PLUTUS IAS

CURRENT AFFAIRS

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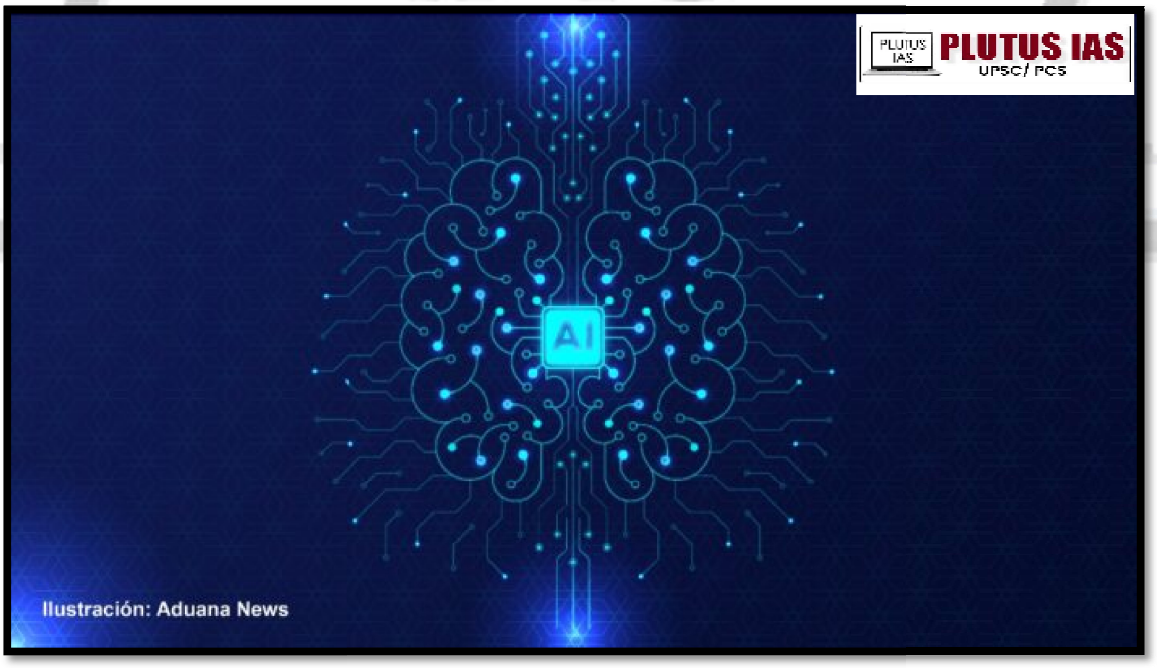
INCLUSIVE ARTIFICIAL INTELLIGENCE FOR DEVELOPMENT

WHY IN THE NEWS?

Artificial Intelligence (AI) is reshaping economies and societies, offering significant potential to accelerate sustainable development. However, many developing countries face challenges in harnessing its benefits due to insufficient digital infrastructure, limited data access, and a lack of necessary skills. To bridge the gap with leading economies, developing countries should swiftly implement AI policies to overcome barriers to AI diffusion consistent with their development strategies and goals while addressing possible economic and social downsides of AI. The cross-border impacts of AI further highlight the need for global collaboration to make it accessible and beneficial for all, fostering inclusive innovation to tackle global challenges. As AI development is highly concentrated in a few countries and companies, stronger international cooperation is crucial to co-create inclusive governance mechanisms and to ensure AI will drive sustainable progress rather than deepening existing inequalities.



WHAT IS AI AND ITS TYPES

Artificial Intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think, learn, and make decisions. These machines can perform tasks that typically require human cognition, such as reasoning, problem-solving, perception, language understanding, and learning from experience. AI systems work using algorithms, vast data sets, and computational power to mimic intelligent behaviour, adapt to inputs, and improve over time.

