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Polity & Governance

- 01. Discuss the structural challenges in India's healthcare system that limit the effectiveness of publicly funded health insurance schemes. Suggest measures to strengthen equitable access to healthcare. (10 Marks)**

Introduction:

Publicly funded health insurance schemes like PM-JAY have expanded financial coverage in India; however, structural deficiencies in the health system limit their ability to ensure universal, equitable, and effective access to healthcare.

Structural Challenges:

1. **Insurance-Access Mismatch:** Health insurance expansion has not translated into proportional increase in hospitalisation or service utilisation. Limited availability of quality facilities and uneven distribution of healthcare infrastructure restrict actual access despite coverage.
2. **Dependence on Private Sector:** Low reimbursement rates under public schemes lead private hospitals to impose additional charges for diagnostics and services. This results in indirect out-of-pocket expenditure and weakens financial protection objectives.
3. **Inadequate Public Health Infrastructure:** Public sector capacity remains strong in primary care but insufficient in secondary and tertiary care. This compels patients to depend on costlier private facilities for advanced treatment.
4. **Rising Burden of Non-Communicable Diseases:** The health system is not fully equipped to manage long-term and chronic diseases, which require sustained care beyond episodic hospitalisation covered under insurance schemes.
5. **Persistent Out-of-Pocket Expenditure:** While routine care costs have reduced, catastrophic expenditures for major illnesses continue, particularly affecting middle-income groups.

Measures to Strengthen Equitable Access:

1. **Strengthening Public Hospital Capacity:** Expand and upgrade public sector hospitals, especially for secondary and tertiary care, to reduce reliance on private providers.
2. **Regulation of Private Healthcare:** Ensure standardised pricing, transparent billing, and effective regulation of private hospitals to prevent hidden costs.
3. **Comprehensive Health Coverage:** Extend coverage beyond hospitalisation to include outpatient care, diagnostics, medicines, and chronic disease management.

Conclusion:

For publicly funded insurance schemes to achieve their intended outcomes, India must move beyond financial coverage and invest in strengthening healthcare delivery systems, ensuring that access is equitable, affordable, and comprehensive.

- 02. Discuss the existing framework for brain death certification in India. What are the key challenges associated with its implementation, and how can they impact organ donation systems? (15 Marks)**

Brain death certification has gained renewed attention due to concerns over premature or incorrect declaration of brain death in organ transplantation cases. The issue requires balancing medical certainty, ethical safeguards, and the need to strengthen deceased organ donation systems.

Existing framework for brain death certification in India:

- **Legal recognition:** Brain death is legally recognised under the Transplantation of Human Organs and Tissues Act, 1994, especially for deceased organ donation.
- **Medical board certification:** Brain death is certified by a four-member medical board, which includes specialists such as a neurologist or neurosurgeon.
- **Two-stage confirmation:** Brain death must be confirmed twice with a prescribed time gap, generally a minimum of 12 hours, to ensure medical certainty.
- **Clinical bedside tests:** The framework relies mainly on clinical examination, including absence of brainstem reflexes, absence of response to light, absence of motor response, and the apnoea test.
- **Apnoea test:** This test checks whether the patient can breathe spontaneously despite rising carbon dioxide levels. Absence of spontaneous breathing indicates brainstem failure.
- **Exclusion of reversible causes:** Doctors must rule out conditions such as drug effects, hypothermia, metabolic disturbances, or other reversible causes before declaring brain death.
- **No mandatory advanced confirmatory tests:** Tests such as EEG or cerebral angiography are not compulsory, though they can provide objective evidence of absent brain activity or blood flow.

Key challenges in implementation:

- **Subjectivity in clinical assessment:** Heavy reliance on bedside tests, especially the apnoea test, can create doubts regarding objectivity and uniformity.
- **Non-adherence to safeguards:** Concerns exist regarding poor documentation, lack of videography, and weak procedural transparency in some cases.
- **Infrastructure limitations:** EEG, angiography, and trained specialists may not be available in smaller hospitals and rural areas.
- **Cost concerns:** Making advanced confirmatory tests mandatory may increase costs and delay certification.
- **Lack of uniform training:** Absence of standardised training among doctors can lead to inconsistent application of protocols.
- **Ethical concerns:** Families may fear that patients are being declared brain dead mainly to facilitate organ retrieval.

Impact on organ donation systems:

- **Erosion of public trust:** Allegations of premature declaration can reduce family consent for organ donation.
- **Lower deceased donation rates:** If certification becomes controversial or delayed, viable organs may be lost.
- **Hospital hesitancy:** Doctors may avoid certification due to fear of legal or ethical scrutiny.
- **Need for stronger safeguards:** Transparent, standardised, and well-documented procedures can improve confidence in the transplantation system.

Way forward:

- India should adopt a more standardised certification protocol with mandatory documentation, videography, and periodic audit.
- Advanced confirmatory tests may be used in doubtful cases or high-risk contexts, without making them impractical for all hospitals.
- Training of doctors and public awareness are essential to protect patient rights while strengthening organ donation.

Conclusion:

Brain death certification is central to India's organ donation ecosystem. A scientifically reliable, ethically transparent, and legally robust framework is necessary to maintain public trust while ensuring that life-saving organ transplantation is not weakened.

03. Why is the floor test considered the most legitimate method for determining majority support in a parliamentary democracy? Examine with reference to constitutional morality and federalism. (15 Marks)

Introduction:

A floor test is a procedure conducted in the Legislative Assembly to determine whether the government enjoys the confidence of the House. In a parliamentary democracy like India, the executive derives legitimacy from the support of the elected legislature. Therefore, the Supreme Court has repeatedly emphasized that majority should be tested on the floor of the House rather than through the subjective satisfaction of the Governor.

Why Floor Test is Considered the Most Legitimate Method?**1. Upholds the Principle of Parliamentary Democracy:**

- The Council of Ministers is collectively responsible to the Legislative Assembly under Article 164.
- Therefore, legitimacy of the government depends on legislative confidence and not on gubernatorial discretion.
- A floor test ensures that elected representatives decide the majority question.

2. Prevents Arbitrary Exercise of Discretion:

- Governors may otherwise rely on personal assessments, political claims or external pressures.
- Floor tests reduce the possibility of partisan or politically motivated decisions.
- It limits misuse of discretionary powers in hung Assemblies.

