravitational waves, the ripples in spacetime made by objects like black holes, can help piece together the processes that shaped the cosmos long before we, and perhaps even our planet, existed

Vasudevan Mukunth

On January 14, 2025, the twin LIGO observatories in the U.S. detected a gravitational wave emitted by two black holes merging together 1.3 billion lightyears away. One black hole was 34-times as heavy as the sun and the other, around 32-times. The LIGO team called the gravitational wave signal GW250114 – and it was the clearest signal the team had recorded to date.

Scientists first began to detect and study gravitational waves in 2015. These waves are ripples in spacetime created when really heavy objects, like neutron stars and black holes, accelerate rapidly. After a decade of improvements to the LIGO detectors, by 2025, the scientists using it could study hundreds of black hole mergers at the same time and, using the data, answer questions about how different black holes form, why some are heavier than others, and whether gravity always behaves the way Albert Einstein predicted it would.

Humankind has a stake in understanding the universe simply, but no less importantly, because it can. And gravitational waves have emerged as a way for us to piece together the processes that shaped the cosmos long before we, and perhaps even our planet, existed.



A still image from a simulation of a black-hole binary merger with unequal masses. SIMULATING EXTREME SPACETIMES COLLABORATION

New catalogue

Today, in fact, gravitational-wave astronomy can be said to have entered its statistical era: when its detectors have collected enough data from observations to discern large scale patterns among black holes, including their prevalence, and draw conclusions that individual signals alone could never support.

In one important development, an international collaboration of gravitational-wave scientists on May 26 this year released a catalogue 70% larger than its predecessor to help study black-hole populations and their formation and evolution, effectively a means for scientists to check if the black holes' properties deviate from what their theories predict. The catalogue contained 390 candidate events in the universe, including 161 new ones, that the LIGO detectors and VIRGO and KAGRA in Italy and Japan, respectively, detected between April 2024 and January 2025. All events were consistent with merging black holes.

Scientists triangulate the source of a gravitational-wave signal by comparing when it arrived at different detectors. However, the four detectors are all located in the earth's northern latitudes and are also sensitive to signals to different degrees. Together with uncertainties in the measurements, scientists are only able to say a source lies in areas of the sky too large to be very useful. This is why the third LIGO is set to come up in Hingoli district in Maharashtra, with its more southerly location and distance from the other detectors designed to improve triangulation.

One 2018 study in *Living Reviews in Relativity* estimated that the network of detectors including LIGO-India could reduce the average area of uncertainty by 40%.

The bird and the bell

According to Einstein's general theory of relativity, gravity is the curvature of spacetime caused by matter and energy. When a massive object accelerates in specific ways through this spacetime, the change in curvature can travel outwards at the speed of light as a gravitational wave. Gravitational waves pass through matter by disturbing it just a little – and instruments like LIGO, VIRGO, and KAGRA are designed to pick up on this disturbance. No other telescopes can.

Black holes that are orbiting each other, pulling closer and closer until they are pirouetting rapidly through space before eventually merging to form a bigger black hole are especially strong sources of gravitational waves. The orbiting and merger constitute a kind of cosmic laboratory where scientists can check whether Einstein's predictions hold even in such extreme conditions.

As the black holes move closer and orbit each other faster, the frequency of the gravitational waves they emit increases, producing a rising signal called a chirp, much like the call of a bird. Once they have merged, the final black hole is momentarily distorted before it settles down, emitting a set of waves called the ringdown, like a struck bell that is fading away. Scientists can glean many details about the black holes by studying the strength and shapes of these signals, including how fast they were spinning, which way their spins were pointing, and how far away they might be. None of these measurements are 100% certain, of course.

For example, scientists have compared the chirps and ringdowns with equations describing how black holes should move and merge to test the theory. In one analysis reported in July, the LIGO collaboration checked 168 signals this way and found no disagreement with general relativity. The GW250114 signal in particular proved helpful: its clear ringdown allowed the team to measure more than one 'ring' of the final black hole, and the rings all matched the frequencies they expected from the black holes' mass and spin.

Puzzles in the mass

As the LIGO detectors have become more sensitive, scientists have used them to check larger volumes of the universe. In mid-2024, LIGO and VIRGO recorded a signal called GW240615, produced by black holes weighing around 34 and 26 solar masses. By comparing the signal's timing at the two LIGO and one VIRGO detectors, scientists narrowed the source's location to a patch of the spanning just six square degrees – around 30-times the apparent size of the full moon – a record at the time. Then other telescopes could take over scanning this patch for potential source events.

At the same time, the detectors have some limitations that incremental upgrades to their instruments cannot surmount. The LIGO, VIRGO, and KAGRA detectors are better at finding nearby sources and signals emitted by objects with a certain minimum mass. Otherwise, the signals are too weak.

One analysis based on the May 26 catalogue found that the black holes the detectors eavesdropped on do not have a smooth range of masses. Instead, there are more black holes around 10 solar masses than expected, and black holes near 35 solar masses have a strong tendency to merge with companions of similar mass. Such findings give scientists clues about how these black holes could have been produced.