Category	Type	Description	Examples / Status
Based on Capability	**Narrow AI**	Performs specific tasks, limited scope	Siri, Alexa, Google Translate
	General AI	Human-like intelligence across tasks	Under development
	Super AI	Surpasses human intelligence	Theoretical / Hypothetical
Based on Functionality	**Reactive Machines**	No memory, responds to current input only	IBM's Deep Blue Chess computer
	Limited Memory	Uses past data for decisions	Self-driving cars, recommendation systems
	Theory of Mind	Understands emotions, intentions	In research phase
	Self-aware AI	Has self-consciousness and awareness	Hypothetical / Future possibility

LEVERAGING AI IN VARIOUS FIELDS

1. Healthcare: AI aids in early and accurate diagnosis through imaging analysis, supports drug discovery, enables robotic surgeries, and provides virtual health assistants for patient care.

2. Agriculture: Helps in precision farming, real-time crop and soil monitoring, pest detection, and yield forecasting, boosting productivity and sustainability.

3. Education: Enables personalized learning experiences, AI tutors, automated grading systems, and predictive analytics to improve student outcomes.

4. Finance: Enhances fraud detection, enables algorithmic trading, automates credit scoring, and provides smart financial advisory through AI-powered chatbots.

5. Manufacturing: Improves efficiency with predictive maintenance, AI-driven quality control, smart automation, and optimization of supply chains.

6. Transportation: Powers self-driving vehicles, enhances traffic management systems, streamlines smart logistics, and supports drone-based delivery.

7. Retail: AI enhances customer experience through behaviour analysis, manages inventory, offers virtual try-on tools, and enables dynamic pricing strategies.

8. Defense and Security: Assists in surveillance, autonomous drones, threat detection systems, and analysis of large-scale security data.

9. Environment: Supports climate modelling, disaster forecasting, pollution control, and wildlife monitoring for ecological conservation.
10. Governance: AI improves public service delivery through e-governance, decision-making support, citizen grievance redressal, and increased administrative efficiency.

GOVT POLICIES, NATIONAL AND INTERNATIONAL

National (India)

1. National Strategy for AI (NITI Aayog): Known as AIForAll, it focuses on inclusive growth in key areas: healthcare, agriculture, education, smart mobility, and smart cities.
2. National Programme on AI (MeitY): Implements AI in government services and builds AI computing infrastructure and R&D.
3. IndiaAI Mission (Upcoming): Proposed comprehensive mission with a focus on AI research, compute infrastructure, datasets, startups, and skilling.
4. Responsible AI for Youth: Initiative to train students in ethical AI use.
5. AI in Digital India: Integration of AI in e-governance, digital health, education portals, and public grievance systems.
6. Data Governance Framework: Under development to manage AI datasets, privacy, and responsible data sharing.
7. Centre for AI (CAIR, IITs, IIITs): Government supports academic institutions for research and innovation in AI.
8. AI-related PLI Schemes: Encourage electronics, chip-making, and AI hardware manufacturing.

International

1. OECD Principles on AI (2019): Focus on trustworthy, transparent, and human-centred AI.
2. UNESCO Recommendation on AI Ethics (2021): First global framework on AI ethics, ensuring rights, privacy, and fairness.
3. European Union AI Act (Ongoing): A risk-based regulation classifying AI systems and regulating high-risk AI.
4. USA – National AI Initiative Act (2020): Promotes AI leadership, R&D, education, and ethical standards.
5. China – Next Gen AI Development Plan (2017): Ambitious AI leadership goals by 2030 through massive state investment.
6. Global Partnership on AI (GPAI): India is a founding member and promotes responsible and inclusive AI globally.
7. G20 & BRICS AI Cooperation: Platforms to share best practices and regulate AI across borders.