3. Ensures Transparency and Objectivity:

- The voting process in the Assembly provides a clear numerical outcome.
- It removes ambiguity regarding support enjoyed by a political party or coalition.
- Public and constitutional institutions can clearly verify majority support.

4. Protects Constitutional Morality:

- Constitutional morality requires constitutional authorities to act according to democratic values, fairness and institutional restraint.
- Delaying or selectively inviting parties may violate democratic ethics.
- Conducting an immediate floor test respects the spirit of representative democracy.

5. Strengthens Federalism:

- Arbitrary gubernatorial actions may be perceived as interference by the Union government in State politics.
- Floor tests reduce chances of misuse of the Governor's office for political purposes.
- This protects the autonomy and democratic mandate of State governments.

6. Supported by Judicial Pronouncements:

- In **S.R. Bommai v. Union of India (1994)**, the Supreme Court held that majority must be tested on the floor of the House.
- In **Nabam Rebia case (2016)**, the Court clarified that gubernatorial discretion is limited by constitutional boundaries.
- Courts have consistently treated floor tests as the most democratic and constitutionally valid mechanism.

Challenges Associated with Floor Tests:

- Possibility of horse-trading and political defections.
- Pressure tactics on legislators before voting.
- Delays in conducting floor tests may create constitutional instability.

Way Forward:

- Clear codified guidelines should be evolved for Governors in hung Assemblies.
- Floor tests should be conducted within a short time frame.
- Greater adherence to Sarkaria and Punchhi Commission recommendations is required.
- Political neutrality of the Governor's office must be preserved.

Conclusion:

The floor test represents the core democratic principle that governments derive legitimacy from the confidence of the elected House. By ensuring transparency, limiting arbitrary discretion and protecting federal balance, it upholds both constitutional morality and parliamentary democracy. Hence, the floor test remains the most legitimate and constitutionally appropriate method to determine majority support in India.

04. Examine the key causes behind the growing Centre–State tensions in India in recent times. (10 Marks)**Introduction:**

Centre–State tensions refer to disagreements between the Union and State governments over powers, resources and decision-making. In a federal democracy like India, cooperative federalism is essential for smooth governance and balanced development.

Key Causes:

- **Fiscal disputes:** States often complain about reduced fiscal autonomy, delays in GST compensation, centrally sponsored scheme conditions and unequal distribution of resources.
- **Role of Governor:** Frequent controversies arise over delay in assent to Bills, appointment issues and the Governor's perceived political role.
- **Use of central agencies:** States allege selective use of agencies such as ED, CBI and Income Tax Department against opposition-ruled States.
- **Legislative conflicts:** Disputes emerge when Union laws affect areas linked to State interests, such as agriculture, policing, education and public order.
- **Political differences:** Different parties ruling at the Centre and States often convert administrative issues into political conflicts.
- **Regional and identity issues:** Language, reservation, delimitation, border disputes and local resource control also create tensions.

Impact:

- Weakens cooperative federalism and trust between governments.
- Delays implementation of welfare schemes and development projects.
- Creates policy uncertainty and affects public service delivery.
- Encourages competitive politics instead of collaborative governance.

Way Forward:

- Strengthen the **Inter-State Council** and regular Centre–State consultations.
- Ensure fair fiscal devolution and greater flexibility to States.
- Make the Governor’s office more neutral and constitutional.
- Promote cooperative federalism over political confrontation.

Conclusion:

A strong Centre and empowered States are both necessary for India’s unity and development. Balanced Centre–State relations can deepen democracy and improve governance.

05. “The growing stray dog population in Indian cities has transformed from a municipal issue into a constitutional and public health challenge.” Discuss the legal, ethical, and administrative dimensions of the stray dog issue in India.

Introduction:

The rise in stray dog populations in Indian cities is no longer only a municipal sanitation problem. Frequent dog-bite incidents, rabies risk, urban waste mismanagement and resident–animal welfare conflicts have made it a serious question of **urban governance, public safety and constitutional balancing**.

Legal Dimension:

- **Article 21** guarantees the right to life and personal safety, which includes protection from preventable dog attacks and rabies.
- **Article 51A(g)** places a fundamental duty on citizens to show compassion towards living creatures.
- The **Prevention of Cruelty to Animals Act, 1960** protects animals from cruelty, while the **Animal Birth Control Rules** promote sterilisation and vaccination instead of indiscriminate killing.
- Municipal laws make urban local bodies responsible for sanitation, stray animal management and public health.
- Courts have repeatedly tried to balance **human safety and animal welfare**, especially in disputes over feeding, relocation, sterilisation and aggressive dogs.

Ethical Dimension:

- The issue involves a conflict between **animal rights and human safety**.
- Compassion cannot mean ignoring dog bites, rabies and fear among citizens.
- At the same time, indiscriminate culling, cruelty or unscientific relocation violates humane values.
- Ethical governance requires coexistence through vaccination, sterilisation, shelters for aggressive/sick dogs and responsible pet ownership.

Administrative Dimension:

- Municipal bodies are responsible for sterilisation, vaccination, shelters, complaint redressal and waste control.
- Poor garbage management increases food availability for stray dogs, aiding population growth.
- Weak coordination among municipalities, animal welfare bodies, health departments and police worsens implementation.
- Rabies remains a major public health concern; India accounts for a significant share of global rabies deaths

Key Challenges:

- Rising dog-bite cases and fear in public spaces.
- Poor implementation of ABC programmes.
- Conflict between residents and animal activists.
- Lack of reliable dog population data, funding and trained personnel.

Way Forward:

- Implement scientific **ABC** and **mass anti-rabies vaccination**.
- Strengthen municipal accountability and ward-level monitoring.
- Improve waste management and feeding regulation.
- Create clear legal SOPs for aggressive, rabid and sick dogs.
- Promote awareness on dog-bite response and responsible pet ownership.

Conclusion:

India needs a balanced approach that protects **human life and public health** while respecting **animal welfare and compassion**. The solution lies not in cruelty or neglect, but in scientific, humane and accountable urban governance.

