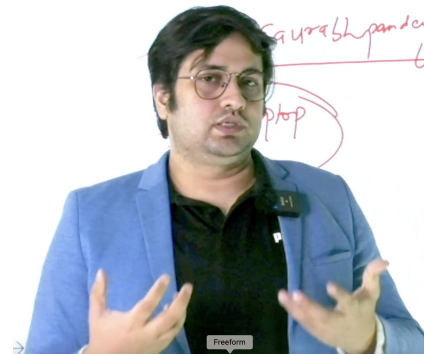


Topics

- Neutrinos
- Impact of heat waves
- What are money and financial Bills?
- Karnataka bill on Gig workers
- Hodeidah,
- Mains



By saurabh Pandey



THE HINDU

Target Mains -2024/25 -

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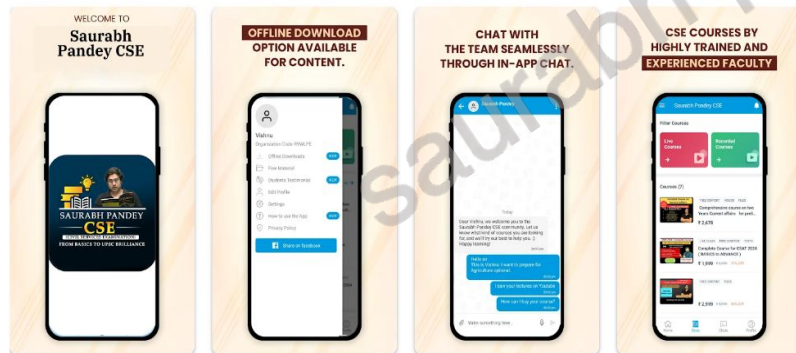
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In painstaking steps, scientists piece the neutrino universe together

Researchers conducting an experiment with the Large Hadron Collider reported observing electron-neutrinos in a particle collider for the first time. Understanding these particles could transform what we know about our universe, the tools we use to study it, and the technologies in our lives

Quaidia Gani

Neutrinos are a type of subatomic particle. They don't have an electric charge, have a small mass, and are left-handed in physics term meaning the direction of its spin is opposite to the direction of its motion. And they are flooding the universe. They are the second most abundant particles after photons (quanta of light) and the most abundant among particles that make up matter.

The study of neutrinos is an area of immense current interest among particle physicists and astrophysicists. These particles are produced when particles called leptons interact with matter. For example, when a type of lepton called a muon interacts with matter, the interaction produces a muon neutrino. The same goes for electrons (electron-neutrino) and tausons (tau neutrino). However, the neutrinos themselves interact with matter very, very rarely to produce a corresponding muon, electron, or tauon.

This small interaction rate makes studying neutrinos difficult. For example, a muon-neutrino will scatter off an atom's nucleus only once out of a million times or so, producing a muon and a proton. So to study them, physicists have built detectors with very fine tracking capabilities. They are also large to maximise the number of interactions between the neutrinos and the detectors' matter.

New data from NOVA

One such experiment is NOVA, an acronym for 'Neutrino Oscillation Appearance', in Minnesota in the U.S. It creates a beam of neutrinos that fly towards a 14,000-tonne detector located 800 km away. NOVA is managed by the Fermi National Accelerator Laboratory. Scientists presented the latest results from the NOVA collaboration at a conference in Italy on June 17. They said the collaboration had acquired more than 100 million neutrino events since its results data as it had during NOVA's previous run, four years ago. The new results complemented the previous ones with greater precision.

NOVA was designed to determine the role of neutrinos in the evolution of the cosmos. It does this by trying to understand which neutrino type has the most mass and which type has the least. This is an important detail because neutrinos may be their mass through a different mechanism from other matter particles. Unraveling it would answer many open questions in physics.

In pursuit of this goal, in July 11, a study at the Large Hadron Collider in Europe also reported observing electron-neutrinos at a particle collider for the first time.

The surprise of mass

Physicists first detected extraterrestrial neutrinos coming from a supernova in 1987 when a star exploded around 150,000 light years away. Three hours before light from the explosion reached the earth, three underground detectors in Japan, Russia, and the U.S. recorded a spike in the number of neutrinos coming from the explosion. This event was the birth of neutrino astronomy.