CHALLENGES IN AI

1. Data Privacy and Security: AI systems rely on vast data, raising concerns over misuse, surveillance, and breaches of personal privacy.
2. Bias and Discrimination: AI can reflect or even amplify societal biases present in training data, leading to unfair decisions.
3. Lack of Explainability (Black Box Problem): Many AI models, especially deep learning, work in opaque ways, making it hard to understand or trust their decisions.
4. Job Displacement and Unemployment: Automation through AI threatens traditional jobs, particularly in routine or repetitive sectors.
5. Ethical and Legal Issues: Moral dilemmas arise in areas like autonomous weapons, predictive policing, and AI-based surveillance.

6. High Cost and Infrastructure Needs: Developing and deploying AI systems require advanced computing power and large-scale infrastructure.
7. Skilling and Talent Gap: Shortage of trained professionals in AI research, data science, and ethical AI governance.
8. Fragmented Regulation and Governance: Lack of a unified global or national AI regulatory framework hampers responsible innovation.
9. Misinformation and Deepfakes: AI tools can be misused to create fake images, videos, or content, threatening democratic processes.
10. Cybersecurity Risks: AI systems themselves can be vulnerable to adversarial attacks or used to create smart malware.

GLOBAL COOPERATION FOR INCLUSIVE AND EQUITABLE AI

1. Promoting Shared Ethical Standards: Establishing global ethical guidelines through platforms like UNESCO's Recommendation on the Ethics of AI ensures fairness, transparency, and human rights in AI deployment.
2. Bridging the Digital Divide: Developed nations can support developing countries through technology transfer, funding, and capacity building to prevent AI-driven inequalities.
3. Global Research Collaborations: Joint AI research projects between countries and multilateral institutions can foster innovation while respecting local contexts.
4. Inclusive AI Policy Frameworks: International cooperation through forums like OECD, G20, and UN can harmonize policies on data governance, algorithmic transparency, and cross-border AI use.
5. Open Data and Infrastructure Sharing: Encouraging global open-source AI tools, datasets, and models can democratize AI access and reduce costs for low-income nations.
6. AI for Sustainable Development Goals (SDGs): Collaborative use of AI in areas like healthcare, agriculture, and climate action can accelerate SDG progress in underrepresented regions.
7. Global Capacity Building Initiatives: Training programs and AI skill development partnerships led by tech-advanced nations can empower youth and professionals in the Global South.
8. Preventing AI Weaponization and Abuse: Global treaties and norms are essential to regulate military AI, facial recognition, and autonomous systems to prevent misuse and ensure peace.

CONCLUSION

Artificial Intelligence holds transformative potential to drive innovation, improve service delivery, and address developmental challenges. However, to ensure that AI benefits all sections of society and aligns with sustainable development goals, it is essential to bridge the digital divide, promote ethical standards, and foster inclusive innovation. India and other developing nations must formulate proactive, adaptable, and ethical AI frameworks while enhancing skills and infrastructure. Global cooperation, knowledge sharing, and responsible governance are key to building a future where AI uplifts humanity and narrows inequalities rather than deepening them.

PRELIMS QUESTIONS

Q. With reference to Artificial Intelligence (AI), consider the following statements:
1. Narrow AI systems are capable of performing multiple unrelated tasks with human-like intelligence.
2. The OECD Principles on AI promote the use of AI that is innovative and trustworthy while respecting human rights.
3. India is a founding member of the Global Partnership on Artificial Intelligence (GPAI).
How many of the above-given statements are correct?

A. Only one
B. Only two
C. All three
D. None
Answer: B

MAINS QUESTIONS

Q. Discuss the significance of AI for India, outline the challenges involved in its adoption, and suggest how national and international efforts can promote inclusive and responsible AI governance.
(250 words, 15marks)

SECURING SPACE: MILITARY SPACE DOCTRINE

WHY IN THE NEWS?

India is currently formulating its first-ever Military Space Doctrine, as announced by the Chief of Defence Staff (CDS) in early 2025. This development marks a strategic shift in India's defence policy, recognising space as a critical warfighting domain alongside land, sea, air, and cyber. The doctrine aims to define operational roles, deterrence frameworks, and capability development in space, especially amidst rising space militarisation by countries like China and the United States. Additionally, the recent approval of a 52-satellite military constellation, including private sector participation, further underscores India's ambition to secure its assets and influence in the increasingly contested space domain.