Economy

- 06. “Rapid economic growth does not automatically ensure inclusive development.” Examine the changing nature of inequality in India in the context of urbanisation, service-sector expansion and consumption disparities. (15 Marks)**

Introduction:

Rapid economic growth increases national income and expands economic opportunities, but it does not automatically guarantee equitable distribution of benefits. In India, despite sustained high growth, rising urbanisation, expansion of the services sector, and changing consumption patterns have generated new forms of inequality across regions, classes, and social groups.

Nature of Changing Inequality in India:**Uneven Benefits of Urbanisation:**

- Urbanisation has concentrated economic activity in metropolitan regions, creating islands of prosperity alongside expanding informal settlements and urban poverty.
- Access to quality housing, sanitation, healthcare, and education remains highly unequal between affluent urban populations and migrant or informal workers.
- Rural-to-urban migration often results in insecure employment, low wages, and lack of social protection.

Service-Sector Driven Growth:

- India's growth has been led primarily by high-productivity service sectors such as IT, finance, telecommunications, and digital services.
- These sectors generate wealth for highly skilled workers but provide limited opportunities for low-skilled labour.
- Manufacturing has not expanded sufficiently to absorb surplus labour from agriculture, resulting in “jobless growth.”
- Wage disparities between skilled and unskilled workers have widened significantly.

Consumption Disparities:

- Rising aggregate consumption masks unequal purchasing power across households.
- Higher-income groups account for disproportionate growth in luxury consumption, digital access, and financial assets.
- Meanwhile, vulnerable sections continue to face nutritional insecurity, poor healthcare access, and indebtedness.
- Regional disparities between developed and less-developed States further intensify inequality.

Intergenerational and Digital Inequality:

- Unequal access to education, technology, and skill development limits upward social mobility.
- The digital divide creates exclusion from modern economic opportunities, welfare delivery, and online services.

Measures Required:

- Promote labour-intensive manufacturing and MSMEs to generate broad-based employment.
- Strengthen public expenditure on health, education, nutrition, and urban infrastructure.
- Improve social security coverage for informal and migrant workers.
- Ensure inclusive digital and financial access through targeted welfare policies.

Conclusion:

India's experience shows that economic growth alone cannot ensure inclusive development. Sustainable and equitable progress requires redistributive policies, employment generation, human capital investment, and balanced regional development to ensure that the gains of growth reach all sections of society.

07. Calls for reducing fuel consumption, gold imports, and foreign exchange expenditure reflect concerns regarding India's external sector stability. Critically analyse the effectiveness and limitations of austerity-based economic responses in managing external economic crises.

Introduction:

External economic crises emerge when rising imports, currency depreciation, capital outflows, and global commodity shocks create pressure on foreign exchange reserves and the Balance of Payments. In such situations, governments often adopt austerity-oriented measures aimed at reducing foreign exchange outflows through lower fuel consumption, reduced imports, and restrained discretionary expenditure. While such measures may provide temporary macroeconomic relief, their long-term effectiveness remains limited.

Why Governments Adopt Austerity-Based Responses?**1. Reducing Pressure on Forex Reserves:**

- India imports large quantities of crude oil, gold, edible oils, and fertilisers, resulting in substantial foreign currency outflows.
- Reducing consumption of imported goods can temporarily conserve foreign exchange reserves.

2. Containing Current Account Deficit (CAD):

- Lower imports help narrow the gap between imports and exports.
- Reduced gold imports and fuel consumption can improve external sector indicators.

3. Stabilising the Rupee:

- High import demand increases dollar demand and weakens the rupee.
- Conserving foreign exchange can reduce depreciation pressures on the domestic currency.

4. Controlling Imported Inflation:

- Rising global oil prices increase inflation in transport, food, and manufacturing sectors.
- Reduced fuel dependence may moderate inflationary pressures to some extent.

Limitations of Austerity-Based Responses:**1. Risk of Slower Economic Growth:**

- Excessive reduction in consumption can weaken aggregate demand and economic activity.
- Sectors such as transport, tourism, and retail may witness reduced growth.

2. Structural Import Dependence:

- India remains dependent on imports for crude oil, LNG, fertilisers, and edible oils.
- Domestic alternatives cannot replace imports immediately.

3. Adverse Impact on Agriculture and Industry:

- Sharp reduction in fertiliser usage may reduce agricultural productivity and increase food inflation.
- Industrial output may suffer if imported inputs become constrained.

4. Burden on Citizens:

- Inflation and restrained consumption disproportionately affect poor and middle-income households.
- Austerity measures indirectly transfer adjustment burdens to citizens.

5. Temporary Rather Than Structural Solution:

- Consumption reduction may provide short-term relief but cannot permanently strengthen external stability.
- Long-term resilience requires stronger exports, manufacturing, and productivity growth.

Long-Term Measures Needed:

- Strengthening Export Competitiveness:** Expanding manufacturing and exports can improve foreign exchange earnings and reduce trade imbalances.
- Diversifying Energy Sources:** Renewable energy, EVs, ethanol blending, and domestic energy production can gradually reduce import dependence.
- Attracting Stable Capital Inflows:** Higher FDI, policy stability, and improved business conditions can strengthen external sector resilience.

Conclusion:

Austerity-based responses can temporarily reduce foreign exchange pressure during external economic crises. However, excessive reliance on consumption reduction may weaken growth and employment. Sustainable external sector stability ultimately depends on structural reforms that strengthen exports, domestic production, energy security, and economic competitiveness.

08. Discuss the role of Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI) in India's economic development. Why has India witnessed volatility in foreign capital flows in recent years?

(10 Marks)

Foreign investments are important for India's economic growth, industrialisation, employment generation, and integration with the global economy. India receives foreign capital mainly through Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI), both of which play a significant role in strengthening economic and financial development.

Role of FDI and FPI in India's Economic Development:

- FDI brings long-term capital into sectors such as manufacturing, infrastructure, banking, telecommunications, and services.
- FPI increases liquidity in stock and bond markets and strengthens capital markets.
- Foreign investments support industrial growth, infrastructure creation, and employment generation.
- They promote technology transfer, innovation, and managerial expertise.
- Foreign capital improves foreign exchange reserves and investor confidence.
- FDI and FPI help India integrate with global supply chains and financial markets.
- Government initiatives such as PLI schemes, digital governance reforms, and infrastructure expansion aim to attract greater foreign investments.

