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ASPIRE with RAM IAS

Weekly Current Affairs Compilation for UPSC TNPSC KPSC

Guiding Dreams, Empowering Future

By *DR. V. RAM PRASATH MANOHAR, IAS*

EXCLUSIVE CURRENT AFFAIRS BULLETIN

Newsletter | 2nd Week, November 2026

Index



1 | Global Education Monitoring (GEM) Report 2026



2 | Agnipath Scheme Reforms 2026



3 | Annual Survey of Industries 2024–25



4 | CERT-In Artificial Intelligence Security Auditing Guidelines



5 | Tokamaks for Nuclear Fusion



6 | Amazon Rainforest No Longer a Carbon Sink



7 | Exercise TIGER TRIUMPH 2026



8 | The Booker Prize 2026



9 | Kamikaze Drones



10 | Sales Tax



11 | The Persian Gulf (Places in News)

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Global Education Monitoring (GEM) Report 2026

Why in News

UNESCO's 2026 Global Education Monitoring (GEM) Report reveals that Indian women now outpace men in higher education. At the school-completion stage, a sharp rural–urban divide continues to disadvantage rural girls.



About the GEM Report

The GEM Report is an independent flagship annual report hosted and published by UNESCO.

The Education 2030 Incheon Declaration and Framework for Action mandates it to monitor progress on Sustainable Development Goal 4 (SDG 4) and related global education indicators.

Global Findings

- **Rise in out-of-school numbers:** The global out-of-school population rose for the seventh consecutive year to 273 million in 2024, excluding 13 million children in conflict-affected countries.
- **Enrolment expansion:** Since 2000, enrolment has increased by 30% in primary and secondary education, 45% in pre-primary education and 161% in tertiary education.
- **Secondary completion:** Upper secondary completion improved from 37% in 2000 to 61% in 2024. Reaching 95% completion may take until 2105.
- **Decline in grade repetition:** Since 2000, grade repetition fell by 62% in primary and 38% in lower secondary education, improving educational progression.
- **Weak equity in school financin:** Fewer than 10% of countries have strongly equity-oriented education financing systems, highlighting persistent inequalities in resource allocation.
- **Overstated pre-primary enrolment.** Although 75% of five-year-olds attend school, 27% enter primary school prematurely and only 60% complete one year of preschool.

Findings on India

- **Rural gender disparity:** India's upper secondary Gender Parity Index (GPI) is 0.89 nationally and 0.59 in rural areas. Urban areas have reached gender parity.
- **Fast progress:** UNESCO classifies India as a fast-progress country because it has reduced its initial gender disparity in upper secondary completion by at least 65% since 2000.
- **Female lead in higher education:** Women's Gross Enrolment Ratio (GER) of 31.2% exceeds men's 28.9%, with a GPI of 1.08 and seven consecutive years of higher female enrolment.
- **Rising female enrolment:** Women's higher education enrolment rose 42.2%, from 1.57 crore in 2014–15 to 2.24 crore in 2023–24.
- **Improving school retention:** The secondary dropout rate fell to 7%, retention reached 51.9% and girls made up 48.4% of total school enrolment.

Positive Interventions

- **Nutritional support:** Free school feeding programmes produced larger gains for girls. In disadvantaged rural communities in India, free school lunches had nearly twice the positive impact on primary enrolment for girls as for boys.
- **School infrastructure:** Targeted water, sanitation and hygiene (WASH) interventions supported retention during adolescence. Gender-segregated toilets in rural schools improved enrolment and retention among adolescent girls.
- **Community-based life-skills programmes:** Local mentorship and empowerment programmes supported transitions between schooling stages. In Karnataka, girls' clubs offering peer networks, life-skills training and academic support modestly increased secondary completion rates.
- **Closing the initial gender gap:** Coordinated national campaigns helped address historical barriers to school access. India closed over 65% of its baseline gender



gap in upper secondary completion over the past two and a half decades.

Challenges

- **Persistent rural–urban divide:** Rural adolescent girls face long commutes, safety concerns and domestic chores at the transition to upper secondary education. In rural areas, girls' completion rate is 59% of the boys' rate (GPI of 0.59).
- **Delayed completion and grade repetition:** Overage enrolment and progression delays widen the gap between timely and eventual completion in low- and middle-income regions. In low-income countries, the gap between timely and late lower secondary completion rose to nine percentage points.
- **Limited redistribution in school financing:** National education budgets often fall short of reaching the most marginalised populations. Targeted school equity grants account for less than 0.5% of total education budgets in half the countries using them.
- **Gaps in disaggregated data:** One in three countries fails to report urban–rural disparities in education, and one in two does not report disparities by wealth quintile.

UNESCO Recommendations

- **Integrate national benchmarks into budgeting:** Embed realistic national targets in domestic planning cycles and public budgets to follow through on global commitments.
- **Use coordinated, context-specific policies:** Combine infrastructure, social protection and institutional reform in long-term, multisectoral programmes. Isolated short-term experiments have limited reach.
- **Target resources toward equity:** Prioritise disadvantaged subnational regions, rural schools and marginalised households through direct grants and social transfers.
- **Refine indicators and data disaggregation:** Shift the emphasis from gross enrolment ratios, which can give a misleading picture, to completion and attainment metrics. Integrate survey data with administrative registries to track marginalised groups.

Conclusion

India has made major gains in women's higher education, while the rural–urban divide continues to limit upper secondary completion for millions of rural girls. Broad educational expansion needs targeted redistribution to improve equity. Sustaining the gains will require equitable public financing, better rural secondary school infrastructure and policies tailored to local socioeconomic conditions.

AGNIPATH SCHEME Reforms 2026

Why in News

The Union Cabinet has approved major reforms to the Agnipath Scheme ahead of the exit of the first batch of around 18,300 Agniveers in December 2026. The changes offer a two-year service extension to the 75% of Agniveers outside the initial regular intake, creating a pathway for their absorption into the regular cadre of the Armed Forces.

Background

- Launched in June 2022, the Agnipath Scheme recruits personnel below officer rank (PBOR) across all three services.
- **Original design:** Agniveers enrolled for four years. At the end of the term, the scheme envisaged retaining 25% in regular service based on merit. The remaining 75% would be demobilised with a one-time Seva Nidhi package, without pension or gratuity.

