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POLITY AND GOVERNANCE

CRITICAL ANALYSIS OF AMRUT SCHEME

Why in the News?

The World Bank projects that India will require an investment of approximately $840 billion over the next 15 years to cover the essential urban infrastructure requirements. This funding is crucial to adequately support the rapidly expanding urban population, anticipated to reach 600 million by 2036, constituting 40% of the total population.

WHAT IS THE AMRUT SCHEME?

The Atal Mission for Rejuvenation and Urban Transformation (AMRUT) is a national urban renewal initiative launched by the Government of India in June 2015 under the Ministry of Housing and Urban Affairs.

Objectives of AMRUT Scheme

Water Supply and Sewerage: Ensure every household has access to a tap with a reliable water supply and a sewerage connection.

Green Spaces and Parks: Enhance city aesthetics by promoting greenery and maintaining well-kept open spaces, including parks.

Non-Motorized Urban Transport: Reduce pollution by encouraging public transport use and developing facilities for non-motorized transportation like walking and cycling.

Components of AMRUT Mission

Capacity Building: Focuses on enhancing urban governance and services through capacity building and urban reforms.

Water Supply and Sewerage Management: Ensures adequate water supply and sewerage connections in urban areas.

Stormwater Drainage: Improves stormwater drainage systems to reduce flooding.

Urban Transport: Develops infrastructure for footpaths, walkways, sidewalks, foot over-bridges, and non-motorized transport.

Green Space and Parks: Creates green spaces and parks with unique features catering to different age groups and people with disabilities.

Progress and Funding

AMRUT 1.0: By June 2021, 10.5 million household water tap connections and 7.8 million sewer/septage connections were provided. Additionally, 8.8 million streetlights were replaced with energy-efficient LED lights, saving 1.93 billion units of energy and reducing the carbon footprint by 8.46 million tons.

AMRUT 2.0: Launched in October 2021, it aims for universal water supply coverage through functional taps for all households and effective sewage/septage management in 500 cities. The total projected outlay for AMRUT 2.0 is ₹2,99,000 crore, including ₹76,760 crore from the central government over five years.

SIGNIFICANCE OF AMRUT SCHEME

Improving Quality of Life: AMRUT aims to elevate urban living standards by providing essential civic amenities such as water supply, sewerage systems, stormwater drainage, green spaces, and facilities for non-motorized urban transport.

Ensuring Water Security: A key goal of AMRUT is to ensure every household has access to a reliable water supply and a sewerage connection, addressing urban water scarcity.

Promoting Sustainable Development: The scheme fosters sustainable urban development by creating green spaces and parks, enhancing the aesthetic appeal of cities.

Reducing Pollution: AMRUT aims to lower pollution levels by encouraging the use of public transport and establishing

infrastructure for non-motorized transportation like walking and cycling.

Capacity Building: The scheme enhances urban governance and services through capacity building and urban reforms.

Addressing the Urban Infrastructure Gap: The World Bank estimates that $840 billion in urban infrastructure investment will be needed over the next 15 years, and AMRUT is essential in closing this gap.

Improving Health and Sanitation: By prioritising water supply and sewerage management, AMRUT helps improve health and sanitation, addressing the issue of inadequate hygiene that causes around 200,000 deaths annually in India.

Promoting Cooperative Federalism: AMRUT embodies cooperative federalism by involving states as equal partners in project development and execution. The Ministry of Housing and Urban Affairs (MoHUA) approves the State Annual Action Plan (SAAP) yearly, allowing states to authorise and oversee their own projects.

MAJOR ISSUES WITH AMRUT SCHEME

Project-Oriented Approach: The scheme was criticised for focusing on individual projects rather than a comprehensive strategy, resulting in limited participation from elected city governments and a bias towards private interests.

Governance Structure: The governance framework was seen as overly bureaucratic, with key decisions made by non-elected officials, contrary to the 74th Constitutional Amendment. This lack of involvement from elected representatives impeded effective implementation.

Water Management Issues: The approach to water management under the scheme failed to adequately consider climate variations, rainfall patterns, and existing infrastructure, causing inefficiencies in sewage treatment plant designs and water management strategies.

Urban Planning Concerns: Urban planning under the scheme often became synonymous with real estate development, leading to the disappearance of water bodies, disrupted stormwater flows, and insufficient drainage systems. There were calls for adopting nature-based solutions and a more people-centric approach, along with empowering local bodies for better implementation.

Financial Constraints: The scheme faced financial limitations, with a total budget of ₹50,000 crore over five years (FY 2015-16 to FY 2019-20), which was inadequate to address the extensive urban infrastructure needs.

Lack of Monitoring and Evaluation: There was a lack of effective monitoring and evaluation mechanisms, making it difficult to track progress and identify areas needing improvement.

Inadequate Capacity Building: The capacity-building efforts were insufficient, resulting in a shortage of skilled professionals and resources necessary for effective project implementation.

Mechanical Implementation: The scheme was implemented in a rigid manner, without sufficient consideration for local conditions and city-specific needs, leading to inefficiencies and unsustainable outcomes.

MEASURES TO BE TAKEN FOR EFFECTIVE IMPLEMENTATION OF AMRUT SCHEME

Adopt a Holistic Approach: Rather than focusing on individual projects, the scheme should embrace a more comprehensive approach to urban development. This would include increased participation from elected city officials and a focus on solutions centered around the needs of the people.

Strengthen Governance Structure: Reform the scheme's governance framework to ensure greater representation of elected officials following the 74th Constitutional Amendment. This would enhance accountability and improve implementation effectiveness.

Improve Water Management: The scheme should incorporate a climate-sensitive approach to water management, considering factors such as rainfall patterns and existing infrastructure. This would lead to the design of more efficient sewage treatment plants and better water management strategies.

Promote Nature-Based Solutions: To address urban planning issues, the scheme should advocate for nature-based solutions and empower local bodies to create people-centric urban plans. This includes preserving water bodies, ensuring effective stormwater drainage, and developing more green spaces.

Enhance Financial Resources: To meet the extensive urban infrastructure needs, the scheme should be allotted more financial resources. This could involve innovative financing mechanisms, such as public-private partnerships and municipal bonds.

Strengthen Monitoring and Evaluation: Implement more robust monitoring and evaluation systems to track progress and identify improvement areas. This involves setting clear targets and indicators and regularly assessing the impact of interventions.

Invest in Capacity Building: Increase investment in capacity-building initiatives to ensure sufficient skilled professionals and resources for effective project implementation.