Reasons for Volatility in Foreign Capital Flows:

- Rising interest rates in developed economies have shifted capital away from emerging markets.
- Global geopolitical tensions, wars, and economic slowdown have increased investor uncertainty.
- Rising crude oil prices have increased concerns regarding India's current account deficit.
- Taxation complexity and regulatory uncertainty discourage long-term investors.
- High logistics costs, infrastructure gaps, and compliance burden reduce India's competitiveness.
- Competition from countries such as Vietnam and Indonesia has intensified in manufacturing investments.

Way Forward:

- India must ensure stable and predictable taxation and regulatory policies to improve investor confidence.
- Greater investment in infrastructure, logistics, and manufacturing competitiveness is necessary.
- Faster judicial processes, ease of doing business reforms, and labour reforms can help attract sustained long-term capital inflows.

Conclusion:

FDI and FPI remain essential for India's economic growth, financial stability, and industrial development. However, global uncertainty and domestic structural challenges have increased volatility in foreign capital flows. Comprehensive reforms aimed at improving competitiveness, policy stability, and investor confidence are necessary for attracting stable and long-term foreign investments.

09. "Rising government bond yields reflect deeper macroeconomic stress rather than merely changes in financial market conditions." Discuss. (10Marks)

Introduction:

Government bond yield is the return investors demand for lending money to the government. Rising yields may reflect normal financial market changes, but when sustained, they can indicate deeper macroeconomic vulnerabilities.

Rising Bond Yields as a Reflection of Deeper Macroeconomic Stress:

- **High inflation** reduces real returns, so investors demand higher yields.
- **Fiscal deficit** increases government borrowing needs, pushing yields upward.
- **High public debt** raises concerns about debt sustainability.
- **Currency depreciation and capital outflows** make investors demand risk premium.
- **Slower growth** weakens investor confidence in the economy.
- **Global shocks** like oil price rise, wars and recession fears worsen macro stability.
- Higher government borrowing may **crowd out private investment** by raising overall interest costs.

Rising Bond Yields as Changes in Financial Market Conditions:

- Bond yields may rise due to **central bank monetary tightening** and repo rate hikes.
- Reduced liquidity in the banking system can raise yields.
- Investor sentiment and risk appetite influence bond demand.
- Rise in **US Treasury yields** may transmit to emerging markets.
- FII and institutional investors may rebalance portfolios away from bonds.
- Demand-supply mismatch in the bond market can also raise yields.

Critical Analysis / Balanced Assessment:

- Bond yields are financial indicators, but sustained rise often signals fiscal and macro stress.
- Short-term rise may be market-driven; prolonged rise is more serious, especially for emerging economies.

Challenges:

- Higher government borrowing cost.
- Increased debt servicing burden.
- Crowding out of private credit and investment.
- Pressure on fiscal consolidation.
- Slowdown in growth and decline in investor confidence.

Way Forward:

- Maintain fiscal discipline and reduce deficit.
- Strengthen inflation management.
- Deepen domestic bond markets.
- Improve policy predictability and investor confidence.
- Support macroeconomic stability through growth-oriented reforms.

Conclusion:

Rising government bond yields are not merely financial market fluctuations; when sustained, they often reflect broader macroeconomic stress. Sound fiscal and monetary coordination is essential to preserve stability.

International Relations

- 10. The contemporary U.S.–China relationship is increasingly characterised by simultaneous economic interdependence and strategic rivalry. Examine in the context of recent developments relating to trade, technology, and geopolitical competition. (15 Marks)**

Introduction:

The U.S.–China relationship represents one of the most significant dynamics shaping the contemporary international order. While both countries remain deeply interconnected economically through trade, investment, and supply chains, they are simultaneously engaged in growing strategic rivalry across technology, geopolitics, defence, and global governance.

Economic Interdependence between the U.S. and China:**Trade and Manufacturing Linkages:**

1. China remains a major manufacturing hub and export partner for the United States.
2. American companies depend heavily on Chinese supply chains for electronics, consumer goods, and industrial inputs.
3. China also depends on access to U.S. markets, finance, and advanced technologies.

Financial and Global Economic Integration:

1. Both economies significantly influence global trade, commodity prices, and financial markets.
2. Economic instability in either country affects global inflation, investments, and growth.
3. Despite tensions, complete economic decoupling remains difficult due to mutual dependence.

Growing Strategic Rivalry:**Trade and Economic Competition:**

1. Tariff wars and restrictions on market access have intensified economic tensions.
2. Both countries increasingly view trade and supply chains through a national security lens.
3. Efforts toward supply-chain diversification and reshoring are accelerating.

Technology and AI Competition:

1. Artificial Intelligence, semiconductors, quantum computing, and digital infrastructure have become major areas of competition.
2. The U.S. has imposed export controls on advanced semiconductor technologies and chip-making equipment.
3. China is investing heavily in technological self-reliance and indigenous innovation.

Geopolitical and Security Competition:

1. Rivalry is expanding in the Indo-Pacific region, particularly regarding Taiwan and the South China Sea.
2. Both countries are strengthening military capabilities and strategic partnerships.
3. Competition also extends to influence in international institutions, critical minerals, and emerging technologies.

Energy and Supply Chain Geopolitics:

1. Strategic competition increasingly involves control over rare earths, batteries, and clean-energy technologies.
2. Regional instability in West Asia and maritime chokepoints affects both powers' economic interests.

Implications for the World

1. The rivalry is accelerating fragmentation of global trade and technology ecosystems.
2. Countries increasingly face pressure to balance relations between competing blocs.
3. Global governance institutions are witnessing growing polarisation and strategic competition.

Implications for India:**Opportunities:**

1. India may benefit from supply-chain diversification and rising global investments.
2. Strategic partnerships with major powers can strengthen India's technological and economic capabilities.

Challenges:

1. Intensifying rivalry may increase geopolitical pressures on India's strategic autonomy.
2. Regional instability and technological fragmentation may affect trade, energy security, and growth.

Conclusion:

The contemporary U.S.–China relationship is marked by a complex coexistence of economic interdependence and strategic rivalry. While mutual dependence limits complete confrontation, expanding competition in technology, trade, and geopolitics is reshaping the global order. Managing this rivalry will remain critical for global stability and for countries like India navigating an increasingly multipolar world.