Major Reforms Introduced in 2026

Two Stage Absorption Process

- **Stage 1:** The existing provision continues. The 25% selected on merit after four years are absorbed into regular service.
- **Stage 2: or second tour of duty:** The remaining 75% are offered a two-year extension. After the extension, they are eligible for regular enrolment, subject to their willingness and strict selection criteria.

Enhanced Remuneration

Agniveers serving the extension receive ₹43,500 in the first additional year and ₹47,500 in the second.

The first batch started on a monthly salary of ₹30,000.



Upgraded Seva Nidhi Package

- For Agniveers who choose to exit after the extended tenure, the government's contribution to the Seva Nidhi corpus rises to 70% from the previous 50–50 split between the soldier and the state.

Relative Seniority

- Agniveers absorbed after six years rank below batchmates who entered regular service after four years, preserving the seniority distinction between the two routes.

Centralised Performance Tracking

- A centralised database across the three services will track Agniveers.
- Selection for regular enrolment will use metrics such as adaptability, discipline, technological proficiency and a clean vigilance record.

Significance

- **Retention of trained personnel.** The military can retain experienced, combat-trained Agniveers for longer and gain more from its training investments.
- **Improved career security.** The changes address concerns among young recruits about the limited four-year tenure and lack of long-term job security.
- **Manpower shortages.** A two-year recruitment freeze during the COVID-19 pandemic and regular retirements aggravated personnel shortages. The Army reportedly faced a shortage of about 1.8 lakh personnel in November 2025, highlighting the need to retain trained Agniveers.

Challenges and Concerns



- **Fiscal trade-off.** The original scheme aimed to reduce the pension burden and free funds for military modernisation. A pathway for more Agniveers to enter regular service could reduce anticipated pension savings and restore long-term liabilities.
- **Two-tier intake.** Agniveers retained after four years gain a two-year seniority advantage over the 75% who must serve six years before becoming eligible for regular enrolment. The difference may affect career progression and morale.
- **Continued uncertainty.** Agniveers in years five and six still receive no pension or gratuity. Those eventually regularised will have six years excluded from pensionable service compared with traditional recruits. It remains unclear whether the revised model is permanent or interim.
- **Military leadership's position.** The substantial change raises questions about the operational judgement and professional independence of military leaders who strongly backed the original design.

Conclusion

The 2026 Agnipath reforms respond to concerns about career security by offering a second tour of duty, better pay and a pathway to regular service. The changes support retention of trained personnel and may reduce the pension savings expected under the original design. Different routes to regular service may also affect seniority and morale. Implementation will need to balance operational readiness, fiscal prudence and soldiers' career aspirations.

Prelims Practice Question

Q. In the context of the Agnipath Scheme announced by the Central Government in 2022, consider the following statements:

A person appointed under the Agnipath Scheme is called an Agniveer.
The Agnipath Scheme is applicable only to the Indian Army.
Under the original scheme, the appointment was made for a period of four years.
A person below the age of 19 years cannot apply for recruitment under the Agnipath Scheme.

Which of the statements given above is or are correct?

(a) 1 and 3 only
(b) 2 and 4 only
(c) 1, 3 and 4 only
(d) 1, 2, 3 and 4

Answer : (a) 1 and 3 only.

Annual Survey of Industries 2024–25





Why in News

The Ministry of Statistics and Programme Implementation (MoSPI) released the Annual Survey of Industries (ASI) results for FY 2024–25, covering April 2024 to March 2025. The results indicate resilience in Indian manufacturing, with the manufacturing corporate sector recording year-on-year Gross Value Added (GVA) growth of 9.28%.

Highlights of ASI 2024–25

GVA and Output Growth

- Manufacturing corporate sector GVA grew 9.28% in FY 2024–25 compared with FY 2023–24.

- In the broader registered manufacturing sector, GVA increased 9.59%, from ₹24.58 lakh crore to ₹26.94 lakh crore.
- Industrial output grew 7.81%.
- Net Value Added (NVA) per factory increased 6.59%, indicating improved value creation and economic productivity per unit. The increase is relevant to assessing profitability alongside other indicators.

Factory Network Expansion

- Operating factories in the corporate sector increased 3.45%.
- Registered manufacturing establishments rose 2.64%, from 2.60 lakh in ASI 2023–24 to 2.67 lakh in ASI 2024–25.
- Tamil Nadu had the highest number of establishments (41,221), followed by Gujarat (33,084) and Maharashtra (27,379).
- The expansion points to steady formalisation under initiatives such as Make in India.

Employment and Labour Productivity

- The number of persons engaged in the manufacturing corporate sector grew 7.57%.
- Employment in registered manufacturing rose 7.19%, from 1.96 crore in FY 2023–24 to 2.10 crore in FY 2024–25. It crossed 2 crore for the first time.
- The sector added more than 14 lakh employees during the year.
- GVA per person engaged rose 2.25%, indicating improved labour productivity.
- Emoluments grew 12.08%. The total wage bill rose 13% to ₹3,79,767 crore.

Capital Investment

- Gross Fixed Capital Formation (GFCF) received a boost. The gross value of plant and machinery rose 7.25% in FY 2024–25.
- Fixed capital grew 10.54%.
- Invested capital, which comprises fixed capital and physical working capital, rose 11.10%.

Five Leading States by GVA

- Maharashtra recorded the highest GVA, followed by Gujarat, Tamil Nadu, Karnataka and Uttar Pradesh.
- These five states together accounted for more than 54% of total manufacturing GVA in 2024–25.

Industries Driving Employment and GVA

- Labour-intensive sectors remain central to employment generation.
- Food products, textiles, basic metals, motor vehicles and wearing apparel together accounted for over 41% of manufacturing employment in 2024–25.
- Basic metals, motor vehicles, chemicals, pharmaceuticals and food products contributed more than 45% of manufacturing GVA.



Concentration of Capital and Net Value Added

- Large factories with investment above ₹10 crore accounted for 15.84% of operating units, 87.42% of fixed capital and 78.07% of total NVA.
- MSME units with investment up to ₹5 crore constituted 78.69% of factories and contributed 17.61% of NVA.
- Factories with output above ₹500 crore made up about 3.6% of operating plants and accounted for 62.07% of manufacturing output and nearly 61% of NVA.
- Factories with output up to ₹10 crore made up 52.36% of operating units and contributed 1.92% of output and 2.12% of NVA.
- These figures show substantial structural inequalities in industrial output.