For almost 50 years, physicists thought neutrinos were massless particles, like



A technician works on the NOVA prototype New Detector. (SCIENCE PHOTO LIBRARY)

photons. According to the special theory of relativity, a massive particle can't travel at the speed of light (in vacuum). So a light signal could overtake the neutrino, and it would appear right-handed when viewed in the opposite direction, i.e., with its directions of motion and spin aligned with each other. However, physicists had never detected right-handed neutrinos, so they concluded neutrinos were massless.

But from the late 1990s, scientists in Japan and Canada found evidence to overturn this view and prove neutrinos actually have mass. They found that when neutrinos travel through space, they can change from one type to another, which massless particles can't do.

The existing theory of how particles behave and their properties, called the Standard Model of particle physics, doesn't predict massive neutrinos. Incorporating them in the Standard Model will require far-reaching changes that physicists are still working out.

Ordering the neutrinos

This is why physicists study how neutrinos and their antineutrino counterparts, antineutrinos, change their type as they travel large distances. This quantum mechanical phenomenon is called neutrino oscillation. For example, all neutrinos from the Sun are neutrinos and their antineutrino counterparts are antineutrinos. As they travel large distances, they can change their type on the earth as mass neutrinos.

Theoretical models predict two possible solutions for the neutrino mass hierarchy problem, called *normal* and *inverted*. The normal order proposes that one of the three types is much heavier and that the other two have comparable lower masses. In the inverted order, one



If we find a way to transmit neutrinos, it wouldn't be far-fetched to say we can replace electromagnetic waves in communication channels with neutrino beams within a few decades.

of the neutrino types is lighter and the other two have comparable heavier masses.

The new NOVA data favours the normal order, but not conclusively.

Cracking the hierarchy problem is closely related to the universe's evolution. Their low interaction rate means neutrinos are excellent carriers of information from the universe's past, from sources like exploding stars and black holes. We can't otherwise access a lot of this information today. Supernovae are known to release 99% of their radiant energy in a short, 10-second burst of neutrinos.

Studying these neutrinos can reveal how light or radio waves from the explosion diffuse after travelling a certain distance.

The best information carriers

Indeed, because neutrinos pass through most matter unimpeded, they can carry information across large distances.

Humans currently use electromagnetic waves to do this job because they are much easier to transmit and to detect. But in some situations, they don't work well.

For example, seawater is opaque to electromagnetic radiation of shorter wavelengths, which impedes the

transmission of waves of certain frequencies to submarines. Neutrinos on the other hand can easily pass through 1,000 light years (9,460 million million km of lead, so an ocean will hardly be a barrier).

We only need to find a way to transmit and capture them, which is not to understand them fully. If this happens, it wouldn't be far-fetched to say we can replace electromagnetic waves in communication channels with neutrino beams within a few decades.

Eyes on the neutrino universe

Given all these advantages, the world's most scientifically endowed countries are racing to study neutrinos.

A few of the experiments involved are the Super-K III in Japan, the Sudbury Neutrino Observatory (in its new SNO+ avatar) in Canada, the MiniBOONE, the MicroBOONE, and NOVA in the U.S., the Double ChooZ in France, the Jiangmen Underground Neutrino Observatory in China, the OPERA experiment in Switzerland, and the IceCube Neutrino Observatory in Antarctica.

India's own India-based Neutrino Observatory, funded by the Department of Atomic Energy, was supposed to come up in Tamil Nadu but currently faces an uncertain future over procedural lapses and lack of political support.

Just as more matter increases the number of interactions with neutrinos, a large number of experiments increase the chances of cracking the mass hierarchy and other problems, and bring us closer to a complete picture of the universe.

Quaidia Gani is an assistant professor in the Department of Physics, Government Degree College Puttur, Karnataka.

Neutrinos

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Heat stress is more than a degree of concern

In recent periods, climate change and environmental degradation have significantly affected the safety and health of workers worldwide. Heat stress is anticipated to affect labour efficiency and productivity, in turn reducing work hours and hindering the International Labour Organization's (ILO) objective of promoting fair and decent employment. Workers, who are particularly vulnerable to climate change hazards, sometimes cannot cease working despite hazardous conditions because of financial constraints.