11. The Arctic is no longer a distant frozen region but an emerging theatre of climate, commerce and strategic competition. Discuss its significance for India. 15M.

Introduction:

The Arctic, once seen as a remote ice-covered region, is now undergoing rapid transformation due to climate change, melting sea ice, new shipping routes, resource exploration and great power rivalry. For India, the Arctic is significant not only for climate science but also for energy security, trade, geopolitics and strategic preparedness.

Significance of the Arctic for India:**1. Climate and Monsoon Linkages:**

- Changes in the Arctic directly influence global climate systems.
- Melting Arctic ice affects atmospheric circulation, jet streams and ocean currents.
- These changes can influence the Indian monsoon, extreme weather events, heatwaves and rainfall variability.
- Since India is highly dependent on monsoon-based agriculture, Arctic research becomes important for food and water security.

2. Scientific Research:

- The Arctic acts as an early warning system for climate change.
- India's research station **Himadri** at Ny-Ålesund, Svalbard, helps study atmospheric science, glaciers, marine ecosystems and climate patterns.
- Arctic research also supports India's polar science capabilities in both the Arctic and Antarctica.

3. Energy and Mineral Resources:

- The Arctic region has large reserves of oil, natural gas and minerals.
- As India's energy demand is rising, the Arctic may become important for long-term energy diversification.
- Rare earths and critical minerals found in Arctic regions may also be relevant for India's clean energy and technology sectors.

4. Trade and Connectivity:

- Melting ice is opening new sea routes such as the **Northern Sea Route**.
- These routes may reduce travel distance between Europe and Asia.
- India may benefit through shorter shipping time, lower transport costs and new connectivity opportunities.
- However, these routes are still risky due to harsh weather and inadequate infrastructure.

5. Geopolitical and Strategic Importance:

- The Arctic is witnessing increasing competition among Russia, the USA, China, Canada and Nordic countries.
- China's idea of a "Polar Silk Road" shows the growing strategic value of the region.
- India needs to monitor these developments to protect its economic and strategic interests.

6. India's Arctic Policy:

- India's Arctic Policy focuses on scientific research, climate and environmental protection, economic cooperation, governance, human capacity building and international cooperation.
- India is also an Observer in the **Arctic Council**, which gives it a platform for engagement.

Challenges:

- Harsh climate and high operational costs limit Indian participation.
- Geopolitical tensions may restrict cooperation.
- Excessive commercial exploitation can damage fragile Arctic ecosystems.
- India has limited infrastructure and private sector presence in the region.

Way Forward:

- India should strengthen polar research and climate modelling.
- Cooperation with Arctic states must be deepened in science, energy and shipping.
- India should promote sustainable and responsible Arctic development.
- Greater investment in polar technology, ice-class vessels and trained manpower is needed.

Conclusion:

The Arctic is important for India's climate security, energy interests, trade prospects and strategic outlook. India must pursue a balanced approach based on science, sustainability and strategic engagement.

Environment, Ecology and Disaster Management

- 12. "Tiger conservation in India has entered a second phase where ecological balance matters more than population growth." Discuss with reference to carrying capacity and habitat connectivity. (10 Marks)**

Introduction:

India has successfully increased its tiger population to 3,682 (2022). However, conservation has now entered a second phase where the focus must shift from increasing numbers to ensuring ecological balance and sustainability.

Carrying Capacity and Its Implications:

- Carrying capacity refers to the maximum number of tigers that a habitat can sustainably support based on prey availability, territory, and ecological conditions.
- When tiger populations exceed this limit, it leads to increased competition, forcing weaker individuals to disperse outside protected areas.
- Such dispersal often results in higher human-tiger conflict, livestock predation, and retaliatory killings, as seen in parts of Madhya Pradesh.

Importance of Habitat Connectivity:

- Habitat connectivity through wildlife corridors enables movement of tigers between reserves for dispersal and breeding.
- It helps maintain genetic diversity and prevents isolation of populations.
- Fragmentation due to infrastructure and land-use change disrupts corridors, increasing inbreeding risks and conflict during dispersal.

Need for Ecological Balance:

- Excessive focus on population growth without habitat expansion can strain ecosystems and reduce prey availability.
- Conservation must therefore prioritize habitat quality, prey base, and coexistence with local communities.

Conclusion:

India's tiger conservation must now move beyond numbers to a habitat-centric approach, where managing carrying capacity and ensuring connectivity are essential for long-term sustainability.

13. Carbon Border Adjustment Mechanism (CBAM) reflects the intersection of climate policy and international trade. Examine the challenges it poses for developing economies and evaluate the need for a robust domestic carbon pricing mechanism. Suggest suitable measures for an effective response. (15 Marks)

Introduction:

CBAM is a trade-linked climate policy tool, notably introduced by the European Union, that imposes a carbon cost on imports based on their embedded emissions. It aims to prevent "carbon leakage" while ensuring a level playing field between domestic and foreign producers.

Challenges for Developing Economies:

- **Trade Competitiveness Loss:** Export sectors like steel, cement, and aluminium face higher costs, reducing price competitiveness in global markets.
- **Lack of Carbon Pricing Systems:** Many developing countries lack established carbon markets, making compliance difficult.
- **Data and Measurement Constraints:** Limited technical capacity to measure and verify embedded emissions accurately.
- **Equity Concerns:** CBAM may violate the principle of *Common but Differentiated Responsibilities (CBDR)* under global climate frameworks.
- **Risk of Protectionism:** Perceived as a disguised trade barrier favoring developed economies.
- **Impact on Industrialisation:** Raises costs for carbon-intensive industries, slowing growth and employment generation.
- **Administrative Burden:** Complex reporting and certification requirements increase compliance costs.

Need for a Robust Domestic Carbon Pricing Mechanism:

- **Avoid Double Taxation:** Domestic carbon pricing allows exporters to claim adjustments under CBAM, reducing external burden.
- **Enhance Competitiveness:** Aligns domestic industry with global low-carbon standards.
- **Encourage Green Transition:** Incentivizes adoption of cleaner technologies and energy efficiency.
- **Revenue Generation:** Provides fiscal space for green investments and climate adaptation.
- **Policy Sovereignty:** Ensures countries design their own climate policies rather than being externally dictated.