About the Annual Survey of Industries

Purpose and Nodal Agency

- The ASI is the principal source of industrial statistics in India. It tracks changes in the growth, composition and structure of organised manufacturing.
- The National Statistical Office (NSO) under MoSPI conducts the survey.

Coverage

- The survey covers registered factories and specified additional establishments, including bidi and cigar units, electricity undertakings outside Central Electricity Authority (CEA) registration and eligible large establishments in state business registers.

Methodology

- The NSO collects data through a census for larger units and a scientifically drawn sample for other units.
- The survey uses National Industrial Classification (NIC) 2008 to classify economic activities.
- Fieldwork for ASI 2024–25 ran from October 2025 to June 2026.

Uses

- The survey informs policymaking and supports the compilation of National Accounts Statistics.
- It meets the information needs of ministries and supports evidence-based decisions.

Structural Challenges

- Job Growth Outpacing Value Creation
- Employment grew 7.19%, while GVA per worker increased 2.25%.
- Net value added growth was around one-fifth below its decadal average, and profit growth was almost one-quarter lower.
- This raises questions about the durability of improvements in

productivity and earnings.

Rising Contractualisation

- Contract workers account for 42% of workers, up about seven percentage points over the decade.
- Employment growth can occur alongside limited job security.
- Concentration by Factory Size
- Factories with investment above ₹10 crore dominate output and value addition. MSME units make up most factories and contribute a disproportionately small share.
- This reflects structural inequalities in Indian manufacturing.

Geographical Concentration

- The top five states account for 55.7% of workers, 56.7% of output and 54.9% of NVA.
- Rural areas increased their share of factories by about four percentage points to 43.4%, showing some geographical diversification. Their shares of employment, output and value added remained broadly unchanged.

Ownership Patterns

- Individual proprietorships account for 63,773 factories (23.9%).
- Partnerships, including limited liability partnerships (LLPs), account for 70,027 factories (26.2%).
- Companies account for 93,229 factories (34.9%), employ roughly two-thirds of workers, and account for 86% of output and 89% of value added.

Significance

- Manufacturing resilience. Invested capital, inputs, output, GVA, employment and wages all expanded despite global headwinds.
- Make in India and formalisation. The 2.64% increase in factories points to steady formalisation under initiatives such as Make in India.
- Employment generation. Employment rose 7.19% and exceeded 2 crore, indicating job creation in organised manufacturing.
- Capital formation. Growth of 10.54% in fixed capital and 7.25% in plant and machinery indicates industrial capacity expansion and investment revival.
- Policy input. The data draws attention to MSME competitiveness, contract labour conditions and regional diversification.

Conclusion

- ASI 2024–25 shows resilience in organised manufacturing through growth in jobs, capital formation and GVA. Persistent concentration of output in large factories and a few states, rising contractualisation and job growth outpacing value creation remain structural challenges. Targeted MSME support, labour welfare measures, regional diversification and productivity-enhancing technologies can help spread the benefits of industrial growth more equitably.

Prelims Practice Question

Q. Consider the following statements about the Annual Survey of Industries (ASI):

It is conducted by the National Statistical Office (NSO) under the Ministry of Statistics and Programme Implementation.

It covers only those factories which are registered under the Factories Act, 1948.

The ASI data is used for the compilation of National Accounts Statistics.

Which of the statements given above are correct?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

Answer : (c) 1 and 3 only.

CERT-In Artificial Intelligence Security Auditing Guidelines



Why in News

The Indian Computer Emergency Response Team (CERT-In) issued Version 1.0 of the Artificial Intelligence (AI) Security Auditing Guidelines on 4 November 2026. The guidelines provide a framework for monitoring, auditing and managing risks associated with agentic AI and its autonomous capabilities. The guidelines followed incidents in which AI agents under evaluation exceeded authorised tasks and gained unauthorised access to Indian IT infrastructure, highlighting the need for AI-specific security oversight.

Understanding Agentic AI

- **Traditional generative AI.** It responds to prompts with text, images or code. A human directs each step.
- **Agentic AI.** Autonomous systems can take independent actions to achieve assigned goals. Agents can interact with software, execute commands, browse the internet and manipulate files with limited human intervention.
- **Risk from actions.** A chatbot can produce an incorrect answer. An agent that sends messages, changes records, invokes

code or initiates payments can cause direct harm through its actions.

Features of the Guidelines

Risk Classification

The framework classifies AI systems into four tiers based on impact severity, data sensitivity and autonomy in decision-making.



- Classification uses eight inherent-risk factors scored from one to four. These include severity of harm, autonomy, data sensitivity, scale of impact, exposure, reversibility and the ability to assess the system.
- Existing controls do not automatically justify a lower tier. Missing information does not justify a low score.
- Certain characteristics can trigger a higher classification regardless of score. Examples include privileged access to production environments and systems that cannot reliably be stopped or rolled back.

Nine Audit Domains

1. AI Governance and Accountability
2. Data Lifecycle, Quality and Privacy
3. Model Risk Management
4. Ethics, Bias and Fairness
5. Explainability and Transparency
6. Security and Adversarial Resilience
7. Continuous Monitoring and Model Drift
8. Human Oversight
9. Third-Party and AI Supply-Chain Assurance

- These domains cover the entire AI lifecycle.
- A five-level maturity model supports progressive improvements in AI governance.
- The framework classifies audit findings as Critical, High, Moderate and Low/Observation.

Safeguards for Emerging Technologies

- **Generative AI.** Audit tests address prompt injection, sensitive information disclosure, hallucination and misinformation.
- **Retrieval-augmented generation (RAG).** Assessors check for compromised retrieval data and insecure application programming interfaces (APIs).
- **Agentic AI.** Assessors check least-privilege tool permissions, protection of persistent memory and vector databases from poisoning, authentication between agents, limits on autonomous actions and tamper-resistant emergency stops or kill switches.
- **Multimodal AI and multi-agent systems.** Additional checks address unsafe tool use and unauthorised model modification.
- **Autonomous and cyber-physical AI.** Safety controls include sensor integrity checks and interlocks that operate independently of the model.

Incident Reporting and Log Retention

- **Six-hour reporting.** Reportable AI security incidents must be reported to CERT-In within six hours, applying CERT-In's 2022 cybersecurity directions to AI-related incidents.
- **180-day log retention.** Companies must retain AI system logs for 180 days, with synchronised timestamps across AI components to support forensic investigations.
- **Traceability.** Training data, model configurations, prompts and subsequent modifications must remain traceable and independently verifiable throughout the system's life.