The main health effects of heat stress on workers include heat stroke, heat cramps, cardiovascular disease, acute kidney injury, and physical injury. The Intergovernmental Panel on Climate Change (IPCC) states that to retain normal physiological activities, it is necessary to maintain a core body temperature of roughly 37°C. Temperature elevations over 38°C have a deleterious effect on one's cognitive and physical capabilities. During various life stages, women who are employed in heat-exposed sectors, such as subsistence agriculture, may be at risk for pregnancy-related complications, including hypertension, miscarriages, and premature births. An increase in temperature can diminish work productivity due to excessive heat that makes it difficult to work. Or, there is a need for personnel to operate at a slower pace.

ILO study findings

The ILO study (2019) estimated that "Heat stress is projected to reduce total working hours worldwide by 2.2 percent and global GDP by US\$2,400 billion in 2030... Agricultural and construction workers are expected to be the most affected, accounting for 60 percent and 19 percent, respectively of working hours lost to heat stress in 2030". Agricultural workers face a significantly higher risk from heat than workers in other occupations, with farmworkers being 35 times more susceptible to heat-related fatalities. Recent ILO (2024) estimates that 2.41 billion workers worldwide are exposed to extreme heat. Further, exposure to extreme heat is directly associated with about 22.85 million injuries and 18,970 fatalities annually. The Asia and the Pacific regions experience the highest Gross Domestic Product (GDP) losses due to heat stress affecting labour productivity. In 1995, the region's GDP was estimated to have decreased by 1.4%, which is forecast to decrease by 2.3% in 2030 due to climate change. Projections indicate that Thailand, Cambodia, and India will experience significant declines in their national GDP in 2030, with a decrease of over 5%.

Asia and the Pacific exhibit exceptional diversity in terms of climate and the varying levels of economic development among various countries. The geographical distribution of heat stress impact is not uniform. It is projected that

Ishwar Choudhary

pursuing a PhD in Economics in the Department of Economics and Finance at the BITS Pilani, Pilani campus, Rajasthan

Balakrushna Padhi

an Assistant Professor in the Department of Economics and Finance at BITS Pilani

Geetilaaxmi Mohapatra

an Associate Professor in the Department of Economics and Finance at the BITS Pilani, Pilani campus, Rajasthan

The Asia and Pacific regions could experience significant economic losses due to heat stress affecting labour productivity

by 2030, there would be a decrease of almost 5% in working hours in southern Asia and western Africa, while the reduction in the European subregions will be only 0.1%.

Further, southern Asia and sub-Saharan Africa are most susceptible to experiencing declines in labour productivity due to heat stress; these regions are already vulnerable to climate change and home to most of the world's poor population, which counteracts efforts to reduce inequalities. The countries that are most susceptible to experiencing decreases in productivity are those having a significant proportion of their workforce employed in the agricultural and/or construction sectors, as well as those situated in the tropical and subtropical latitudes. The decline in available working hours and output among small-scale and subsistence farmers is expected to affect household food security. Heat stress significantly impacts labour hours and productivity, and the impact is not uniform across regions and genders. Heat stress poses concerns that have the potential to exacerbate gender disparities in the workforce, particularly by deteriorating working conditions for the numerous women engaged in subsistence agriculture. Excessive heat stress is expected to impact the achievement of various Sustainable Development Goals (SDGs).

Impact in India

India is undergoing a consistent increase in temperatures annually. By 2030, an estimated 160 million/200 million individuals around the nation may face the risk of experiencing deadly heat waves every year. Approximately 34 million people in India will experience job losses due to reduced productivity caused by heat stress. A study in West Bengal shows that as the temperature increases by 1°C, there is a corresponding decrease of approximately 2% in the productivity of female brickmaking workers. India is the country that experiences the most impact from heat stress; in 1995, it lost 4.3% of its working hours, which is anticipated to increase to 5.8% by 2030.

In addition, India is expected to experience a significant decline in full-time employment by 2030 as a result of heat stress, which can be attributed to its large population. Further, migrant workers often work in hazardous and physically demanding jobs, primarily in the informal economy. They are particularly vulnerable to the risks posed by climate change, as they usually lack occupational safety and health protections, essential services, and infrastructure.

Informal workers may continue working despite the risk to their health from extreme climate events due to financial constraints. Thus, there is a need to strengthen adaptation and mitigation measures at the global, national, and workplace levels to reduce the detrimental

impact of heat stress on workers.