WHY IS A MILITARY SPACE DOCTRINE (MSD) NEEDED?

Space, once considered a peaceful domain reserved for scientific exploration, has become the next frontier of national defense. The militarization of space is no longer hypothetical. From anti-satellite (ASAT) weapons to space-based surveillance systems, nations are now aggressively securing strategic advantages beyond the

atmosphere. A Military Space Doctrine is needed to provide a clear policy framework for how a country intends to use, secure, and if necessary, defend its assets in outer space.

Examples Highlighting the Need for MSD:

1. China's ASAT Test (2007): China destroyed one of its own satellites using a ballistic missile, creating over 3,000 pieces of debris in low Earth orbit (LEO). This marked a turning point in global space policy and alarmed defense establishments worldwide.

2. U.S. Space Force Formation (2019): The United States formalized its space military ambitions with the establishment of the U.S. Space Force, a separate branch of the armed forces.

3. India's Mission Shakti (2019): India successfully demonstrated ASAT capability by shooting down a live satellite in LEO. This was a powerful signal of India's evolving military-space ambitions.

4. Ukraine-Russia War (2022–24): The war demonstrated how commercial satellite constellations (like Starlink) could be leveraged in real-time combat scenarios, blurring lines between civilian and military space assets.

WHAT DOES A MILITARY SPACE DOCTRINE INCLUDE:

A Military Space Doctrine is a strategic document or framework that outlines a country's objectives, principles, and capabilities concerning military operations in outer space. It usually includes policy directives, command structures, integration with other military branches, legal frameworks, and technological roadmaps.

Key Components of an MSD:

Component	Description
Strategic Objectives	National goals in space: deterrence, surveillance, early warning, force projection
Command & Control Structure	Who controls space-based military operations; integration with tri-services
Space Surveillance & Intelligence	Use of satellites for ISR (Intelligence, Surveillance, Reconnaissance)
Deterrence & Defense Mechanisms	ASAT weapons, missile warning systems, cyber capabilities
Rules of Engagement	Guidelines for conflict in space; how, when, and against whom force may be used
Legal & Ethical Frameworks	Compliance with treaties like the Outer Space Treaty (OST), 1967
Interoperability	Integration with allies and global coalition forces
Research & Development (R&D)	Investment in next-gen tech: quantum sensors, laser communication, AI in space
Dual-Use Infrastructure	Leveraging civilian satellites for military uses

IMPORTANCE OF MILITARY SPACE DOCTRINE

1. National Security and Strategic Deterrence: An MSD enhances national defense by protecting critical space infrastructure such as GPS, communication, and early-warning systems. It deters adversaries from pre-emptive strikes and sets clear red lines.

2. Preventing Space Militarization Escalation: By formalizing norms and doctrines, countries can avoid misunderstandings or inadvertent escalations. Clear doctrines ensure transparency and responsible behavior in space.

3. Enhancing Inter-Agency Coordination: MSD helps harmonize civilian and military efforts in space technology, optimizing budgets and technical expertise. It also coordinates efforts between ISRO/DRDO in India or NASA/DoD in the USA.

4. Preparedness for Emerging Threats: As space becomes contested, congested, and competitive (3C's), doctrines ensure preparedness for emerging threats such as:

Directed energy weapons
Cyberattacks on satellites
Kinetic ASAT missiles
Electronic warfare (EW) jamming signals

5. Promoting Indigenous Capability Development: Doctrines push for strategic investments in indigenous satellite navigation systems (like India's NavIC), secure satellite communication, space situational awareness, and space launch capabilities.

6. Leveraging Dual-Use Technologies: MSDs optimize the use of space assets for both civilian and military applications, maximizing return on investment.