This includes training local officials, promoting knowledge sharing, and fostering innovation.

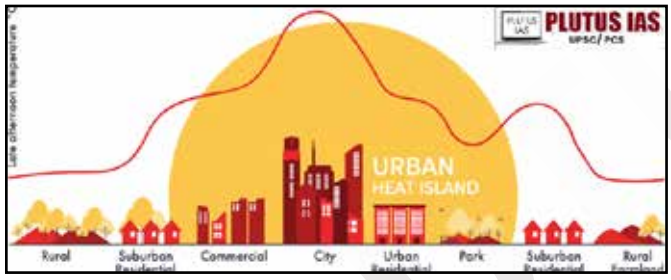
Convergence with other Schemes: AMRUT and the Swachh Bharat Mission aim to enhance sanitation and hygiene in urban regions. Integrating these two initiatives can result in more holistic sanitation and hygiene solutions. While AMRUT concentrates on creating water supply, sewerage, and stormwater drainage infrastructure, the Smart Cities Mission focuses on developing digital and smart infrastructure. Combining these efforts can lead to more comprehensive urban development.

TRAGEDY OF HEAT WAVES

Why in the News?

At least 61 people have reportedly died from suspected heat stroke across several states. Among these fatalities, 23 were polling personnel participating in the last phase of the Lok Sabha election. The deaths primarily took place in Uttar Pradesh and Bihar, where 18 of the poll workers succumbed to heat waves-related conditions.

WHAT ARE HEAT WAVE CONDITIONS?



According to the **India Meteorological Department (IMD)**, a heat wave is characterised by an extended period of unusually high temperatures, lasting several days or even weeks. The IMD uses two main criteria to declare a heat wave:

Temperature Criteria: A heat wave is declared if the maximum temperature at a station reaches 45°C or higher for at least two consecutive days.

Frequency Criteria: To confirm a heat wave, the above temperature threshold must be met in at least two stations within a meteorological subdivision for a minimum of two consecutive days.

For **coastal areas**, the IMD has specific criteria: a heat wave is declared if the maximum temperature is 37°C or higher and shows a departure of 4.5°C or more from the normal.

In **hilly regions,** the threshold temperature is set at 30°C.

URBAN HEAT ISLAND EFFECT

The urban heat island (UHI) effect refers to the phenomenon where urban areas absorb and retain more heat than their rural surroundings, resulting in higher temperatures. This effect intensifies during heat waves, causing cities to become even hotter.

IMPACT OF THE URBAN HEAT ISLAND EFFECT

Increased Temperatures: The UHI effect can elevate urban temperatures by up to 5°C (9.0°F) compared to nearby rural areas.

Air Quality: Higher temperatures from the UHI effect can worsen air quality by increasing the production of pollutants like ozone, a greenhouse gas that forms more rapidly at elevated temperatures.

Water Quality: Warmer waters flowing into local streams and rivers can stress ecosystems and degrade water quality.

WHAT ARE THE MAJOR HEALTH RISKS ASSOCIATED WITH HEAT WAVES?

Heatstroke: This is a severe form of hyperthermia where the body's temperature regulation system fails, leading to a rapid increase in body temperature. Symptoms include confusion, seizures, and loss of consciousness. Without immediate medical intervention, heatstroke can be fatal.

Heat Exhaustion: This condition results from excessive sweating, leading to dehydration and electrolyte imbalance. Symptoms include heavy sweating, weakness, dizziness, nausea, and headache. If not addressed promptly, heat exhaustion can progress to heatstroke.

Dehydration: High temperatures increase the body's need for fluids. Without adequate hydration, individuals can experience severe dehydration, which can cause kidney failure, seizures, and other complications.

Heat Rash: Also known as prickly heat, this condition is characterised by red, itchy skin caused by excessive sweating. It commonly affects areas of the body that are covered by clothing.

Cardiovascular Issues: Heat waves put extra strain on the heart, increasing the risk of heart attacks and other cardiovascular problems. People with pre-existing heart conditions are particularly vulnerable.

Respiratory Problems: Extreme heat can exacerbate respiratory issues, especially in individuals with asthma or **chronic obstructive pulmonary disease (COPD)**. High temperatures can also increase the levels of air pollutants, further aggravating respiratory conditions.

Impact on Mental Health: Prolonged exposure to high temperatures can lead to heat-induced irritability, anxiety, and other mental health issues. There is also evidence suggesting a link between heat waves and increased rates of mental health-related emergencies.

Increased Mortality in vulnerable populations: Vulnerable populations such as the elderly, infants, and individuals with chronic illnesses face a higher risk of mortality during heat waves due to their reduced ability to regulate body temperature and cope with extreme heat.

HEAT WAVES ACTION PLAN PROPOSED BY IMD

Key Components of Heatwave Action Plan

Early Warning System: Develop a system to notify residents about anticipated high and extreme temperatures in advance.

Inter-Agency Coordination: Facilitate collaboration among various agencies to ensure a prompt and effective response to heat waves and timely communication with the public.

Capacity Building and Training: Implement training programs for professionals and stakeholders to enhance their ability to manage heat-related health issues.

Public Awareness and Community Outreach: Conduct public education campaigns using hoardings, posters, workshops, and other methods to inform people about preventive measures during heat waves.

Collaboration with NGOs and Civil Society: Work with non-governmental organisations and civil society groups to extend the reach and effectiveness of heat action plans.

Health Impact Assessment: Perform epidemiological studies on heat-related deaths, gather data on risk factors and illnesses, and use the findings to improve future Heat Action Plans.

Monitoring and Response: Track heat-related illnesses and fatalities, record daily mortality rates and analyse this data to assess and refine the plan's effectiveness.

Adaptation and Mitigation Measures: Implement a range of measures, including awareness campaigns, capacity-building workshops, mitigation strategies, early warning communications, medical preparedness, and ongoing monitoring and analysis.

DIFFERENT STRATEGIES ADOPTED BY VARIOUS STATES TO TACKLE HEAT WAVES

Madurai is organising medical camps in high-traffic areas

Bhubaneswar has set up cool wards in hospitals, and Nagpur is minimising traffic stoppages.

In **Delhi**,school hours are staggered, and there is a ban on construction and other labor-intensive activities from 12 PM to 3 PM to avoid peak heat hours.

Additionally, cities are promoting cost-effective solutions like **cool roofs and green roofs to reduce household heating**. Large-scale implementation of these measures, such as in Ahmedabad and Jodhpur, has primarily been driven by the non-government sector.