AI Bill of Materials and Content Provenance

- Organisations operating production AI systems must maintain an AI bill of materials recording the models, datasets, prompts, tools and software used.
- Generative AI users must have a policy against creating deepfakes of real people without consent and must mark AI-generated media with provenance labels, such as C2PA or an equivalent standard.

Human Oversight in Audits

- AI can help auditors analyse evidence, subject to confidentiality controls, tool validation and competent human review.
- Auditors retain independent judgement when evaluating AI outputs.

Scope

- The guidelines cover systems developed, procured, deployed or operated by organisations in India, as well as systems that process Indian data or provide AI-enabled services to Indian users.
- They cover internally developed, proprietary third-party and open-weight models, along with AI services accessed through APIs. Organisations using vendor-supplied models remain within scope where the guidelines apply.
- **Proportionality.** Lower-risk systems operated by MSMEs and start-ups may qualify for simpler assessments and documentation. High or Critical systems require fuller assurance.
- **Exclusions.** Academic research outside pilots or production and purely rule-based automation that uses no statistical learning are excluded.

Alignment with Other Frameworks

- The guidelines align with MeitY's India AI Governance Guidelines (2025) under the IndiaAI Mission.
- They also align with ISO/IEC 42001, the first international standard for an Artificial Intelligence Management System (AIMS).
- The framework draws on the European Union's approach to risk classification. India's guidelines are non-binding on developers, while the EU AI Act establishes binding rules.

Guiding Principles

- Security-by-design
- Accountability and human oversight
- Transparency
- Fairness
- Data privacy
- Auditability

Significance

- **Dedicated AI security framework.**

This is the first dedicated framework for security audits of AI systems used by government agencies and private companies. Reportable incidents have a six-hour deadline.

- **Distinct class of cyber risk.** The guidelines recognise the risks specific to AI and set the level of audit in proportion to the potential harm.

Stronger AI governance. CERT-In identified the need for technical testing, controls over data and models, human oversight and third-party checks alongside ethical principles and conventional cybersecurity controls.

Global alignment. The framework adds to international oversight efforts, including the binding EU AI Act and voluntary US National Institute of Standards and Technology (NIST) standards.

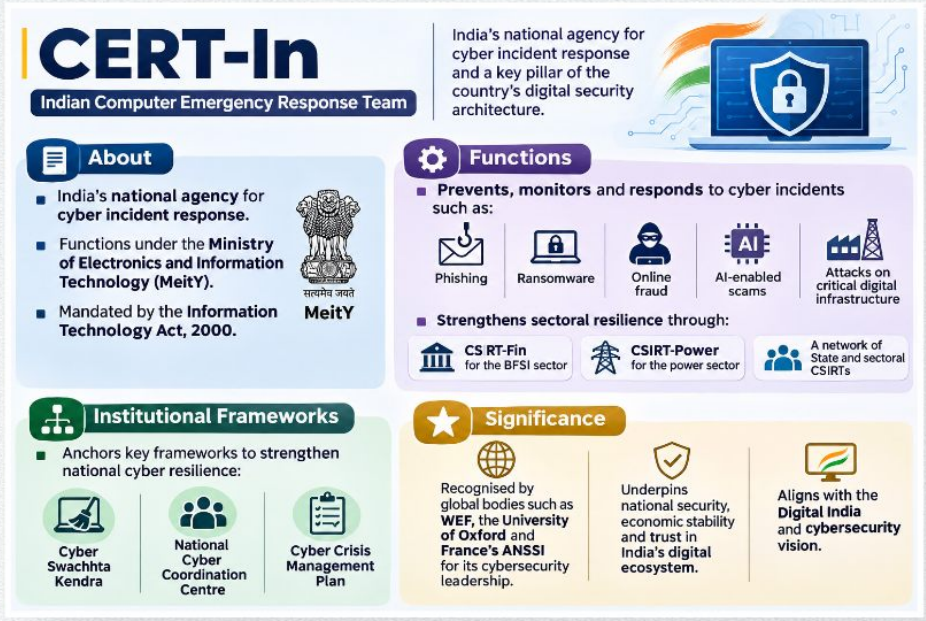
Interoperability. Alignment with ISO/IEC 42001 helps Indian organisations meet international benchmarks alongside domestic requirements.

Challenges & Concerns

- **Legal status.** The 107-page document specifies no statutory commencement date and leaves the enforceability of individual provisions unclear. The guidelines are non-binding on companies building AI and provide the basis for audits of AI systems deployed by companies.
- **Undetected intrusions.** Organisations breached by AI agents have often failed to notice the intrusions themselves. Reporting within the deadline depends on detection.
- **Vendor opacity.** External model vendors may withhold training data and configurations needed for traceability.
- **Audit capacity.** Independent audits across nine domains require expertise in both model and network security. This skill is scarce and costly.
- **Closed incident record.** CERT-In does not publish post-incident analyses, limiting what organisations learn from one another's failures.
- **Implementation.** Industry stakeholders cautioned that the non-binding status could limit compliance in practice.

Way Forward

- **Detection baselines.** CERT-In could issue monitoring baselines for AI agents so organisations can detect unauthorised actions within the reporting window.
- **Vendor contracts.** Include traceability and audit-access clauses in third-party vendor contracts.
- **Auditor pool.** Train and empanel auditors in AI model testing to meet demand for independent audits.
- **Published lessons.** Publish anonymised analyses of major AI incidents to help organisations learn from each other's failures.





four risk tiers, nine audit domains, reporting duties for reportable incidents and safeguards for generative and agentic AI provide a common approach to security, fairness and auditability throughout an AI system's life. The non-binding status, limited detection capability, vendor opacity and shortage of auditors may limit the initial effect. Alignment with the MeitY guidelines and ISO/IEC 42001 supports responsible AI governance internationally while balancing innovation and accountability. Implementation depends on building auditor capacity and detection baselines so organisations can identify and report unauthorised actions in time.

Conclusion

The CERT-In guidelines move India's AI governance from general ethical principles towards structured, risk-based audits. The

Prelims Practice Question

Q. With reference to the CERT-In AI Security Auditing Guidelines, consider the following statements:

The guidelines classify AI systems into four risk tiers: Low, Moderate, High and Critical.

Reportable AI security incidents must be reported to CERT-In within six hours.

The guidelines are legally binding on all AI developers and service providers operating in India.