There are national guidelines under the title, 'Preparation of Action Plan - Prevention and Management of Heat Wave', by the National Disaster Management Authority in collaboration with the Ministry of Home Affairs. These guidelines are designed to protect the Indian workforce from the negative impacts of extreme heat. They are designed to help public officials create heatwave action plans for both urban and rural areas, with a focus on the general population.

The importance of the following factors is highlighted: providing education to workers; ensuring proper hydration; managing work schedules, and offering necessary medical facilities. The General Discussion Committee of the International Labour Conference, in June 2023, highlighted the urgent need to implement measures to ensure the safety and the health of workers impacted by climate-related risks and extreme weather events. This involves tackling the effects on their mental and physical well-being and the advocating of secure and conducive working environments.

In this regard, it is crucial for all stakeholders, including governments, employers, and workers, to collaborate in implementing measures that prioritise the protection of the most vulnerable individuals. These measures should include the development of sufficient infrastructure and enhanced early warning systems for extreme weather events.

Additionally, there should be a focus on improving the implementation of international labour standards that are related to occupational safety and health. This will ensure that those affected by heat stress are provided with suitable working conditions. Further, effective communication between workers and employers is essential to facilitate the adjustment of working hours, guarantee adequate rest breaks, provide access to drinking water, and offer training on the identification and management of heat stress. This can help alleviate the adverse effects of heat stress.

Think of green jobs

The government may implement adequate regulatory and legislative measures in occupations that are susceptible to heat waves in order to ensure the safety and well-being of workers. Additionally, infrastructure-related measures, such as implementing construction standards, should safeguard indoor workers. Considering the current climate change scenario, decent and green employment emerges as a promising solution for the future of work. Green jobs are employment opportunities that help protect or restore the environment while also supporting economic and social well-being.

The views expressed are personal

Impact of heat waves



- In recent periods, climate change and environmental degradation have significantly affected the safety and the health of workers worldwide.
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- Workers, who are particularly vulnerable to climate change hazards, sometimes cannot cease working despite hazardous conditions because of financial constraints.
- The main health effects of heat stress on workers include heat stroke, heat cramps, cardiovascular disease, acute kidney injury, and physical injury.

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Steps



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How and when can a bill be defined as a money Bill?

Why do money Bills have a special procedure for approval? What is the way forward?

Rangarajan.R

The story so far:

The Chief Justice of India (CJI) has agreed to list before Constitution Benches, the petitions challenging the money Bill route taken by the Centre to pass contentious laws/amendments.

What are money and financial Bills?

The Constitution defines certain categories of bills that deal with financial matters as money Bills and financial Bills. Article 110(1)(a) to (f) defines a money Bill as a bill that contains 'only' provisions dealing with one or more of six specific matters. They relate to taxation; borrowing by government; custody of consolidated fund or contingency fund and payment/withdrawal of money from such fund; appropriation out of consolidated fund; expenditure charged on consolidated fund; receipt on account of consolidated fund or public account or the audit of accounts of Union or States.

Clause (g) of Article 110 (1) provides that any matter incidental to these six matters can also be classified as a money Bill. Classic examples of money Bills include the Finance Act and the Appropriation Act that deal primarily 'only' with taxation and spending out of the consolidated fund respectively. Article 117 provides for two different categories of financial Bills. Category I contains any of the six matters mentioned in Article 110(1)(a) to (f) along with any other matter. Category II Bills do not contain any of those six matters but would involve expenditures from the consolidated fund.

What is procedure for a money Bill?

As per Article 109, a money Bill shall be introduced only in the Lok Sabha. After it is passed in the Lok Sabha, the Rajya Sabha has only 14 days to provide its recommendations on such a Bill which may or may not be accepted by the Lok Sabha. Money Bills deal 'only' with financial matters that are crucial for the administration of the country. Hence, the

Constitution provides for this special procedure that effectively requires only the approval of Lok Sabha where the ruling government enjoys a majority. It has its origin in the U.K., where in 1911 the powers of the unelected House of Lords over the Budget were curtailed. The Budget was required to be passed only by the House of Commons that reflected the will of the people. However, it must be noted that the operative word of the definition of a money Bill is the word 'only.' It is the Speaker of Lok Sabha who certifies a Bill to be a money Bill.

Financial Bills of Category I and II do not enjoy this special procedure.

What are the issues?