Telangana has introduced a state-wide cool roof policy that mandates a gradual increase in coverage.

Many Indian cities are also initiating greening projects to provide shade and mitigate the heat island effect. As part of the **Resilient Kerala initiative**, Kerala is conducting a '**bare earth program**,' demolishing all abandoned buildings and grey infrastructure.

Prelims Question

Q1. Consider the following statements with reference to AMRUT Scheme:

1. It is a flagship scheme of Ministry of Housing and Urban Affairs, launched in 2018.
2. The primary objective of AMRUT scheme is to develop sustainable urban infrastructure.

Choose the correct answer using the codes given below:

(a) 1 Only

(b) 2 Only

(c) Both 1 and 2

(d) Neither 1 nor 2

Q2. Consider the following statements:

1. IMD has described different conditions to declare heat waves in different regions such as coastal, hilly and plains.
2. Prolonged exposure to heat waves can also cause mental health issues.

Choose the correct answer using the codes given below:

(a) 1 Only

(b) 2 Only

(c) Both 1 and 2

(d) Neither 1 nor 2

ANSWER

S. No.	Answers
1.	B
2.	C

Mains Question

Q1. Critically analyse the implementation of AMRUT Scheme. How did the scheme perform over a period of time, and what measures should be taken to improve the functioning of the scheme?

Q2. Tropical countries like India have faced unprecedented Heatwave crises in recent times. Why have heat wave conditions increased, and what measures could be employed to tackle the issue of heat waves?

INTERNATIONAL RELATIONS

CHINA TAIWAN TENSIONS

WHY IN THE NEWS?

On Thursday, China intensified its display of military prowess by encircling Taiwan with naval vessels and military aircraft during war games. The rhetoric accompanying these maneuvers was ominously laced with threats of bloodshed against any hint of independence from the self-ruled island.

This brazen show of force, spanning two days, is the latest in a series of escalating acts of intimidation orchestrated by China. Over recent years, Beijing has conducted numerous large-scale military exercises in close proximity to Taiwan, signaling its unwavering stance on the issue.

MORE ABOUT THE NEWS

The timing of these drills is noteworthy, coinciding with the inauguration of Taiwan's new President, Lai Ching-te. His inaugural address, perceived by China as a veiled declaration of independence, has further stoked tensions between the two entities.

In response to Lai's inauguration speech, China wasted no time in denouncing it as a blatant affirmation of Taiwan's separatist aspirations. This vehement reaction underscores the deep-seated sensitivity surrounding the issue of Taiwan's sovereignty within the halls of power in Beijing.

The situation in the Taiwan Strait remains volatile, with each military maneuver and diplomatic gesture carrying the potential to escalate into a full-blown crisis. As China continues to assert its dominance in the region, the international community watches with bated breath, acutely aware of the precarious balance of power at play.

CHINA TAIWAN CONFLICT

Historical Context: China considers Taiwan a part of its territory and has not renounced the use of force to achieve reunification. The Chinese government views Taiwan's independence as a red line and has repeatedly stated its commitment to achieving reunification, by peaceful means if possible, but by force if necessary.

Military Capability: China has significantly modernized and expanded its military capabilities in recent years, including its naval and amphibious forces, which are essential for

any potential invasion of Taiwan. While Taiwan has invested in its defense and enjoys U.S. support, China's military strength and resources are formidable.

Political Dynamics: The political climate in both China and Taiwan plays a crucial role in shaping the likelihood of invasion. Changes in leadership, shifts in public opinion, and domestic political considerations can influence decision-making on both sides.

International Response: Any Chinese invasion of Taiwan would likely trigger a strong international response, particularly from the United States, which is committed to Taiwan's security under the Taiwan Relations Act. The potential for broader regional instability and conflict could lead to diplomatic, economic, and possibly military consequences for China.

Taiwan's Defense: Taiwan has invested in its defense capabilities, including military modernization, training, and cooperation with allies such as the United States. While Taiwan's military may not match China's in terms of size and resources, its geographical advantages and defensive strategies could pose significant challenges to a potential invasion.

Economic Considerations: The economic costs of a military conflict, including potential disruptions to trade and investment, could deter both China and Taiwan from pursuing aggressive actions. Economic interdependence between China, Taiwan, and other countries in the region also factors into decision-making.

HOW REALISM DOMINATES IN CHINESE FOREIGN POLICY

Realist theory emphasizes the role of power and security dynamics in international relations. From a realist perspective, the conflict between China and Taiwan can be understood as a struggle for power and influence in the Asia-Pacific region. China seeks to assert its dominance and preserve its territorial integrity, while Taiwan aims to maintain its de facto independence and sovereignty. Realists would argue that the potential for conflict arises from the security dilemma, where actions taken by one side to enhance its security are perceived as threats by the other, leading to a spiral of tension and militarization.

Security and Territorial Integrity: Realism emphasizes states' pursuit of power and security. For China, safeguarding its territorial integrity and sovereignty is paramount. This is evident in China's assertive stance on issues like Taiwan, the South China Sea, and Tibet, where it seeks to assert its control and prevent perceived threats to its territorial integrity.

Balance of Power: Realists argue that states seek to maintain a balance of power to ensure their security and survival. China's rise as a major global power has led to a shift in the balance of power in the Asia-Pacific region, challenging the dominance of traditional powers like the United States. China's military modernization and assertive actions in the region can be seen as efforts to establish a favorable balance of power in its favor.

National Interest: Realism posits that states prioritize their national interests, often defined in terms of power, security, and survival. China's foreign policy decisions are guided by its national interests, which include economic growth, territorial integrity, and maintaining internal stability. Realists argue that China's pursuit of these interests sometimes leads to competition and conflict with other states, especially in regions where its interests intersect with those of other major powers.

Zero-Sum Thinking: Realism is characterized by zero-sum thinking, where gains for one state are perceived as losses for another. In its interactions with other states, China often adopts a zero-sum approach, seeking to maximize its own benefits and minimize the influence of its rivals. This can be seen in China's efforts to expand its economic and political influence globally, sometimes at the expense of other countries' interests.

Military Expansion: Realism suggests that states prioritize military power as a means of ensuring their security and deterring potential adversaries. China's military modernization efforts, including the development of advanced weapons systems and expansion of its naval capabilities, reflect its realist approach to security. China's military expansion is seen as a means of projecting power regionally and globally and enhancing its ability to defend its interests against potential threats.