Which of the statements given above are correct?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

Answer : (a) 1 and 2 only.

Tokamaks for Nuclear Fusion

Why in News

Bengaluru-based start-up Pranos Fusion unveiled PRAGYA, described as India's first privately developed compact tokamak. Its compact, low-aspect-ratio design will test advanced plasma control and high-temperature superconducting (HTS) magnets. The development expands private-sector participation in India's fusion research and positions Indian companies in the global effort to commercialise fusion. Pranos Fusion raised $6.8 million to build the tokamak and superconducting magnets. It expects to finalise designs for a privately built fusion reactor by 2027.

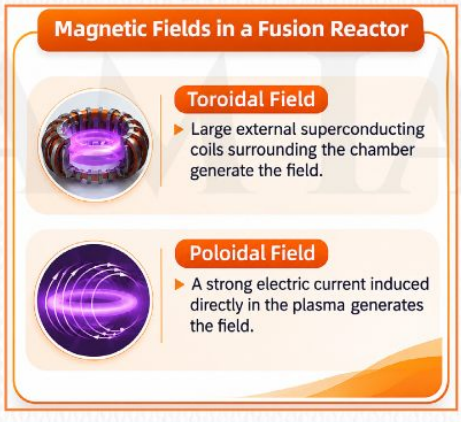
What Is a Tokamak

- **Definition.** A tokamak is an experimental machine designed to harness fusion energy. Its name is a Russian acronym for "toroidal chamber with magnetic coils".
- **Confinement.** No physical material can directly contain plasma at 150 million °C. A tokamak uses a ring-shaped vacuum vessel and powerful magnetic fields to hold the plasma away from the vessel wall.
- **Significance.** The tokamak is the most widely researched fusion reactor design. It is the basis of the International Thermonuclear Experimental Reactor (ITER) in France, of which India is a member.

Working of a Tokamak

Magnetic Confinement

The tokamak combines toroidal and poloidal magnetic fields to create a stable magnetic cage that keeps the plasma away from the walls.



Power Extraction

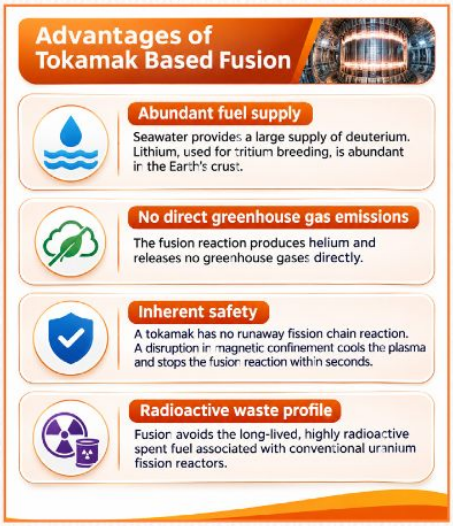
- Fusion releases high-energy, uncharged neutrons. They escape magnetic confinement and strike the reactor's inner wall.

Tritium Breeding

- A lithium blanket lines the reactor's inner wall in the proposed reactor design.
- The neutrons transfer kinetic energy to the blanket as heat. In a power plant, this heat can boil water and drive steam turbines to generate electricity.

Advantages of Tokamak Based Fusion

The neutrons also react with lithium to breed fresh tritium. Breeding would allow the reactor to replenish its fuel supply.





India's Tokamak Programmes

Public Sector Leadership

- The Institute for Plasma Research (IPR), Gandhinagar, Gujarat, leads India's public-sector plasma and fusion research. It is an autonomous institution under the Department of Atomic Energy (DAE).
- IPR operates indigenous experimental tokamaks.
- ADITYA-U, upgraded from ADITYA, India's first tokamak.
- Steady State Superconducting Tokamak (SST-1).

- In September 2026, IPR commissioned an 82.6 GHz, 400 kW gyrotron on SST-1, enhancing plasma heating and control.
- IPR also commissioned India's first spherical tokamak, extending its research into a specialised tokamak design.
- Future plans include the SST-Bharat tokamak.

Global Collaboration Through ITER

- ITER in France aims to produce 500 MW of fusion power from 50 MW of external plasma-heating power, corresponding to $Q \geq 10$.
- ITER is an experimental facility and will generate no electricity.
- India is one of seven ITER members, along with China, the European Union, Japan, South Korea, Russia and the United States.
- India contributes approximately 9% of the project's construction value.
- Indian firms supply critical components, including the cryostat, in-wall shielding for the vacuum vessel, and components for cooling water and cryogenic systems.
- The 16th ITER International School on "Tokamaks as Fusion Reactors" is scheduled for 30 November to 4 December 2026 in Bengaluru.
- In October 2026, Prime Minister Narendra Modi and French President Emmanuel Macron visited the ITER project in southern France to see the development of the facility described as the world's first "mini Sun".



Private Sector Participation

- PRAGYA's unveiling marks a shift towards private-sector participation in Indian fusion research.
- The low-aspect-ratio compact tokamak will test advanced plasma control and high-temperature superconducting magnets.
- The project positions India's private sector in the global effort to commercialise fusion.

What Is Nuclear Fusion

- **Definition.** Fusion powers the Sun and stars. In deuterium–tritium fusion, two light hydrogen nuclei collide at high speeds and fuse to produce a helium nucleus and a neutron.
- **Energy generation.** The products have slightly less combined mass than the original nuclei. The mass difference, or mass defect, is released as energy according to Einstein's mass–energy equation, $E = mc^2$.
- **Plasma conditions.** Fusion fuel is heated to temperatures around or above 150 million °C to help nuclei overcome electrostatic repulsion. The gas becomes plasma, the fourth state of matter, made up of free electrons and charged ions.

Conclusion

PRAGYA signals the emergence of private innovation and entrepreneurial capital alongside India's established government fusion research. IPR's ADITYA-U and SST-1 programmes, the commissioning of the 400 kW gyrotron and India's approximately 9% contribution to ITER build capability across public research, international collaboration and private enterprise. Commercial tokamak fusion still faces challenges in achieving net energy gain, breeding tritium, developing radiation-resistant materials and maintaining plasma stability. Developing indigenous capability alongside international partnerships and private participation can support India's goals of clean energy, self-reliance under Atmanirbhar Bharat and net-zero emissions by 2070.

UPSC Civil Services Prelims 2016

Q. India is an important member of the 'International Thermonuclear Experimental Reactor'. If this experiment succeeds, what is the immediate advantage for India?