Certification of a Bill as a 'money Bill' by the Speaker came under judicial review during the scrutiny of the Aadhaar Act passed in 2016. This law contains provisions with respect to process for enrolment and authentication, establishment of authority for Aadhaar, mechanism for safeguards, and penalties

for offences under the Act. Section 7 of the Act provides that the Central or State government may require Aadhaar authentication of an individual as a condition for providing subsidy, benefit or service, for which expenditure is incurred from the consolidated fund. Stating the withdrawal of funds from the consolidated fund as the primary purpose of the Act, with all other provisions being incidental to it, this law was passed as a 'money Bill'. While this was a debatable classification, the Supreme Court upheld this with a majority of 4:1. The current CJI was the lone dissenting judge who held that the Aadhaar Act did not fulfil the definition of a 'money Bill'.

The Finance Act, 2017 was even more controversial, in passing amendments to various Acts for reorganisation of tribunals such as the National Green Tribunal, as a money Bill. These amendments were struck down in *Rojer Mathew versus South Indian Bank* (2019) wherein a five-judge Bench opined that the Aadhaar case judgment did not substantially discuss the effect of the word 'only' in the definition of money Bill. It referred the matter to a larger Bench for consideration. A seven-judge Bench should be constituted for an authoritative judgment on the definition of money Bills. The Speakers should also uphold the spirit of the definition while certifying a 'money Bill'.

Rangarajan. R is a former IAS officer and author of 'Polity Simplified'. Views expressed are personal.

THE GIST

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A case for regulating gig-based work

Karnataka's draft Bill introduces provisions that mandate fair contracts and income security for platform workers. These provisions strengthen the position of workers who are at the same time not considered employees, nor do they enjoy the freedom and flexibility of being independent contractors

ECONOMIC NOTES

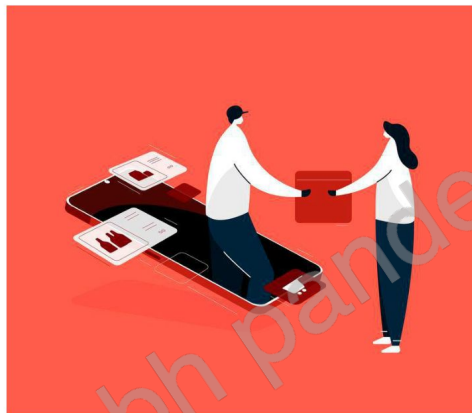
Rakshita Swamy
Biju Mathew

The Karnataka government's intent to introduce a legislation for the welfare of gig workers is a welcome and necessary step.

It squarely addresses the three big myths propagated by the gig and platform industry. The first myth that aggregators sell to promote platform work is that they would have "no boss" and would be "partners" and "captains" – anything but workers. This drew in many people, particularly the young, to join platform-based gigs. However, it soon became clear that this was not the case. There was a big boss – the algorithm and a network of team managers deployed at the local level to enforce the algorithm.

Algorithms dictate the number of hours the worker needs to put in on weekends, the orders to be delivered, cancellations and rating scores that ought to be maintained in order for tasks to be continually allocated to the worker, and finally when a worker is deactivated or fired. Shaikh Salauddin from the Indian Federation of App-based Transport Workers put it succinctly when he said that "Gig workers spend hours trying to guess what the algorithm is doing and it feels like they are a rat in a maze". This is totally opposite to the idea of being one's own boss. A plain reading of the digitally generated terms and conditions that the worker has to invariably agree on to commence work dispels any notion of being an independent contractor. Every aspect of the work is monitored and dictated, with workers facing the consequences if they do not comply.

The Karnataka Bill recognises the pervasive role played by such algorithms and makes the aggregator responsible for sharing the parameters that are used by the algorithm to determine allocation of work, grounds for denial of work, the categorisation of workers and how



ISTOCKPHOTO

personal data of workers is being used to determine their ability to work and earn through the aggregator. The Bill breaks the algorithmic control the companies have and allows workers to take back control for at least some part of their work lives.