VARIOUS POLICIES USED BY CHINA

China employs various policies and strategies to assert its dominance regionally and globally. Some key policies include:

Military Modernization: China has significantly modernized its military capabilities, investing heavily in advanced weaponry, cyber capabilities, space technology, and naval expansion. This modernization effort aims to enhance China's military strength and assert its dominance in regional security affairs, particularly in the South China Sea and East China Sea.

Belt and Road Initiative (BRI): Launched in 2013, the BRI is a massive infrastructure development and investment project aimed at expanding China's influence globally. Through infrastructure projects, trade agreements, and economic investments, China seeks to increase its geopolitical influence and gain access to strategic resources and markets in Asia, Africa, and Europe.

Assertive Diplomacy: China adopts an assertive diplomatic

posture to advance its strategic interests and challenge the existing international order. This includes the use of diplomatic pressure, economic coercion, and assertive rhetoric to assert its claims in territorial disputes, such as those in the South China Sea and with Taiwan.

United Front Work: China employs united front tactics to influence and co-opt foreign actors, including overseas Chinese communities, business leaders, academics, and political elites, to advance its interests and suppress dissent. This includes efforts to control narratives, shape public opinion, and promote pro-China agendas abroad.

Technology and Cybersecurity: China leverages technology and cybersecurity as tools for dominance, including through the development of advanced technologies such as artificial intelligence, quantum computing, and 5G networks. China's cybersecurity policies also involve censorship and surveillance to control information flow and suppress dissent.

Debt Diplomacy: China engages in debt-trap diplomacy by extending loans and infrastructure investments to developing countries, often with opaque terms and high-interest rates. This strategy allows China to gain influence and strategic leverage over debtor nations, potentially compromising their sovereignty and autonomy.

Expansionist Policies: China pursues expansionist policies to assert its territorial claims and maritime interests, particularly in the South China Sea. This includes the construction and militarization of artificial islands, the imposition of fishing restrictions, and the establishment of administrative districts to assert sovereignty over disputed territories.

HOW IT AFFECTS INDIA'S NATIONAL INTEREST

China's realist approach to foreign policy can have significant implications for India's interests in several ways:

Border Disputes: Realist competition between China and India over territorial claims, such as those in the **Himalayas (e.g., the Doklam plateau) and along the Line of Actual Control (LAC)**, can escalate tensions and even lead to military confrontations. Both countries prioritize their territorial integrity and sovereignty, leading to periodic border standoffs and disputes.

Regional Influence: China's assertive actions in the **Indian Ocean region, such as its maritime Silk Road initiative (part of the Belt and Road Initiative**) and the development of strategic ports like Gwadar in Pakistan and Hambantota in Sri Lanka, challenge India's traditional sphere of influence. This competition for regional dominance can undermine India's efforts to maintain strategic autonomy and regional stability.

Economic Competition: China's economic rise and its growing presence in South Asia through **infrastructure projects, trade agreements, and investments pose challenges to India's economic interests.** Chinese investments in sectors like telecommunications, manufacturing, and infrastructure in South Asia and beyond can potentially undermine India's economic competitiveness and influence in the region.

Security Dilemma: Realist competition between China and India can lead to a security dilemma, where actions taken by one side to enhance its security are perceived as threats by the other, leading to a spiral of mistrust and militarization. India's efforts to enhance its military capabilities and strategic partnerships, particularly with the United States and other Indo-Pacific countries, can be seen as responses to China's assertiveness.

Strategic Alignment: China's close ties with Pakistan, including military and economic support, create a strategic challenge for India. The **China-Pakistan Economic Corridor (CPEC),** a flagship project of China's Belt and Road Initiative, passes through disputed territory claimed by India, further exacerbating tensions. India's efforts to counterbalance China's influence by strengthening partnerships with countries like Japan, Australia, and the United States reflect its realist calculations of power politics in the region.

SCIENCE AND TECHNOLOGY

"EUROPE`S AI CONVENTION"

WHY IN THE NEWS?

The regulation of Artificial Intelligence (AI) on a global scale is increasingly intricate. Nations endeavour to establish diverse frameworks within their jurisdictions, spanning legislative acts to executive directives. Despite calls from numerous experts for a unified international agreement, significant challenges impede its realisation.

WHAT IS EUROPE`S AI CONVENTION?

Europe's initiative in AI governance is exemplified by the Council of Europe's landmark decision to adopt the Framework Convention **on Artificial Intelligence and Human Rights, Democracy, and the Rule of Law,** commonly called the 'AI convention'. Unlike many existing ethical guidelines and soft law instruments, this convention carries binding implications, addressing the intersection of AI governance with fundamental human rights, democratic values, and responsible AI deployment.

The Council of Europe, an intergovernmental organisation established in 1949 with 46 member states, has significantly shaped a comprehensive framework for AI regulation, with the convention scheduled for signature starting September 5.

IS THE FRAMEWORK CONVENTION LEGALLY BINDING?

A "framework convention" constitutes a **legally binding agreement** outlining overarching commitments and goals within a convention while establishing mechanisms for their attainment.

This framework establishes specific targets for subsequent agreements termed protocols. For instance, the Convention on Biological Diversity serves as a framework convention, while the Cartagena Protocol on Biosafety functions as a protocol beneath it, focusing on regulations concerning genetically modified organisms.

The framework convention approach **offers flexibility** while embedding fundamental principles and processes necessary for realising objectives. Parties to the convention retain discretion in determining methods to achieve these objectives, tailored to their capacities and priorities.

Moreover, adopting the AI convention could spark the negotiation of similar agreements at the regional level worldwide. Given the United States' membership in the Council of Europe, albeit indirectly, the AI convention could indirectly influence AI governance in the U.S., which is a crucial consideration due to its status as a prominent hub for AI innovation.

SCOPE OF THE CONVENTION:

Article 1 delineates the convention's scope and underscores its primary aim: "to ensure that activities throughout the lifecycle of artificial intelligence systems **align fully with human rights, democracy, and the rule of law."**

Article 3 further elaborates on this, specifying that the convention applies to activities within the lifecycle of artificial intelligence systems that possess the potential to infringe upon human rights, democracy, and the rule of law. **This includes**:

The application of the convention by each Party to activities within the lifecycle of artificial intelligence systems conducted by public authorities or by private actors acting on their behalf.

Each Party has an obligation to address risks and impacts stemming from activities within the lifecycle of artificial intelligence systems conducted by private actors in a way consistent with the objectives and principles of the convention.