INDIA'S MILITARY SPACE DOCTRINE: A WORK IN PROGRESS

India has taken major steps in developing a coherent military space policy, although a formal doctrine is yet to be fully articulated.

Key Developments in India:

Institution/Program	Description
Mission Shakti (2019)	First successful demonstration of ASAT capability
Defence Space Agency (DSA)	Operationalizes space warfare strategies; coordinates with tri-services
Defence Space Research Organisation (DSRO)	Focuses on space-based warfare R&D
Integrated Space Cell (2008)	First institutional mechanism for defense-space integration
GSAT-7 Series Satellites	Dedicated military satellites for Navy, Army, and IAF
NavIC System	India's indigenous satellite navigation system; alternative to GPS
SRO-DRDO Cooperation	Collaboration in ASAT, surveillance, and communication technologies

India emphasizes "non-weaponization of outer space" in diplomatic forums but is clearly building deterrence and strategic autonomy through hard capabilities.

COMPARISON TABLE

Country	ASAT Capability	Military Doctrine	Dedicated Command	Satellite Navigation	Key Focus
USA	Yes	Yes (Space Force)	Yes	GPS	Space dominance
China	Yes	Implicit	Yes (PLA SSF)	Beidou	Counterspace warfare
Russia	Yes	Legacy-focused	Yes	GLONASS	Jamming, EW
India	Yes	In development	Partial (DSA/DSRO)	NavIC	Deterrence, integration
France	No	Yes	Yes	EU Galileo	Surveillance, resilience

United States

1.Established U.S. Space Force in 2019.
2. Operates over 160 military satellites for navigation, communication, and missile tracking.
3. Follows the 2020 Defense Space Strategy, focusing on space dominance and proactive deterrence.
4. Uses the X-37B spaceplane for classified operations.
5. Deep integration with allies through NORAD, NATO, and Five Eyes.

China

1. Operates a comprehensive military space program under the PLA Strategic Support Force (SSF).
2. Conducts frequent counterspace activities including co-orbital ASAT systems.
3. Developed Beidou Navigation System, rival to GPS and NavIC.
4. Active in quantum communication satellites and AI-driven surveillance.

Russia

1. Maintains legacy space military programs from the Soviet era.
2. Focus on jamming, co-orbital satellites, and missile tracking.
3. Active in cyberwarfare capabilities and GLONASS navigation.

France

1. Released a military space doctrine (2019) and created Space Command.
2. Focuses on surveillance, laser defense, and cyber resilience in space.

Israel

1. Highly advanced in miniaturized surveillance satellites (e.g., Ofek series).
2. Focus on quick-launch responsive satellite capabilities for regional conflicts.

CHALLENGES IN FRAMING AND IMPLEMENTING AN MSD IN INDIA

1. Lack of Unified Doctrine: Multiple agencies like ISRO, DRDO, and the Defence Space Agency (DSA) currently operate with distinct mandates and limited interoperability. The absence of a single, published Military Space Doctrine results in policy fragmentation, duplication of efforts, and delayed decision-making during crises.

2. Legal Constraints: India is a signatory to the Outer Space Treaty (OST) 1967, which prohibits the placement of nuclear weapons and other weapons of mass destruction in orbit. This international legal

framework, while promoting peaceful use, constrains the development of offensive counter-space capabilities and limits strategic options in case of conflict.

3. Budget Constraints: Military space operations, such as deploying satellite constellations, ASAT programs, and ground control infrastructure, demand substantial and sustained capital investment. Given competing priorities in defense (land, air, maritime), space often receives a smaller allocation, affecting long-term capability-building.

4. Human Resource Shortage: There is a critical shortage of personnel trained in space science, orbital mechanics, AI integration, and satellite operations with a military lens. The absence of dedicated military-academic programs and limited collaboration with institutions like IIST or DRDO labs further hampers talent development.