Measures for Effective Response:

- **Develop Carbon Markets:** Operationalise emissions trading systems (e.g., India's emerging carbon market framework).
- **Strengthen MRV Systems:** Build robust *Measurement, Reporting, and Verification (MRV)* infrastructure for emissions tracking.

- **Technology Upgradation:** Promote cleaner production through subsidies, incentives, and innovation support.
- **Climate Finance Mobilisation:** Leverage global funds and partnerships to support transition costs.
- **Trade Negotiations:** Engage in multilateral forums (e.g., World Trade Organization) to address equity and fairness concerns.
- **Diversification of Exports:** Shift towards low-carbon and high-value goods to reduce vulnerability.
- **Capacity Building:** Support MSMEs and industries in compliance and green transition.

Conclusion:

CBAM signals a shift where climate action increasingly shapes global trade rules. For developing economies, a proactive strategy combining domestic carbon pricing, technological transition, and diplomatic engagement is essential to safeguard growth while aligning with global climate goals.

14. **Battery Energy Storage Systems (BESS) are emerging as an essential component of India's clean energy transition. Examine their significance in ensuring renewable energy reliability, reducing power curtailment and supporting sustainable economic growth.**

Introduction:

Battery Energy Storage Systems (BESS) store electricity generated from renewable sources and supply it when generation falls or demand increases. As India expands solar and wind energy capacity, BESS are becoming crucial for grid stability, efficient energy utilisation and long-term energy security.

Significance of BESS:

Ensuring Renewable Energy Reliability:

- Solar and wind energy are intermittent and depend on weather conditions, leading to fluctuations in power supply.
- BESS store surplus electricity during peak generation periods and release it during periods of low generation or high demand.
- They improve grid stability by supporting frequency regulation and reducing voltage fluctuations.
- BESS reduce dependence on coal-based peaking power and support continuous renewable energy supply.

Reducing Power Curtailment:

- Renewable power is often curtailed when the grid cannot absorb excess electricity generated during peak hours.
- BESS absorb surplus electricity and prevent wastage of renewable energy.
- They improve utilisation of installed renewable energy capacity and reduce transmission congestion.
- BESS also support decentralised renewable systems and improve electricity access in remote regions.

Supporting Sustainable Economic Growth:

- Reliable electricity supply improves industrial productivity and supports economic development.
- Expansion of battery manufacturing and recycling industries can generate employment and investment opportunities.
- Reduced dependence on imported fossil fuels strengthens energy security and lowers import expenditure.
- BESS support India's climate commitments by enabling greater adoption of clean energy technologies.

Challenges:

- High initial costs and dependence on imported raw materials remain major constraints.
- Battery recycling and disposal systems are still underdeveloped.
- India requires stronger grid infrastructure and domestic manufacturing capacity for large-scale deployment.

Conclusion:

BESS are essential for integrating renewable energy into India's power system efficiently and reliably. By reducing power wastage, improving grid stability and supporting sustainable economic growth, BESS can play a major role in achieving India's clean energy and climate objectives.

15. Human-wildlife conflict in India is increasingly becoming a manifestation of ecological imbalance rather than merely a conservation challenge. Discuss. 15M (250 Words)

Introduction:

Human-wildlife conflict (HWC) refers to interactions between humans and wild animals resulting in loss of life, crops, livestock, or property. In India, rising conflicts involving elephants, tigers, leopards, monkeys, and wild boars increasingly reflect ecological imbalance caused by habitat fragmentation, climate stress, and unsustainable land-use change rather than merely a wildlife management issue.

Human-Wildlife Conflict as Ecological Imbalance:**Habitat Fragmentation:**

1. Expansion of roads, railways, mining, dams, and urbanisation has fragmented forests and disrupted wildlife corridors.
2. Animals increasingly enter agricultural and settlement areas in search of food and shelter.
3. Example: Elephant movement into villages in Odisha, Assam, and Karnataka due to blockage of migration routes.

Declining Natural Resources:

1. Deforestation and climate change reduce forest food, prey, and water availability.
2. Wildlife increasingly depends on crops and livestock for survival.
3. Crop raiding by monkeys and livestock attacks by leopards often reflect adaptive survival behaviour.

Human Expansion into Biodiversity Zones:

1. Agricultural expansion and population growth have intensified human presence near forests.
2. Biodiversity-rich regions such as the Western Ghats and Central India witness frequent conflicts due to habitat overlap.

Disruption of Ecological Connectivity:

1. Highways, railways, and infrastructure projects interrupt animal movement patterns.
2. Linear intrusions increase both animal mortality and conflict intensity.

Why It is More Than a Conservation Challenge?**Socio-Economic Impact:**

1. Crop damage, livestock loss, and human casualties severely affect rural livelihoods.
2. Delayed compensation often generates hostility toward conservation measures.

Governance Challenges:

1. Existing responses like fencing and animal relocation are largely reactive.
2. Weak land-use planning and poor coordination reduce long-term effectiveness.

Climate Change Factor:

1. Changing rainfall and temperature patterns alter animal movement and resource availability.
2. Droughts and ecological stress intensify competition between humans and wildlife.

Way Forward:

1. Protect wildlife corridors and restore degraded habitats.
2. Promote community participation through compensation and eco-tourism benefits.
3. Use scientific monitoring, early-warning systems, and ecological planning.
4. Ensure balanced development that integrates conservation concerns.

Conclusion:

Human-wildlife conflict in India reflects deeper ecological imbalance arising from unsustainable development and environmental degradation. Therefore, coexistence requires ecological restoration, scientific planning, and community-centred conservation rather than merely controlling wildlife.

- 16. Dust pollution in Delhi has emerged as a major component of urban air pollution rather than merely a seasonal phenomenon. Discuss the major causes of dust pollution, its impact on public health, and suggest long-term solutions for sustainable urban dust management. (10 Marks)**

Introduction

Dust pollution refers to suspended particulate matter, mainly **PM10 and PM2.5**, generated from roads, soil, construction, demolition and other urban activities. In Delhi, it has moved beyond a seasonal problem and has become a **persistent structural component of urban air pollution**.