CHALLENGES FOR ECONOMIES AND SOCIETIES

Job Displacement: The advent of AI and automation poses a risk of replacing numerous jobs, particularly those involving repetitive tasks. This could result in unemployment and economic upheaval, especially for industries heavily reliant on manual labour.

Economic Disparity: While AI offers benefits, its distribution may not be equitable, widening economic gaps between those with access to AI technologies and those without. Such disparities could exacerbate existing societal inequalities.

Privacy Risks: AI algorithms, shaped by the data they're trained on, can inadvertently perpetuate biases, which may translate into discriminatory results in various domains, such as hiring, lending, and law enforcement. This perpetuation of biases further exacerbates existing social inequalities.

Bias and Discrimination: AI algorithms, shaped by the data they're trained on, can inadvertently perpetuate biases, which may translate into discriminatory results in various

domains such as hiring, lending, and law enforcement. This perpetuation of biases further exacerbates existing social inequalities.

Threats to Autonomy: As AI becomes more integrated into daily life, there are concerns about eroding human autonomy and decision-making. Over-reliance on AI for critical tasks may undermine individual freedoms.

Ethical Quandaries: AI raises ethical questions about accountability, transparency, and fairness. Decisions made by AI systems can have profound societal implications, necessitating careful consideration of ethical principles.

Cybersecurity Vulnerabilities: The increased reliance on AI systems introduces new cybersecurity risks, including the potential for malicious exploitation of vulnerabilities. This poses threats to economic stability and national security.

Education and Training Needs: The swift progress of AI underscores the need for continuous education and training to empower workers with essential skills for thriving in an AI-centric economy. Nevertheless, the task of delivering accessible and pertinent training programs to all societal segments poses significant challenges.

HOW DOES THE CONVENTION ADDRESS NATIONAL SECURITY CONCERNS?

The exemptions outlined in Articles 3.2, 3.3, and 3.4 provide broad provisions for safeguarding national security interests, research and development activities, and national defence efforts, respectively. Consequently, **military AI applications fall outside the AI convention's purview.**

While this exclusion raises valid concerns, it reflects a pragmatic approach considering the lack of consensus on regulating such applications. Notably, the exemptions in Articles 3.2 and 3.3, though expansive, do not entirely negate the convention's potential applicability concerning national security and testing.

Furthermore, the "General Obligations" outlined in the convention primarily centre on safeguarding human rights (Article 4), **upholding democratic processes, and adhering to the rule of law (Article 5).**

While specific provisions addressing disinformation and deep fakes are absent, parties to the convention are expected to take measures against such threats under Article 5. Moreover, the convention suggests in Article 22 that parties possess the flexibility to surpass the specified commitments and obligations, indicating a willingness to address emerging challenges proactively.

SIGNIFICANCE OF THE AI CONVENTION

Rather than introducing novel human rights specific to AI, the convention affirms the importance of **preserving existing human and fundamental rights** upheld by international and national legislation in the context of AI application.

It places primary responsibilities on governments, mandating the implementation of effective remedies (Article 14) and procedural safeguards (Article 15). Overall, the convention adopts a comprehensive stance toward mitigating the risks of using AI systems concerning human rights and democracy.

Implementing such measures poses inevitable challenges, particularly amidst the ongoing evolution of AI technology, which often outpaces policy development and regulatory frameworks.

SPACE ZERO DEBRIS CHARTER

Why in the News?

Recently, **Space Zero Debris Charter** was signed by Twelve countries at the ESA/EU Council to make Space activities debris-free by 2030. The twelve nations that have signed the Zero Debris Charter at the ESA/EU Space Council are:

Austria, Belgium, Cyprus, Estonia, Germany, Lithuania, Poland, Portugal, Romania, Slovakia, Sweden, and the United Kingdom.

WHAT IS THE ZERO DEBRIS CHARTER?

Charter Principles: The charter outlines key guiding principles that stress the importance of international collaboration and coordinated efforts to address space debris issues effectively.

Goals: The charter sets ambitious, collaboratively defined goals for zero debris by 2030.

Debris Mitigation: The charter aims to lower the likelihood of space debris creation to less than 1 in 1,000 per object, ensuring that space missions are designed to minimize debris production.

Global Collaboration: The charter highlights the need for worldwide cooperation to facilitate data sharing, coordinated responses, and the pooling of resources and expertise to tackle space debris effectively.

Long-term Sustainability: The charter focuses on maintaining the long-term sustainability of space activities by addressing the escalating problem of space debris and encouraging responsible conduct in space operations.

SIGNIFICANT IMPACT OF ZERO DEBRIS CHARTER

Enhanced Safety: The charter's goal of making space activities debris-neutral by 2030 aims to improve the safety of space missions by minimizing collision risks with space

debris, thereby protecting spacecraft, satellites, and astronauts.

Sustainability: Focusing on mitigating space debris, the charter seeks to ensure the long-term sustainability of space activities, keeping orbits viable for future missions and decreasing the chances of uncontrolled re-entries or collisions with debris.

Technological Innovation: The Zero Debris Charter will spur technological advancements in debris mitigation and remediation, leading to the development of sophisticated systems for cleaning up space debris and enhancing the safety of space operations.

Global Collaboration: Emphasizing international cooperation, the charter promotes collaboration among countries and organizations to address the challenges posed by space debris collectively.

Cost Reduction: By lowering the risk of collisions with space debris, the charter aims to reduce costs related to collision avoidance manoeuvres and spacecraft protection, making space missions more economically efficient over time.

Preservation of Space Assets: The Zero Debris Charter seeks to safeguard valuable space assets, such as satellites and spacecraft, from potential damage caused by space debris, ensuring their longevity and functionality for future missions.

MAJOR GLOBAL INITIATIVES TO ELIMINATE THE SPACE DEBRIS

Inter-Agency Space Debris Coordination Committee (IADC): Formed in 1993, the IADC is an international governmental forum that coordinates efforts among spacefaring nations to tackle space debris issues.

United Nations Committee on the Peaceful Uses of Outer Space (COPUOS): COPUOS focuses on creating guidelines for the long-term sustainability of outer space activities, including measures to mitigate space debris.

European Space Agency (ESA) Clean Space Initiative: The ESA's Clean Space Initiative aims to reduce space debris and promote sustainable space activities.

Project NETRA: India's ISRO has developed Project NETRA, an early warning system to detect debris and other hazards to Indian satellites.