The myth of flexibility

The second myth that is perpetuated is that persons engaged in platform work enjoy flexible work arrangements. This assertion has enabled platforms to keep gig-based workers away from protections under labour laws. Multiple studies have shown how the term flexibility is abused in the industry. All flexibility in truth rests only with the employer and none with the worker. The payment structure consisting of a number of incentive schemes which enable workers to earn the minimum

surplus required to cover costs, in effect, leaves no flexibility with the workers. For instance, workers have to comply with mandatory login hours to be eligible for incentives. If they log in after gaps of being 'inactive', they have to make peace with disadvantaged rate cards and incentive schemes. Karnataka's draft Bill introduces provisions that mandate fair contracts, income security and the right of platform workers to refuse work without being slapped with sanctions. The above provisions strengthen the position of these workers who are at the same time not considered employees, nor do they enjoy the freedom and flexibility of being independent contractors.

The third myth is that these are 'part time' workers, who engage in platform-based gig work for additional income. According to a study of the

platform economy in India by PAIGHAM and the University of Pennsylvania, 96% of the cab drivers surveyed, secured 100% of their daily income from gigs. The corresponding figure for delivery workers was 90.7%. Average daily work hours for taxi drivers was in excess of 11 hours, and 10 hours for delivery workers. By making social security a mandatory requirement, the Karnataka Law takes a necessary step towards acknowledging this fact and makes room for an umbrella of schemes that can assist workers through events such as old age, death, health shocks etc.

India's stand

Even though the Government of India endorsed a progressive statement on the rights of platform workers at the G-20 last year, it's Code on Social Security, which is the only legislation that makes a passing reference to gig workers, has been detrimental as it delinks workers from minimum labour protections of wages, occupational safety and health. Significantly, it is the State Governments that are showing the way forward. Rajasthan is the first State to pass a legislation on the issue, closely followed by Karnataka, Jharkhand, Tamil Nadu, Haryana, Telangana are following suit.

In the political context of guarantees funded purely by the state exchequer, this law is an important development. It shows how social security for workers ought to also be financed from the market and that private actors should no longer be abdicated from their primary economic accountability towards workers. There are many things that could be improved in the Bill. These include the Bill's silence on critical issues such as minimum wage, occupational safety and health, working hours, and rights on collective bargaining. However, it is also true that this law allows workers to mobilise and assert for more.

Rakshita Swamy is Director, Social Accountability Forum for Action and Research and Biju Mathew is President, International Alliance of App Based Transport Workers.

THE GIST

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▼ The third myth is that these are 'part time' workers, who engage in platform-based gig work for additional income.

Text & Context

• Text & Context pages will not be available on July 24, 2024

Karnataka bill on Gig workers



- **THE KARNATAKA PLATFORM-BASED Gig Workers (Social Security and Welfare) Bill, 2024 (the Bill), as the name suggests, aims to put a social security mechanism for gig workers involved with aggregators such as Zomato, Swiggy, Uber, etc.**
- **This draft legislation consists of several key reforms, including the establishment of a welfare board with major stakeholders overseeing the implementation of the Bill;**
- **a clause on payouts to workers at least once a week, with the workers to be informed about pay deductions; greater autonomy to workers, giving them the right to refuse a certain number of jobs per week and protect themselves from exploitation;**

- **the establishment of a welfare fund to be contributed towards by the aggregator (basis either per transaction or the total turnover), the state, and the Centre;**
- **contractual security, which mandates at least a 14-day notice period prior to dismissal with valid reason; among others.**



A satellite image of burning oil tanks in Yemen's port of Hodeida on Sunday. AFP

Yemeni port still burning days after Israeli air strikes

Agence France-Presse
HODEIDA

Firefighting teams on Monday were struggling to contain a massive blaze at Yemen's Hodeida port, days after a deadly Israeli strike on Houthi targets damaged oil storage facilities and endangered aid ships in the harbour.

Heavy flames and black smoke were seen spilling into the sky for a third consecutive day following the strike on Saturday, said a correspondent in Hodeida. Firefighting teams appear to have made little progress, with the blaze seemingly expanding in some parts of the port, the correspondent said, amid fears it could reach food storage facilities.

Analysis of satellite imagery from Planet by Dutch peace organisation PAX showed at least 33 destroyed oil storage tankers, said Wim Zwijnenburg, a project leader with the organisation.

"We expect (to find) more damage, as not all storage tanks are visible because of heavy smoke" from the fire and burning fuel, Mr. Zwijnenburg said. The fuel depot is run by the Yemen Petroleum Company which said on Sunday that the six people killed in the Israel strike were its employees. The Houthis say more than 80 others were wounded in the attack, many of them with severe burns. The strike on Saturday was the first by Israel on the Arabian Peninsula's poorest country and came in response to a Houthi drone strike that breached Israel's air defences, killing one person in Tel Aviv the day before.