5. Need for Cyber-Space Integration: Modern space warfare includes electronic warfare, cyber-attacks on satellite networks, and AI-driven decision systems. India must evolve beyond platform-based thinking to adopt a multi-domain doctrine integrating cyber, space, and electromagnetic operations for synchronized threat response.

THE WAY FORWARD FOR INDIA'S MILITARY SPACE DOCTRINE

1. Formulation of an Integrated Military Space Doctrine (MSD):

India must institutionalize a comprehensive Military Space Doctrine that synchronizes the roles of the armed forces, ISRO, and private industry. This doctrine should outline strategic deterrence goals, asset protection, space situational awareness, and response mechanisms. It would serve as the foundational policy for coordinated space security planning and reflect India's commitment to peaceful yet prepared uses of outer space.

2. Strengthening the Defence Space Agency (DSA):

The DSA, currently a tri-service body, needs more operational autonomy and budgetary authority to function effectively. Its mandate must evolve from coordination to active development and deployment of military space assets, including small satellites and counter-space technologies. A direct command chain under the Chief of Defence Staff (CDS) can further enhance its strategic focus.

3. Development of Space Situational Awareness (SSA) Capabilities:

Building indigenous SSA systems is vital to track, monitor, and predict the behavior of foreign satellites and debris. This includes radar and optical sensors, AI-enabled tracking, and global data fusion centers. Collaboration with nations like France, Japan, and the U.S. can further improve interoperability and early-warning mechanisms.

4. Indigenous Satellite Constellations for Strategic Communications and Reconnaissance:

India should accelerate the deployment of satellite constellations such as RISAT, GSAT, and CartoSat for persistent coverage and real-time communication. These assets must be encrypted, jam-resistant, and resilient to cyber threats. Future constellations could be launched in low-Earth orbit (LEO) to ensure redundancy and quicker refresh rates.

5. Investment in Counterspace and Defensive Technologies:

India must continue to invest in electronic warfare systems, directed energy weapons (like DEWs), and ASAT capability upgrades to safeguard its orbital infrastructure. Additionally, technologies such as satellite hardening, maneuverability, and cloaking techniques can serve as passive defense against enemy actions.

6. Public-Private-Academic Collaboration in Military Space Tech:

To foster innovation and rapid deployment, India should expand the involvement of startups and academic institutions in military space programs through the IN-SPACe and iDEX platforms. Dual-use technology spin-offs can improve both civilian and military capabilities while reducing dependency on foreign vendors.

7. International Norm-Shaping and Diplomacy:

India should take the lead in pushing for international treaties that ban space weaponization while securing its national interests. Proposing a No First Placement of Weapons in Space (NFPWS) doctrine or collaborating in forums like CD, UNIDIR, and BRICS can reinforce its image as a responsible space power while hedging against future legal asymmetries.

CONCLUSION

The Military Space Doctrine is no longer an abstract policy choice; it is a strategic necessity in an increasingly contested domain. With global powers racing toward space militarization, India must evolve from ad hoc measures to a coherent doctrine that aligns its strategic, scientific, and ethical imperatives.A robust MSD enables India to deter adversaries, protect its satellites, and ensure uninterrupted national services—ranging from communication to weather forecasting to defense intelligence. As technology blurs boundaries between civilian and military roles, India's space doctrine must be forward-looking, resilient, and rooted in strategic autonomy and international peace.

PRELIMS QUESTIONS

Q. The Outer Space Treaty (OST) of 1967 prohibits which of the following?

1. Deployment of nuclear weapons in space
2. Militarization of celestial bodies
3. Peaceful use of outer space

Select the correct answer using the codes below:

A. 1 and 2 only
B. 2 and 3 only
C. 1 and 3 only
D. 1, 2 and 3

Answer: D

MAINS QUESTIONS

Q. Discuss the implications of a Military Space Doctrine for India's strategic autonomy and its obligations under international space treaties like the Outer Space Treaty (1967).

(250 words, 15marks)