System for Safe and Sustainable Operations Management (IS 4 OM): ISRO has established IS 4 OM to monitor objects that pose collision threats continuously, predict space debris's evolution, and mitigate associated risks.

Centre for Space Debris Research: ISRO has set up the Centre for Space Debris Research to monitor and mitigate the threat posed by space debris.

Global Commons Perspective: This approach views space debris as a collective action issue within a global commons, advocating for polycentric governance to enhance communication among governance nodes, empower lower-level decision-making, and build stakeholder trust.

Discourse Network Analysis: This analysis explores the emerging global socio-technical regime for addressing space debris, emphasizing the need for sustainability in orbit and the development of technological solutions.

IMPACT OF HIGH SPACE DEBRIS

Collision Risks: Space debris heightens the risk of collisions between operational satellites and debris, potentially damaging or destroying satellites. This can lead to substantial financial losses and disruptions in essential services such as communication and navigation.

Orbital Congestion: The accumulation of space debris in certain orbital regions can restrict the availability of desirable orbital slots for new satellites, complicating the launch and operation of new missions.

Increased Costs: Managing space debris increases satellite operational costs due to the need for additional resources for collision avoidance manoeuvres, debris mitigation, and maintenance, significantly raising the overall expense of satellite operations.

Reduced Lifespan: Space debris can damage key components like solar panels, shortening satellites' lifespans. This can lead to premature satellite retirement and increased costs for replacement or repair.

Threat to Marine Life: Large pieces of space debris that fall into the oceans can endanger marine life and contribute to pollution.

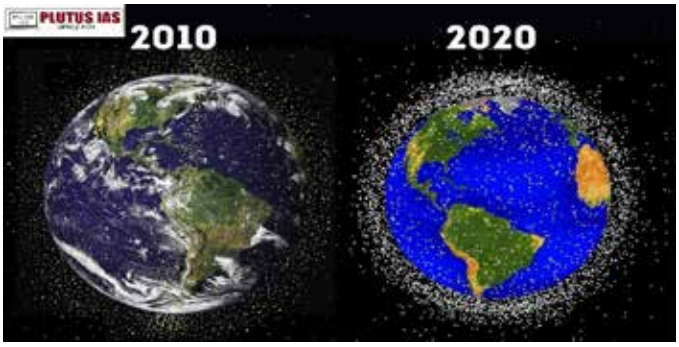
Impact on Space Situational Awareness: Space debris can compromise the effectiveness of space situational awareness systems, making it more difficult to monitor and track operational satellites and other space objects.

Increased Complexity: The growing volume of space debris necessitates more complex and sophisticated tracking and mitigation strategies, which can be resource-intensive and costly.

KESSLER SYNDROME

Kessler Syndrome, also known as the Kessler Effect or collisional cascading, is a theoretical scenario in which the density of objects in low Earth orbit (LEO) is high enough that collisions between objects could cause a cascade effect. This means that each collision generates more debris,

which in turn increases the likelihood of further collisions. The concern is that this self-sustaining chain reaction could significantly increase space debris, rendering certain orbits unusable and posing a severe risk to satellites, space missions, and the International Space Station (ISS).



WORLD`S FIRST 3D PRINTED ROCKET BY INDIAN STARTUP AGNIKUL"

WHY IN THE NEWS?

Agnikul Cosmos Private Ltd., a space start-up based in Chennai, made history by launching the world's first rocket with a single-piece 3D-printed engine. The rocket, named Agnibaan Sub Orbital Technology Demonstrator (SOrTeD), was successfully launched from Sriharikota.

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ABOUT AGNIBAAN:

The Agnibaan SOrTeD marks India's first rocket launch from a private launchpad, named 'Dhanush,' which was set up by Agnikul.

This launch also represents India's debut in using a semi-cryogenic engine and the world's first deployment of a single-piece 3D-printed engine, both designed and built domestically.

According to Agnikul, the primary objective of this mission is to conduct a test flight to validate their homegrown technologies, gather essential flight data, and ensure the systems' optimal performance for their orbital launch vehicle, the 'Agnibaan.'

START-UPS IN THE SPACE INDUSTRY:

Pixxel: focuses on Earth-imaging satellites used for applications such as agricultural monitoring and disaster management.

Skyroot Aerospace: Focuses on Developing cost-effective launch vehicles, including the Vikram series, designed for small satellite launches.

Agnikul Cosmos: Focuses on Specializing in 3D-printed rocket engines and launch services, aiming to enhance accessibility to space with their innovative solutions.

Astrome Technologies: Focuses on High-capacity satellite communication through a low Earth orbit (LEO) constellation to provide global internet access.

Bellatrix Aerospace: Focuses on Developing propulsion systems and satellite propulsion services, offering efficient options for manoeuvring in space.

INDIAN SPACE STARTUPS FACE SEVERAL CHALLENGES:

Funding: Startups struggle to secure the necessary funding to build prototypes and demonstrate proof of concept, which are essential for product development. Venture

Capital Funding Gap: The amount of venture capital available for product development is insufficient in India, making it hard for startups to sustain and grow their operations.

Complex and Evolving Regulations: Navigating the regulatory landscape is challenging due to unclear and frequently changing regulations.

Lack of Institutional Support: Startups often depend on ISRO and DRDO for customers, which can limit their growth opportunities from expanding their customer base and scaling up.

Limited Deep-Pocket Investors: The scarcity of substantial investors in India hampers the ability of startups to secure necessary growth funding.

Implementation of IN-SPACe: The establishment of IN-SPACe, a new regulatory body, must avoid adding a bureaucratic burden for private players.

Import Dependence: Approximately 95% of components required for space solutions are imported, which increases costs and impacts self-sufficiency.

Global Competition: To compete globally, India needs to develop a strong funding ecosystem akin to those in the United States and Europe.

GOVERNMENT INITIATIVES:

Seed Funding: Providing substantial seed funding to startups leveraging satellite data for sectors like agriculture and disaster management.

Soft Funds: Establishing soft funds and additional incentives to accelerate the growth of the space sector by offering financial support to startups.

Venture Capital Funding: Encouraging venture capital firms to invest in the space sector by offering incentives and support for investments in startups.

Private Investments: Facilitating private investments by creating a favourable regulatory environment and supporting startups in raising capital from private investors.

Collaborations and Partnerships: Promoting collaborations and partnerships between startups, private companies, higher educational institutions and government agencies to share resources and expertise, thereby reducing costs and enhancing growth potential.

Export Licenses: Providing export licenses to startups, enabling them to participate in global projects and expand their customer base.