The Houthis, who are fighting Israel as part of a regional network of Iran-backed groups, have pledged a "huge" response to the strikes and threatened to once again attack Tel Aviv.

Hodeidah,



- **Hodeidah, city, western Yemen.**
- **It is situated on the Tihāmah coastal plain that borders the Red Sea.**
- **It is one of the country's chief ports and has modern facilities.**



- **The Hudaydah Port is a key Yemeni port on the Red Sea coast.**
- **It is the second largest port in the country, located in Al Hudaydah, the fourth largest city in Yemen.**
- **The port handles up to 80% of the humanitarian supplies, fuel and commercial goods in northern Yemen.**

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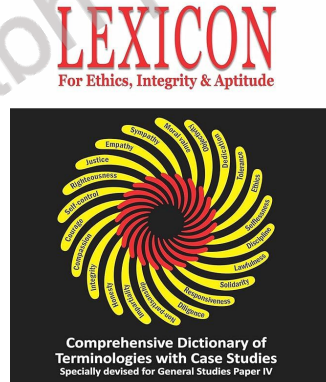
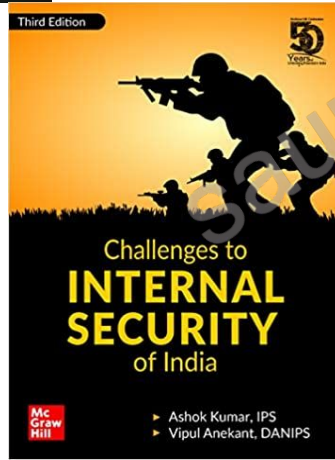
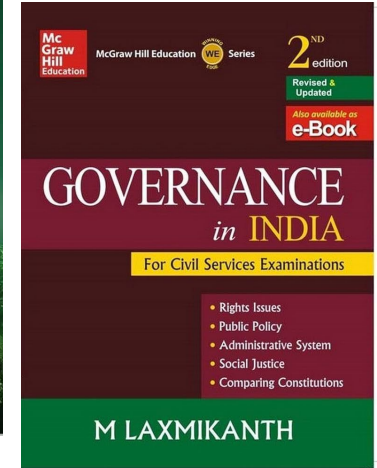
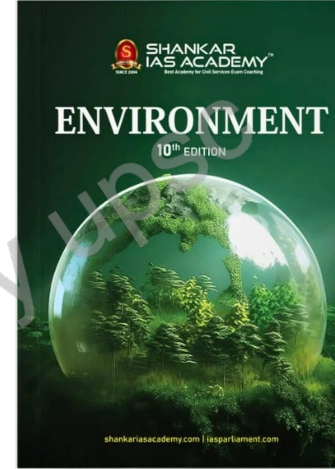
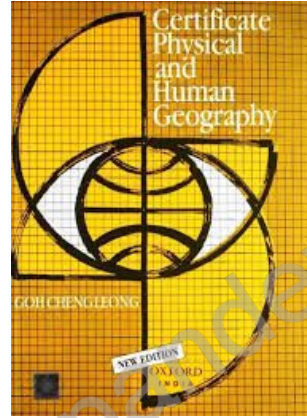
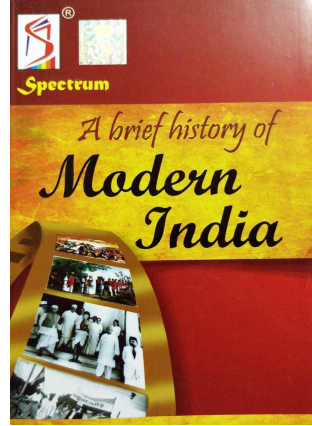
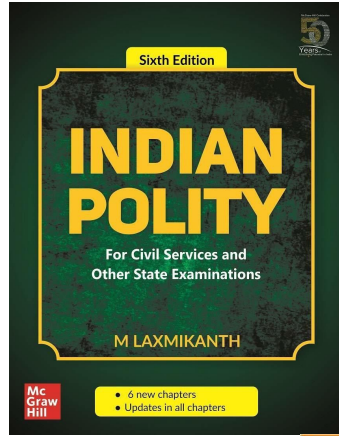
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