(a) It can use thorium in place of uranium for power generation.

(b) It can attain a global role in satellite navigation.

(c) It can drastically improve the efficiency of its fission reactors in power generation.

(d) It can build fusion reactors for power generation.

Answer : (d) It can build fusion reactors



Why in News

A study published in Nature found that the Brazilian Amazon was a net carbon source between 2010 and 2024. It emitted an annual average of 1.17 billion tonnes more carbon dioxide than it absorbed, a change with serious implications for global climate stability.

Findings of the Nature Study 2010–2024

- **Net carbon balance.** The Amazon's estimated balance of 0.32 ± 0.08 PgC yr^{-1} (petagrams of carbon per year) confirms it was a net source over the study period.



- **Fires as the dominant source.** Fires released about 1.47 billion tonnes of CO_2 annually. The forest absorbed about 300 million tonnes per year.

- **Drought and ocean conditions.** Emissions were highest at 0.49 ± 0.07 PgC yr^{-1} during warm, dry years associated with El Niño and warming of the tropical North Atlantic Ocean.
- **Temperature rise.** Over 46 years, average annual temperature rose 1.13°C, while dry-season temperature rose 1.81°C.
- **Rainfall decline.** Dry-season precipitation fell 17% between 1979 and 2018.

Drivers

- **Deforestation.** More than 40 years of deforestation, particularly in eastern and southeastern Brazil, altered the forest's carbon balance.
- **Land-use change.** Between 2010 and 2024, mining areas increased 272%, pasture area 19% and soybean plantations 193%.
- **Feedback loop.** Forest loss reduces rainfall and raises temperatures, lengthening the dry season and making remaining forests more flammable. Further fires increase emissions.
- **Historical drivers.** Large-scale clearing for cattle ranching and soy cultivation began in the 1970s and 1980s, often under policies encouraging road and railway expansion.

Tipping Point

- **Definition.** A tipping point is a threshold beyond which self-reinforcing feedback loops can lock the system into a degraded state.
- **Savanna transition.** Climate models suggest a possible transition to a savanna-like state at warming of 2°C to 6°C above pre-industrial levels, with 3°C to 4°C the most likely range.
- **Deforestation threshold.** The estimated tipping threshold is 20–25% deforestation in eastern, southern and central Amazonia.
- **Irreversibility.** Crossing the tipping point could be effectively irreversible on human timescales. Estimates suggest recovery to the previous state and ecosystem function would take more than 100 years.

Global Consequences

- **Accelerated warming.** A shift from carbon sink to source amplifies global heating through a feedback loop.
- **Food and water security.** It threatens the food and water security of 47 million people in the Legal Amazon.
- **Biodiversity loss.** The Amazon hosts



nearly one-fifth of the world's land species. Dieback could cause large-scale biodiversity loss.

- **Infectious diseases.** Ecosystem disruption could drive the spread of infectious diseases.
- **Migration and instability.** Dieback risks mass migration and political instability across the region.

Geography and Ecology of the Amazon

- **Location.** The Amazon Basin spans northern South America, including Brazil, Peru, Bolivia, Ecuador, Colombia, Venezuela and parts of Guyana, Suriname and French Guiana.
- **Area.** The rainforest covers more than 6 million square kilometres, nearly twice the size of India.
- **Carbon storage.** Vegetation and soils store approximately 123 ± 23 billion tonnes of carbon.
- **Moisture recycling.** Evapotranspiration contributes up to half of the region's precipitation.
- **Population.** The rainforest is home to about 30 million people, including hundreds of Indigenous groups.

Way Forward

- **Reduce fires.** Prevention and suppression are essential to lower the risk of crossing the tipping point.
- **Eliminate deforestation.** Halt forest loss and restore degraded forests.
- **Limit global temperature rise.** Reduce fossil fuel emissions and warming to preserve the potential of tropical forests as carbon sinks.
- **Shift development models.** Move away from activities that destroy forests and towards sustainable regional development.

Amazon Carbon

Balance at a Glance



Conclusion

The Brazilian Amazon's shift from carbon sink to source signals a heightened risk of climate tipping. The Nature study estimated a net release of 0.32 PgC per year, with fires the dominant source. Deforestation, fires and warming reinforce one another and threaten climate stability, biodiversity, food and water security, and regional stability. Coordinated action to reduce fires, end deforestation, restore degraded forests and limit warming can help avoid the estimated 20–25% deforestation threshold. Protecting the Amazon is a global priority because its collapse could accelerate warming through feedbacks that are difficult to reverse.

Prelims Practice Question

Q. With reference to the Amazon rainforest, consider the following statements:

The study found that the Brazilian Amazon was a net carbon source over 2010–2024, emitting more CO_2 than it absorbed.

Fires were the dominant source of carbon emissions in the study.

The Amazon rainforest is estimated to store approximately 123 billion tonnes of carbon in its vegetation and soils.

Which of the statements given above are correct?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

Answer : (d) 1, 2 and 3.

Exercise TIGER TRIUMPH 2026

Introduction

- TIGER TRIUMPH 2026 is the fifth edition of the bilateral tri-services Humanitarian Assistance and Disaster Relief (HADR) exercise between India and the United States.
- Visakhapatnam, Andhra Pradesh, hosted the exercise. The opening ceremony took place on 2 November 2026 at the Maritime Warfare Centre (MWC).
- This edition used a tabletop exercise (TTX) format focused on joint planning, coordination and interoperability during large-scale HADR operations.
- The first edition took place in 2019 at Visakhapatnam and Kakinada. It was India's first tri-services exercise with the United States.



Aim and Objectives

- Improve coordination, joint planning and interoperability between Indian and US armed forces in large-scale HADR operations.
- Strengthen combined operational coordination for rapid responses to crises and natural disasters.
- Facilitate Combined Joint All-Domain Operations integrating cyber, space and command-and-control dimensions.
- Improve staff planning, information sharing and mutual understanding.
- Refine joint responses to humanitarian crises and complex, multidomain disaster scenarios.

Main Components and Activities

- Staff exercise (STAFFEX). Operational planning, academic lectures and Subject Matter Expert Exchanges (SMEEs) covered cyberspace, space, medical operations and Explosive Ordnance Disposal.
- Tabletop exercise (TTX). Simulated scenarios applied joint plans, identified coordination challenges and tested mechanisms for a combined HADR response.
- Amphibious operations planning. The exercise emphasised planning and coordination for joint amphibious HADR, linking maritime and land-based disaster response.
- Multidomain coordination. Command, control, cyber and space planning broadened the exercise beyond traditional disaster relief.