Regulatory Framework: Establishing a clear and business-friendly regulatory framework to ensure policy stability and predictability renders it for startups to operate and grow.

International Partnerships: Facilitating international partnerships and collaborations to leverage global expertise and resources, thereby enhancing the competitiveness of Indian space startups.

Tax Incentives: Offering tax incentives to startups and investors to reduce the financial burden and make investments in the space sector more attractive.

Way forward:

Streamline Regulations: Establish a clear and business-friendly regulatory framework to provide policy stability and predictability, making it easier for startups to operate and grow.

Promote Ease of Doing Business: Implement schemes to promote ease of doing business for space tech businesses, including tax incentives and support for research and development.

Develop Local Capabilities: Encourage the development of local capabilities by providing funding and resources for research and development in space technology, enabling startups to innovate and develop new products and services.

Support for Research and Development: Provide funding and resources for research and development in space technology, enabling startups to innovate and develop new products and services.

Visionary Leadership: Encourage visionary leadership by providing support for startups and private companies in innovation and growth in the space sector.

PRELIMS QUESTION

Q. Consider the following statements concerning AI:

1. Voice to control devices.
2. Driverless Car.
3. Development of customised medicine.
4. Climate resilient infrastructure.

Which of the above statement/s is/are correct?

(a) 2, and 3 only

(b) 3 and 4 only

(c) 3 and 4 only

(d) All of the above

Q2. Consider the following statements regarding Project NETRA:

1. It is one of the Flagship Projects of DRDO.
2. Under the project, DRDO plans to develop an unmanned aerial vehicle to surveil border districts.

Choose the correct answer using the codes given below:

(a) 1 Only

(b) 2 Only

(c) Both 1 and 2

(d) Neither 1 nor 2

Q3. Consider the following statements:

1. 74% FDI allowed in the space industry in INDIA.
2. Start-up Agnikul developed the world`s first 3D Satellite rocket engine.

Which of the following is/are correct about the Indian space industry?

(a)1 only

(b) 2 only

(c) Both 1 and 2.

(d) Neither 1 nor 2

Answer

S. No.	Answers
1.	D
2.	D
20	B

MAINS QUESTION

Q1. Critically Analyse the "In the context of India, the widespread adoption of artificial intelligence is anticipated to revolutionise every industry, yet it is imperative to acknowledge its limitations. With this in mind, let's delve into the advantages and obstacles linked with AI in India."

Q2.What are the major concerns associated with Space debris in Satellite operations? How are various countries and organisations responding to the issue of Space debris?

Q3. As India`s space industry achieves milestones in the sector, What steps should be taken by the government industry-academia to make India a leader in the sector?

ECOLOGY AND ENVIRONMENT

INVASIVE ALIEN SPECIES

WHY IN THE NEWS?

In 2024-2025, the Kerala government's decision to grant permission to the Kerala Forest Development Corporation (KFDC) to plant eucalyptus trees stirred up controversy. Environmentalists swiftly voiced their concerns, arguing that such a move would have **detrimental effects on forests and exacerbate human-animal conflicts i**n the future.

Consequently, on May 20, the government took steps to amend its initial order. The revised directive now strictly limits permission to the **removal of exotic tree species solely from lands under the control** . This adjustment aims to address the environmental and ecological concerns raised by various stakeholders while still allowing the KFDC to pursue its financial objectives within defined parameters.

WHAT ARE EXOTIC PLANTS?

Exotic plants are non-native species that have been introduced to a region or ecosystem where they did not originally occur. These plants are typically brought in deliberately or accidentally by humans, often for **ornamental purposes, agriculture, or landscaping.**

Exotic plants can sometimes thrive in their new environment, **outcompeting native species and disrupting the balance of the ecosystem**. In some cases, they may become **invasive, spreading rapidly and causing harm to the environment, agriculture, or human health**.

Examples of exotic plants include certain species of invasive weeds, ornamental flowers, and agricultural crops introduced to new regions.

WHAT ARE INVASIVE ALIEN SPECIES?

Invasive alien species, often referred to simply as invasive

species, are plants, animals, fungi, or microorganisms that are introduced to a new environment and cause significant harm to the ecosystem, economy, or human health.

These species typically thrive in their new environment due to a lack of natural predators, competitors, or diseases that would normally keep their populations in check in their native habitats.

Invasive alien species can outcompete native species for resources such as food, water, and habitat, leading to declines in biodiversity and ecosystem health.

Invasive species are considered one of the greatest threats to biodiversity worldwide and can have severe economic impacts, such as **reducing agricultural yields, damaging infrastructure, and increasing the cost of controlling their populations**.

Examples of invasive alien species include plants like **kudzu and water hyacinth, animals like the cane toad** and **Asian carp, and pathogens like the chytrid fungus,** which has devastated amphibian populations in many parts of the world.

IMPACT OF INVASIVE ALIEN SPECIES

The impact of invasive alien species on ecology can be profound and wide-ranging:

Biodiversity Loss: Invasive species can outcompete native species for resources such as food, water, and habitat. This competition can lead to a decline in native species populations, potentially resulting in local extinctions and reducing overall biodiversity.

Altered Ecosystem Dynamics: When invasive species become dominant in an ecosystem, they can disrupt natural ecological processes such as nutrient cycling, pollination, and seed dispersal. This disruption can have cascading effects throughout the ecosystem, affecting the abundance and distribution of other species.

Habitat Degradation: Invasive species often have high reproductive rates and aggressive growth habits, allowing them to quickly colonize and dominate habitats. This can lead to the degradation or loss of native habitats such as forests, wetlands, and grasslands, further exacerbating the decline of native species.

Changes in Community Structure: The introduction of invasive species can alter the composition and structure of ecological communities. For example, invasive predators can decimate populations of native prey species, leading to imbalances in predator-prey relationships and ecosystem function.

Genetic Pollution: Invasive species can hybridize with native species, leading to genetic pollution and loss of genetic diversity within native populations. This can weaken the adaptive capacity of native species to respond to environmental changes and threats.

Increased Vulnerability to Other Threats: Invasive species can make ecosystems more vulnerable to other stressors such as habitat destruction, pollution, and climate change. By reducing the resilience of ecosystems, invasive species can exacerbate the impacts of these threats on native biodiversity.

Overall, the ecological impacts of invasive alien species can be long-lasting and difficult to reverse. Prevention, early detection, and rapid response are critical for managing and mitigating the effects of invasive species on ecosystems.