Body:**Major Causes of Dust Pollution in Delhi:**

- Construction and demolition waste releases large quantities of fine dust into the air.
- Road dust resuspension occurs due to continuous vehicular movement.
- Poor road maintenance, potholes and uncovered road shoulders increase loose dust.
- Unpaved surfaces, barren land and soil erosion add to airborne particulate matter.
- Vehicular movement, tyre wear and brake wear contribute to fine particles.
- Industrial emissions and fly ash from nearby industrial areas worsen dust load.
- Reduced green cover and degradation of the Aravalli ecosystem weaken natural dust barriers.
- Dry climate and seasonal dust storms further intensify the already existing dust problem.

Impact on Public Health:

- Increased exposure to **PM10 and PM2.5** affects the respiratory and circulatory systems.
- It aggravates asthma, bronchitis, COPD and reduced lung function.
- Long-term exposure increases risks of cardiovascular diseases.
- It causes eye irritation, allergies and skin problems.
- Children, elderly people and outdoor workers are most vulnerable.
- It also leads to productivity loss, poor quality of life and higher healthcare burden.

Why It Is More Than Seasonal:

- Rapid urbanisation and continuous infrastructure expansion generate year-round dust.
- Persistent construction, traffic congestion and weak enforcement keep dust levels high.
- Ecological degradation and climate variability further increase airborne dust.

Long-Term Solutions:

- Strictly regulate **construction and demolition waste**.
- Use **mechanised road sweeping** and regular water sprinkling.
- Pave open areas and stabilise loose soil.
- Cover vehicles carrying sand, debris and construction material.
- Expand green belts and restore the **Aravalli ecology**.
- Strengthen real-time monitoring, enforcement and inter-agency coordination.
- Promote integrated urban planning and sustainable transport.

Conclusion:

Dust pollution in Delhi is not merely a seasonal issue but a persistent environmental and public health challenge. Sustainable management requires ecological restoration, strong governance and long-term urban planning.

Science and Technology

17. **India's electric mobility transition is increasingly moving from subsidy-led expansion to regulation-driven transformation. Examine in the context of recent EV policy developments and fuel-efficiency norms.**

Introduction:

India's electric vehicle (EV) transition initially depended largely on subsidies and incentives to create an early market for electric mobility. However, recent EV policy developments and the Bureau of Energy Efficiency's proposed CAFE-3 norms indicate a gradual shift toward a regulation-driven framework focused on long-term emission reduction, industrial transformation and cleaner mobility.

Subsidy-Led EV Expansion in India:

- India promoted EV adoption through schemes such as FAME-I and FAME-II, which provided incentives for electric two-wheelers, buses and charging infrastructure.
- State governments introduced EV policies offering tax exemptions, registration fee waivers and purchase incentives.
- Subsidies helped reduce the cost difference between conventional vehicles and EVs and created initial consumer demand.
- Early EV growth remained concentrated mainly in urban transport and two-wheeler segments.

Shift Toward Regulation-Driven Transformation:**Stronger Fuel-Efficiency Norms:**

- The Bureau of Energy Efficiency's proposed CAFE-3 norms aim to impose stricter fuel-efficiency and emission standards on automobile manufacturers.
- Such norms indirectly encourage greater production of EVs and cleaner technologies to meet fleet-wide efficiency targets.
- Regulatory standards create long-term pressure on industries to invest in sustainable mobility solutions.

New EV Policy Approach:

- Recent EV policies increasingly emphasize phase-out timelines for internal combustion engine vehicles, especially in urban transport sectors.
- Clear timelines provide certainty to manufacturers, investors and charging infrastructure providers.
- The policy focus is gradually shifting from temporary incentives toward structural transformation of the automobile sector.

Focus on Industrial Ecosystem:

- Regulation-driven transition encourages investment in battery manufacturing, charging infrastructure and EV supply chains.
- The EV transition is increasingly linked with energy security, reduced oil imports and climate commitments.
- Policymakers are also focusing on electrification of freight and commercial vehicles, which contribute significantly to emissions.

Challenges:

- High battery costs and inadequate charging infrastructure continue to affect EV adoption.
- Freight electrification remains technologically and financially difficult.
- Excessive dependence on hybrid vehicles may slow full electrification.
- Different State-level policies may create uneven implementation.

Conclusion:

India's EV transition is gradually evolving from a subsidy-supported model toward a more stable regulatory framework based on fuel-efficiency norms, phase-out targets and industrial planning. The growing role of the Bureau of Energy Efficiency and stricter CAFE norms reflects this change. Long-term success will depend upon regulatory certainty, infrastructure expansion and technological innovation capable of supporting sustainable clean mobility.

18. Analyse whether drones represent a revolutionary transformation in warfare or merely an evolutionary extension of conventional military power. (10 Marks)

Introduction:

Drones or Unmanned Aerial Vehicles (UAVs) are remotely operated or autonomous systems used for surveillance, reconnaissance, targeting and strikes

Drones as a Revolutionary Transformation in Warfare:

- **Precision strikes:** Drones enable accurate targeting with reduced risk to soldiers.
- **Real-time intelligence:** They provide continuous surveillance, reconnaissance and battlefield awareness.
- **Asymmetric advantage:** Smaller states and non-state actors can challenge powerful militaries using low-cost drones.
- **Cost-effective warfare:** Drones are cheaper than fighter aircraft and allow wider force projection.
- **AI and swarm warfare:** Integration with automation, artificial intelligence and swarm tactics can overwhelm defences.
- **Remote warfare:** They create psychological pressure and allow attacks without direct battlefield presence.

Drones as an Evolutionary Extension of Conventional Military Power:

- They still serve conventional objectives such as deterrence, surveillance, firepower and territorial control.
- They are used along with air power, artillery, missiles and ground forces.
- Many drones have limited payload, endurance and survivability in contested airspace.
- They depend on satellites, communication networks, data links and human operators.
- Strategic success still depends on broader military capability, logistics, intelligence and command structure.
- Hence, drones complement rather than fully replace traditional platforms.

Critical Analysis / Balanced Assessment:

- Drones are **tactically transformative** because they alter battlefield methods.
- However, they are **not fully strategically revolutionary**, as wars are still decided by doctrine, logistics, industrial capacity and political objectives.
- Their real importance lies in integration with cyber, AI, space and conventional warfare.