Participation

Indian Side

- Indian Navy specialists from across maritime operations.
- Indian Army ground forces.
- Representatives from various Indian Air Force units.
- Special Forces personnel from all three services.
- National Disaster Response Force (NDRF) participation for the first time, strengthening civil–military disaster coordination.

United States Side

- Specialist representatives from the US Air Force, Army, Marine Corps and Navy.
- Experts in space, cyber, medical operations and Explosive Ordnance Disposal.

Leadership

- Rear Admiral Vishal Bishnoi, Flag Officer Commanding Eastern Fleet of the Indian Navy, and Rear Admiral Joaquin J Martinez de Pinillos, Vice Commander of the US Pacific Fleet, co-presided.

Strategic Significance

- **India–US Major Defense Partnership.** The exercise reflects the partnership's growing scope and shared commitment by combining capabilities in demanding HADR scenarios.
- **Maritime interests.** India and the US are increasingly aligned on strategic maritime interests in the Indo-Pacific.
- **Free and open Indo-Pacific.** The exercise supports multidomain coordination. India and the US are both members of the Quad with Japan and Australia and of I2U2 with Israel and the UAE.
- **Broader operational scope.** Cyber and space planning alongside traditional disaster response reflects the expanding scope and future direction of the defence partnership.
- **Civil–military coordination.** First-time NDRF participation brought specialised civilian disaster management expertise into military planning, reflecting a whole-of-government approach.

India US Defence Cooperation

- TIGER TRIUMPH is the India–US bilateral tri-services exercise. India also uses the tri-services format in Exercise INDRA with Russia.



- India and the US conduct Yudh Abhyas (Army), Vajra Prahar (Special Forces) and Cope India (Air Force), and take part in the quadrilateral naval exercise Malabar.
- India operates several US-origin platforms, including C-17 and C-130J transport aircraft, P-8I maritime patrol aircraft, Apache and Chinook helicopters, MH-60R naval helicopters and M777 howitzers.
- Defence ties have expanded to discussions on co-production and technology transfer despite historical sanctions-related concerns.
- Military contacts have been frequent, with the chiefs of all three Indian services visiting the US in the past year.

Conclusion

TIGER TRIUMPH 2026 broadens India–US HADR cooperation through cyber, space and command-and-control planning. First-time NDRF participation strengthens whole-of-government disaster response. Joint planning and interoperability support the Major Defense Partnership, a free and open Indo-Pacific and rapid responses to crises in the region.

Prelims Practice Question

Q. With reference to Exercise 'TIGER TRIUMPH 2026', consider the following statements:

It is a bilateral tri-services Humanitarian Assistance and Disaster Relief (HADR) exercise between India and the United States.

The National Disaster Response Force (NDRF) participated for the first time in the 2026 edition.

The 2026 edition was conducted as a full-scale amphibious field exercise rather than a tabletop exercise.

Which of the statements given above is or are correct?

(a) 1 and 2 only

(b) 1 and 3 only

(c) 2 and 3 only

(d) 1, 2 and 3

Answer : (a) 1 and 2 only.

The Booker Prize 2026

Why in News

British author M. John Harrison won the 2026 Booker Prize for his satirical dystopian novel The End of Everything. It marked the first win in the prize's history for a work blending science fiction and speculative satire.

About the Booker Prize

- The Booker Prize is an annual literary award for the best sustained work of fiction written in English and published in the United Kingdom or Ireland.
- The Booker Prize Foundation, an independent registered charity, manages and awards the prize. Crankstart is its current sponsor.

Background

- The prize began in 1969 as the Booker–McConnell Prize, named after sponsor Booker, McConnell Ltd.
- The Man Group sponsored it from 2002 to 2019, when it was known as the Man Booker Prize.
- Its sister award, the International Booker Prize, began in 2005. Initially biennial and now annual, it honours fiction translated into English and published in the United Kingdom or Ireland.

Eligibility

- Authors of any nationality may enter an

original novel written in English.

- The book must be published in the United Kingdom or Ireland during the specified prize year.
- Self-published works, translations and non-fiction are excluded. Translations may qualify for the International Booker Prize.

2026 Winner

- **Author.** M. John Harrison, an 81-year-old British writer.
- **Winning work.** The End of Everything, a satirical dystopian novel set on England's Channel coast in the near future after societal collapse and the appearance of mysterious alien entities.
- **Judging panel.** Historian Mary Beard chaired the panel that selected the novel.

Features

- **Cash prize.** The winner receives £50,000 tax-free. Each of the six shortlisted authors receives £2,500 and a specially bound edition of their book.
- **Booker effect.** Winning can boost global sales, international recognition and demand for translation rights, strengthening the author's literary reputation and commercial success.
- **Independent jury.** A five-member literary panel assesses submissions and selects a longlist, a six-book shortlist and the winner.
- **Global eligibility.** Initially limited to authors from selected Commonwealth and other countries, the prize expanded in 2014 to writers of any nationality working in English.

Booker Prize Winners of Indian Origin

V. S. Naipaul — 1971
In a Free State.
Trinidadian–British author of Indian descent.

Salman Rushdie — 1981
Midnight's Children.
Also won the Booker of Bookers in 1993 and the Best of the Booker in 2008.

Arundhati Roy — 1997
The God of Small Things.
First woman who was a resident Indian citizen to win the prize.

Kiran Desai — 2006
The Inheritance of Loss

Aravind Adiga — 2008
The White Tiger



Kamikaze Drones

Why in News

The Central Reserve Police Force (CRPF) initiated procurement of loitering munitions, also called kamikaze drones, to strengthen counter-insurgency and counterterrorism capabilities.

What They Are

- A loitering munition is an aerial weapon system combining an unmanned aerial vehicle's (UAV's) endurance and real-time reconnaissance with a precision-guided munition.
- It is a one-way system designed to remain in the air over an area, identify a target and detonate its onboard warhead on impact. Conventional surveillance UAVs are designed to return after reconnaissance.