VULNERABILITY OF THE NORTH-EAST TO THE LANDSLIDE

WHY IN THE NEWS?

Following cyclone Remal, severe storms and landslides triggered by heavy rainfall led to the loss of at least 31 lives and left numerous individuals injured across three north-eastern states.

THE VULNERABILITY OF LANDSLIDES TO CYCLONES:

Heavy rainfall: Cyclones bring heavy and sustained rainfall, which can saturate soils and destabilise slopes, triggering landslides. The search results indicate that a single day's rainfall usually does not trigger landslides, but a prolonged spell of heavy rain over a week or ten days can be dangerous.

Slope instability: Cyclones can exacerbate slope instability, especially in regions with fragile, soft, and weathered rock formations along steep slopes, which are common in the North-Eastern Region of India. Anthropogenic factors like slope modification for construction and lack of proper drainage can further contribute to slope instability.

Disruption of infrastructure: Landslides triggered by cyclones can damage critical infrastructure like roads, railways, and communication networks, disrupting relief and recovery efforts. This is a major challenge in the North-Eastern Region, where landslides frequently disrupt connectivity along road corridors and railway tracks.

Cascading effects: Cyclone-induced landslides can lead to secondary disasters, such as the breaching of landslide dams, causing flash floods and further damage downstream.

EFFECTS OF LANDSLIDE:

Loss of Life and Property: Landslides cause loss of life and

property, burying houses, roads, and other infrastructure, leading to fatalities and injuries.

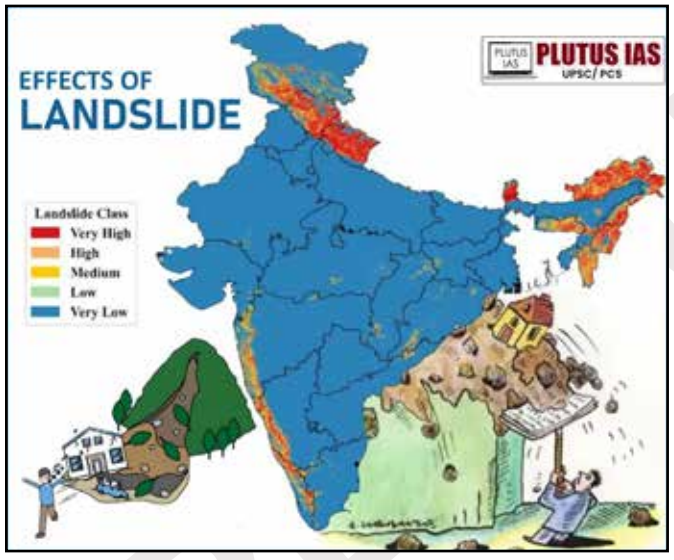
Environmental Damage: Landslides can alter natural watercourses, leading to flooding and erosion and damaging ecosystems by destroying vegetation and wildlife habitats.

Infrastructure Damage: Landslides can damage or destroy buildings, roads, bridges, and other infrastructure, disrupting daily life and economic activities.

Displacement and Loss of Property: Landslides can force communities to evacuate and result in the loss of homes and property, leading to displacement and economic hardship.

Economic Impacts: By disrupting transportation systems, causing delays and increased transportation costs, damaging buildings and infrastructure, and leading to costly repairs.

Social Impacts: By displacing communities, leading to social disruption and psychological stress, and disrupting access to healthcare and education, leading to long-term social consequences.



CHALLENGES IN COMBATING LANDSLIDES:

Highly seismic zone: The region falls under the highest seismic risk zone **(Zone V)** in India's seismic zoning map, making it highly susceptible to earthquakes that can trigger landslides. Heavy monsoon rainfall (up to 600 mm in 2 days) further exacerbates the problem.

The physiography and local geology of the NER plays a important role in the failure of rock formations and overburden, leading to landslide hazards. Fragile, soft, and weathered rock formations along steep slopes make the terrain highly prone to landslides. Anthropogenic factors, such as slope modification for construction and lack of proper drainage along roads, further contribute to the challenge.

Landslides in the NER can be shallow and affect urban areas for short durations or deep-seated, disrupting transportation networks for longer periods. The region experiences a frequent disruption of connectivity along road corridors and railway tracks, causing shortages in the supply of essential commodities and inconvenience to travellers.

To optimize disaster management and reduce the impact of landslides, measures such as retrofitting clinics, capacity building for risk management, and implementing disaster risk reduction policies are crucial.

A MULTI-PRONGED APPROACH IS TO MITIGATE THE EFFECTS OF CYCLONES:

Hazard Mapping and Land Use Planning: Using hazard mapping to predict vulnerable areas affected by cyclones based on wind speed, areas affected, flooding frequency, etc. and Implementing effective land use planning to avoid key activities and settlements in the most vulnerable areas.

Engineered Structures and Retrofitting: Designing public infrastructure to withstand wind forces based on hazard mapping and Retrofitting non-engineered structures by constructing steep-slope roofs, anchoring strong posts, planting trees to break wind forces, and repairing shelters.

Cyclone Sheltering and Flood Management: Constructing cyclone shelters at national, state and regional levels considering population density, transportation, communication, and topography and Designing well-planned drainage systems to mitigate flooding with participation from the government and local community.

Ecosystem-based Measures: Improving vegetation cover to increase water infiltration capacity by planting trees in rows, coastal shelterbelt plantations, and mangrove plantations and Constructing saline barriers along the coast to protect habitation, agricultural crops, and installations.

Early Warning Systems and Capacity Building: Developing state-of-the-art early warning dissemination systems for timely evacuation to safe shelters and Capacity building of the community to manage risk mitigation assets like cyclone shelters and saline embankments.

Awareness and Participation: Initiating public awareness programs to increase community participation in the mitigation process and Ensuring the participation of the aged, differently abled, women and children in cyclone risk mitigation efforts.

PRELIMS BASED QUESTION:

Q1. Consider the following statements with respect to the Landslide:

1. Landslides involve the sinking of the ground due to underground material movement.
2. India is among the top five countries globally prone to landslides.
3. Variations in rainfall patterns represent the primary cause of landslides in India.

Which of the statements above is accurate?

(a) 2, 3 only

(b) 1,2 only

(c) 1, 3 only

(d) All of the above

Answer

S. No.	Answers
1.	A

MAINS QUESTION

Q1. Several regions of India have been facing a calamity caused by landslides. Discuss how India combats the calamity region-wise.