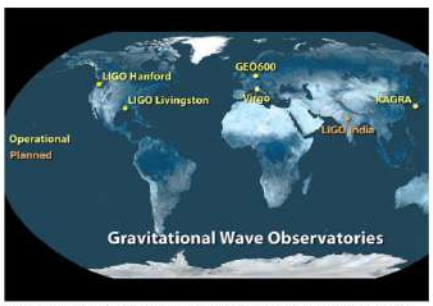
For example, two black holes of similar masses orbiting each other could be the result of two massive stars being born together, each eventually collapsing into a black hole. For another, when a black hole moves among many other stars in a star cluster, it can acquire 'companions' using its gravitational pulls. A remnant of one black hole merger can also collide again to create a second-generation black hole. The direction of a black hole's spin can help scientists pick between these possibilities because a black hole descended from a pair is likely to be spinning in the direction of the pair's common orbit.

The catalogue found that only around 15% of the black holes detected had rapid spins, and they occurred among black holes weighing 10-20 solar masses and those heavier than 45 solar masses. Thus, a single pathway cannot explain the origin of all merging black holes.

Astronomy's statistical eras

Gravitational-wave signals are also helping scientists reconcile the behaviour of stars in the universe with the physics that explain it. For example, theory predicts that inside some extremely massive stars, some high-frequency photons turn into electron-antielectron pairs, reducing the pressure that keeps the core from collapsing under its own weight. The resulting instability can set off runaway nuclear fusion that blows the star apart, leaving behind no black hole – and which should create a shortage of black holes in a specific mass range. A study in *Nature Astronomy* earlier this year reported that the lower end of this range could lie at around 44 solar masses in the distribution of less-massive black holes in pairs.

An endeavour capable of producing statistical results is no small feat. Radio astronomy can be said to have entered its statistical era in the late 1950s.



Gravitational-wave observatories across the globe. In addition to the twin LIGO detectors in Hanford, Washington and Livingston, Louisiana, operating facilities in the network include GEO600 in Germany, KAGRA in Japan, and VIRGO in Italy. A sixth observatory is in the works in India. CALTECH/MIT/LIGO LAB

Radio-frequency data collected from millions of sources in the universe have since challenged the steady state theory of cosmology, helped humankind understand how the universe was born and evolved, and whether the laws of nature that scientists were formulating and testing on the earth really applied throughout the cosmos.

Optical astronomy – using light we can see – has had a livelier, more boisterous history because the first instruments pointed at the stars were our own eyes. Even so, since 2000, programmes like the Sloan Digital Sky Survey have mapped millions of galaxies, revealing the universe's structure at its largest scales, and provided evidence for the existence of dark matter and dark energy.

Similarly, gravitational-wave astronomy could help astronomers understand how the populations of stars and black holes rose and fell across space, across time. In fact, astronomers can consider the galaxies from which gravitational-wave signals might originate, then combine their redshifts – how much their light is being stretched – and statistical information about black-hole masses with the distance data encoded in the signals to estimate how fast the universe is expanding.

Such an analysis attempted this year estimated 71 km/s per megaparsec, around 26% more precise than the previous estimate based on gravitational-wave data. Even if the figure is still too imprecise to help scientists settle open questions in cosmology, it is a proof of concept, of sorts, and could improve in future.

Titanic residents

Indeed, the catalogue itself has some way to go. In 2017, the LIGO detectors recorded gravitational waves emitted by two neutron stars that inspiralled before merging. The collision also accompanied a bright explosion that other telescopes could study – a possibility that rarely arises with black-hole mergers. Importantly, as two neutron stars approach each other, their profound gravity distorts their shapes and the gravitational waves they emit, and measuring these particular changes could indicate how easily matter can be compressed. However, the May catalogue swung in favour of the candidate events being black holes, not neutron stars.

But this is okay. Gravitational-wave astronomy is just commencing its transition to supporting statistical studies. The detectors are improving. LIGO-India is set to begin its first observing run in 2030. European Space Agency and NASA astronomers are also working on a mission called LISA, which will use three satellites orbiting the sun to detect gravitational waves whose frequencies are too low for LIGO et al. to sense. Such waves are expected from far heavier black holes.

Over time, scientists – humans – will acquire a clearer sense of how our universe's most titanic residents are born.

mukunth.v@thehindu.co.in

GS III – Science & Technology

Key Pointers

- What are gravitational waves, and how are they produced?
- Albert Einstein's General Theory of Relativity and gravitational waves.
- How do gravitational waves help scientists study black holes and neutron stars?
- What is the Laser Interferometer Gravitational-Wave Observatory (LIGO), and how does it detect gravitational waves?
- What are the roles of the Virgo and KAGRA observatories in gravitational-wave research?
- How does studying many gravitational-wave events help scientists understand black hole formation, mass and spin?
- What is multi-messenger astronomy, and how does it combine gravitational-wave observations with light and other signals?
- What is the purpose of LIGO-India, and how can it improve the global detection and study of gravitational waves?