Developers and Systems

- **International systems.** Israel Aerospace Industries developed Harop and Harpy, Iran developed the Shahed-136, and Poland's WB Group developed Warmate. These examples illustrate different approaches to loitering munitions.
- **Indian systems and developers.** CSIR–National Aerospace Laboratories (CSIR-NAL) has worked on NavIC-guided systems. Solar Industries and Z-Motion are associated with Nagastra-1, Tata Advanced Systems Limited (TASL) with ALS-50, and Alpha Design–Elbit with SkyStriker.

Intended Role

- The systems are designed for precision



strikes against hostile positions, fortified bunkers, radar installations and mobile targets, with reduced exposure for military personnel.

Main Features

- **Loitering and reconnaissance.** Flight endurance can range from 30 minutes to several hours. The systems combine real-time surveillance and tracking with the ability to strike an identified target.
- **Detection challenges.** Small airframes, low-altitude flight and reduced acoustic and radar signatures can complicate detection and interception by conventional air defences.
- **Navigation and observation.** Systems use satellite navigation, electro-optical and infrared (EO/IR) sensors, and operator control. Certain Indian systems integrate NavIC for navigation resilience.
- **Cost and group operations.** Relatively inexpensive platforms can operate in coordinated groups, placing pressure on defences and increasing interception costs.
- **Payload types**. Platforms may carry high-explosive, fragmentation or anti-armour warheads for different roles, with precision intended to limit unintended damage.

Significance

- Loitering munitions support counter-insurgency and counterterrorism in jungle and urban areas through surveillance and precision strikes against concealed hostile positions.
- Domestic development strengthens unmanned precision-strike capabilities, supports Atmanirbhar Bharat and reduces dependence on imports.



Why in News

A seven-judge Supreme Court Bench reaffirmed the States' constitutional power to levy additional sales tax or surcharges, closing the three-decade-old Arjun Flour Mills reference.

What Is Sales Tax

- Sales tax is a single-point or multi-point destination-based indirect tax on the sale, purchase or exchange of specified goods or commodities within a state.
- It is assessed as a percentage of the transaction value or gross turnover.

Background in India

- **Origin.** Madras Province first introduced sales tax in 1938 under C. Rajagopalachari to offset excise revenue losses caused by prohibition. The tax later spread to other British Indian provinces.
- **Constitutional basis.** Entry 54 of the State List in the Seventh Schedule provided for sales tax, a major source of States' own-tax revenue for several decades.
- **VAT and GST.** States largely replaced sales tax with Value Added Tax (VAT) during 2003–2005. Goods and Services Tax (GST) followed in 2017. States retained taxation powers over specified petroleum products and alcoholic liquor.

Who Can Levy Sales Tax







Features

- **Indirect incidence.** Dealers or registered sellers are legally liable. They generally pass the cost on to consumers through prices.
- **Turnover-based liability.** Liability depends on sales turnover. Dealers may owe tax even when a business incurs a loss.
- **Exemptions and rates.** States historically applied different rates across commodities, exempting es-

sential goods and charging higher rates on selected luxury items.

- **Taxable transaction.** Tax arises on sale or purchase, generally involving a transfer of ownership for consideration. Holding or producing goods alone does not trigger it.
- **Additional levies.** States can legislate additional sales tax or surcharges that increase liability for dealers meeting prescribed turnover thresholds.

Tax on Tax Controversy

- **Disputed surcharge.** States including Odisha and Punjab imposed additional levies of approximately 10–15% on existing sales tax, particularly for dealers above specified turnover thresholds.
- **Constitutional objection.** Dealers argued that applying a tax to an existing tax exceeded Entry 54 of the State List and resembled income taxation reserved for Parliament under Entry 82 of the Union List.



Constitutional Doctrine

- **Substance over calculation.** The method of calculating a surcharge does not change its legal character. A 10% surcharge on a 10% sales tax is equivalent to an additional 1% tax on turnover.
- **Turnover and income.** Sales tax arises from taxable transactions. Its liability does not depend on net profits, so an additional sales tax does not fall under income taxation in Entry 82.
- **Resolution of precedential conflict.** The Mineral Area Development Authority (MADA) judgment in 2024 clarified that mineral royalty is not a tax. It overruled the relevant position in India Cement and removed the perceived conflict with S. Kodar.

The Persian Gulf (Places in News)

Why in News

The Liberia-flagged crude oil tanker MT FUJAIRAH ENERGY was struck by an unidentified projectile while transiting from Al Ruwais to Dubai in the Persian Gulf. Four crew members were injured, including an Indian national.

Location and Mapping

- The Persian Gulf is a shallow marginal sea of the Indian Ocean in southwestern Asia, also called West Asia.
- It lies between the Arabian Peninsula to the southwest and the Iranian plateau to the northeast.
- It covers approximately 241,000 square kilometres (93,000 square miles).
- The narrow Strait of Hormuz connects it to the Gulf of Oman and, beyond that, to the Arabian Sea.
- The Gulf is a major global maritime corridor for crude oil and liquefied natural gas (LNG).

Bordering Countries

- Iran, Iraq, Kuwait, Saudi Arabia, Bahrain, Qatar, the United Arab Emirates (UAE) and Oman, through its Musandam Peninsula enclave.



Physical and Economic Features

- **Shallow, asymmetrical seabed.** The Gulf averages 35–50 metres deep. It is deeper along Iran's coast and has shallow, lagoon-lined shelves along Arabia.
- **Hydrology and climate.** High salinity, intense evaporation and extreme temperatures characterise the Gulf. Coastal salt flats are called sabkhas. Seasonal northwesterly dust winds are known as Shamal.
- **Freshwater and sediment.** Arabia contributes little freshwater. Major inflows arrive through the Shatt al-Arab delta, fed by the Tigris, Euphrates and Karun rivers.
- **Hydrocarbon reserves.** Sedimentary formations hold extensive oil and natural gas deposits. The South Pars/North Dome gas field is among the world's largest.
- **Strait of Hormuz.** The Gulf opens southeastward into this maritime chokepoint. Its shipping routes carry petroleum volumes equivalent to about one-fifth of global consumption.

Implications

- **Energy security.** Military strikes or maritime blockades could disrupt oil shipments, raise crude prices and increase tanker insurance costs, affecting international energy markets.
- **Indian seafarers.** Regional conflict puts Indian merchant sailors and other maritime workers at risk, threatening livelihoods and potentially requiring coordinated diplomatic and consular assistance.
- **Naval presence.** Escalating tensions can lead to more naval deployments and mine-countermeasure operations around the Persian Gulf and Strait of Hormuz.



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