Challenges / Concerns:

- Ethical concerns over targeted killings and civilian casualties.
- Cyber vulnerabilities, hacking and spoofing risks.
- Legal ambiguity in cross-border drone strikes.
- Easy access for terrorists and non-state actors.
- Risk of escalation through autonomous warfare.

Way Forward:

- Frame clear international norms on drone warfare.
- Strengthen anti-drone and counter-UAV systems.
- Invest in indigenous UAV and counter-UAV technologies.
- Integrate drones into joint warfare doctrine.
- Ensure ethical oversight and AI regulation.

Conclusion:

Drones represent a major tactical revolution but remain largely an evolutionary extension of military power at the strategic level. Their future impact will depend on how states integrate them into multi-domain warfare

Geography

- 19. The Atlantic Meridional Overturning Circulation (AMOC) acts as a critical regulator of the global climate system.” Examine the causes behind its weakening and discuss its possible implications for India and the world. (15 Marks)**

Introduction:

The Atlantic Meridional Overturning Circulation (AMOC) is a major system of ocean currents in the Atlantic Ocean that transports warm surface water northward and cold deep water southward. It forms a crucial part of the global thermohaline circulation and plays an important role in regulating climate, rainfall, monsoons, and heat distribution across the planet. Recent scientific studies have raised concerns regarding its gradual weakening due to climate change.

Causes Behind the Weakening of AMOC:**1. Global Warming and Arctic Ice Melt:**

- Rising global temperatures are accelerating the melting of Greenland ice sheets and Arctic sea ice.
- Large volumes of freshwater are entering the North Atlantic Ocean.

2. Decline in Salinity and Density:

- AMOC depends on cold, salty, dense water sinking in the North Atlantic.
- Freshwater reduces salinity and density, thereby weakening the sinking process that drives the circulation.

3. Increased Ocean Warming:

- Warmer ocean waters are less dense and do not sink easily.
- This disrupts the “overturning” mechanism of AMOC.

4. Climate Change-Induced Hydrological Changes:

- Increased rainfall, glacier melt, and river discharge into the Atlantic alter the ocean’s salinity balance.
- Such changes disturb deep-water formation.

5. Crossing of Climatic “Tipping Points”:

- Scientists warn that AMOC may approach a tipping point beyond which recovery may become extremely difficult.
- Sudden collapse could trigger irreversible climate disruptions.

Global Implications of Weakening AMOC:

- 1. Extreme Weather Events:** Increased frequency of heatwaves, storms, floods, and droughts across different regions.
- 2. Cooling of Europe:**
 - Europe currently benefits from warm Atlantic currents.
 - Weakening AMOC may significantly reduce temperatures in parts of Europe despite global warming.
- 3. Sea-Level Rise:** The eastern coast of North America may experience accelerated sea-level rise due to altered ocean circulation.
- 4. Disruption of Rainfall Patterns:** Africa, South America, and Asia could witness shifting rainfall belts and agricultural instability.
- 5. Impact on Marine Ecosystems:** Changes in nutrient circulation and ocean temperatures may affect fisheries and marine biodiversity.

Implications for India:**1. Weakening of the Indian Monsoon:**

- AMOC influences global atmospheric circulation and moisture transport.
- A weaker AMOC may reduce monsoon intensity and increase rainfall variability.

2. Agricultural Stress: Irregular monsoons can affect crop productivity, food security, and rural livelihoods.**3. Increased Climate Extremes:** India may witness more frequent droughts, heatwaves, and extreme rainfall events.

4. **Water and Energy Challenges:** Reduced rainfall and glacier-linked hydrological changes may affect irrigation, drinking water, and hydropower generation.
5. **Economic and Social Impacts:** Climate-sensitive sectors such as agriculture, fisheries, and disaster management may face rising pressure.

Conclusion:

AMOC is one of the most important regulators of the Earth's climate system. Its weakening reflects the growing impact of anthropogenic climate change on oceanic processes. Since the consequences could extend far beyond the Atlantic region, strengthening global climate mitigation efforts, improving climate adaptation strategies, and enhancing scientific monitoring of ocean systems have become essential for ensuring long-term environmental and economic stability.

20. **Pre-monsoon thunderstorms in northern India are increasingly causing large-scale destruction and casualties. Examine the factors responsible for the growing intensity of such extreme weather events.**

(10 Marks)

Introduction:

Pre-monsoon thunderstorms over northern India especially in the Indo-Gangetic Plain are becoming more frequent, intense and destructive, with rising casualties and crop-loss patterns over recent decades.

Key climatic and atmospheric factors:

- **Intensifying heat waves and surface heating:** Very high pre-monsoon temperatures (often 40–47°C) create strong thermal gradients, enhancing convection and CAPE (Convective Available Potential Energy), which boosts storm intensity.
- **Global warming and Climate change:** Rising greenhouse-gas concentrations amplify background temperature and moisture, making the pre-monsoon atmosphere more conducive to explosive thunderstorms.
- **Greater moisture availability:** Warmer Sea-surface temperatures in the Bay of Bengal and Arabian Sea increase moisture transport via easterlies and westerlies, leading to heavier rainfall and hail within thunderstorms.
- **Active western disturbances (WDs):** Anomalous frequency and strength of WDs in April–May introduce cool, moist air aloft that collides with hot, dry surface air, triggering intense thunderstorm clusters over the north.
- **Deforestation and Land-use Changes:** Ecological degradation disrupts local climatic regulation and increases vulnerability to extreme weather events.
- **Urban Heat Island Effect:** Rapid urbanisation, concretisation, and loss of green cover increase localized heating and trigger intense convective activity.
- **Increased Lightning Activity:** Rising temperatures and moisture content have significantly increased lightning frequency, causing large-scale casualties.
- **Weak Disaster Preparedness:** Inadequate early warning dissemination, poor urban drainage, and vulnerable infrastructure aggravate losses and casualties.

Conclusion:

The growing intensity of pre-monsoon thunderstorms highlights the increasing climate vulnerability of northern India. Strengthening forecasting systems, climate-resilient infrastructure, ecological restoration, and disaster preparedness is essential to reduce future destruction and protect vulnerable populations.