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GENERAL STUDIES-I

1. THE EL NIÑO-SOUTHERN OSCILLATION (ENSO)

iMPACT ANALYSIS

SYLLABUS:

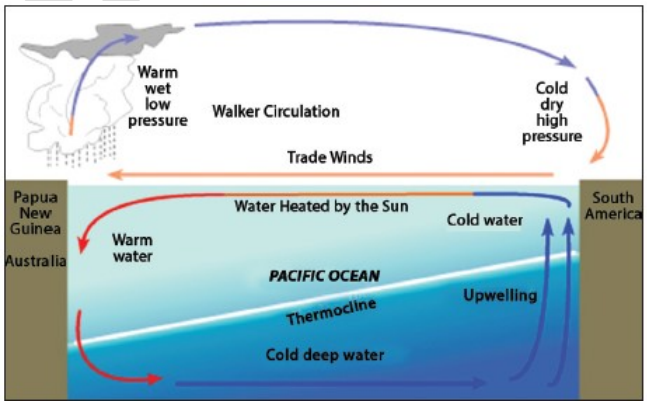
GS 1>Geography >> Atmospheric Circulations

REFERENCE NEWS:

With a La Nina or a cooling of the central Pacific Ocean is expected to firmly take root in September, the India Meteorological Department (IMD) has forecast a rainy September with several parts of north India forecast to receive heavy rainfall. While the monsoon is expected to start retreating in September, the impact of the La Nina is likely to lead to vigorous "cyclonic activity" in the Bay of Bengal and consequently several episodes of rain for most of the month

ENSO

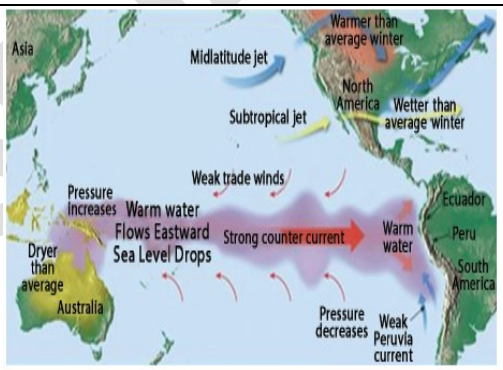
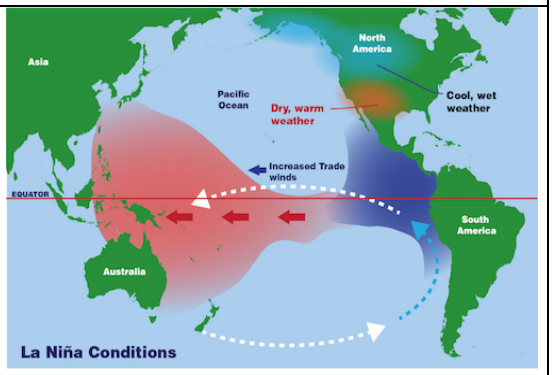
The **Walker circulation** (or Walker cell) which generally occurs **in normal conditions**is driven by the **pressure gradient force** created by a **high-pressure system** over the eastern Pacific Ocean and a **low-pressure system** over Indonesia.A cross-section of the Pacific Ocean along the equator shows the typical atmospheric circulation pattern in the equatorial Pacific.The **thermocline**, a temperature gradient in a body of water that separates layers of different temperatures, is a key feature.The Walker cell is **indirectly related to upwelling** off the coasts of Peru and Ecuador, which brings **nutrient-rich cold water** to the surface and thereby boosts **fishing stocks.**



Southern Oscillation: Refers to the atmospheric pressure variations between the western and eastern Pacific Ocean, which are closely tied to the El Niño and La Niña phenomena. The Southern Oscillation Index (SOI) is used to measure these pressure changes and monitor ENSO

conditions.During an El Niño, sea level pressure tends to be lower in the eastern Pacific and higher in the western Pacific while the opposite tends to occur during a La Niña. o This see-saw in atmospheric pressure between the eastern and western tropical Pacific is called the Southern Oscillation, often abbreviated as simply the SO.

FACTORS	EL NINO	LA NINA
Sea Surface Temperature Anomalies	Characterized by **warmer**-than-average sea surface temperatures in the central and eastern equatorial Pacific Ocean. It is the warm phase of ENSO The warming of the Pacific Ocean is often significant, with temperature anomalies sometimes exceeding 1°C or more above the average.	Characterized by **cooler**-than-average sea surface temperatures in the central and eastern equatorial Pacific Ocean. It is the cool phase of ENSO. The cooling is also significant, with temperature anomalies typically being 1°C or more below the average.
Atmospheric Circulation	Weakens or reverses the typical easterly trade winds across the equatorial Pacific. Leads to a displacement of the Walker Circulation (the east-west atmospheric circulation over the Pacific) and shifts convective activity (thunderstorms) from the western Pacific to the central or eastern Pacific.	Strengthens the easterly trade winds across the equatorial Pacific. Enhances the Walker Circulation, leading to more convective activity over the western Pacific and Indonesia, and drier conditions in the central and eastern Pacific.
Impact on Global Weather pattern	Tends to cause drier conditions in Southeast Asia, Australia, and India, leading to droughts and weaker monsoons. Can cause wetter conditions and increased storm activity along the west coast of the Americas (e.g., increased rainfall in California). Warmer winters in northern parts of North America.	Often leads to wetter conditions in Southeast Asia, Australia, and India, with the potential for stronger monsoons and increased flooding. Tends to cause drier conditions along the west coast of the Americas, particularly in parts of the southern United States and northern Mexico. Colder winters in the northern parts of North America, with increased snowfall. Southern Africa typically receives more rainfall benefitting agriculture while

		eastern Africa suffers from decreased rainfall.
Frequency and Duration	Occurs irregularly, typically every 2 to 7 years, but more frequent than la nina An El Niño event usually lasts about 9 to 12 months, but can sometimes persist for up to 18 months.	Also occurs irregularly, often following an El Niño event, but not always. La Niña events can last longer than El Niño events, sometimes persisting for up to two years – example Triple dip la nina events
Effects on marine life	Warmer ocean temperatures can disrupt marine ecosystems, leading to reduced fish populations, particularly in the Pacific Ocean off the coast of South America. The warming waters disrupt the upwelling of nutrient-rich cold waters, affecting marine food chains and fisheries.	Cooler ocean temperatures typically support healthier marine ecosystems and improve fish populations in regions like the eastern Pacific. Enhanced upwelling during La Niña brings more nutrients to the ocean surface, supporting marine life and fisheries.
Economic and Environmental impact	Can lead to significant economic losses due to droughts, wildfires, reduced agricultural yields, and flooding in different parts of the world. Impacts energy demand, with increased demand for cooling in warmer regions.	Also causes economic impacts, but in different regions, such as flooding in South Asia and Southeast Asia, and drought in the southern United States and parts of South America. Increased snowfall during La Niña can benefit ski industries but also lead to costly disruptions in transportation and infrastructure.
		

IMPACT OF ENSO ON THE INDIAN MONSOON

El Niño and the Indian Monsoon

- **Weakening of Monsoon Rains**:Generally associated with weaker monsoon rains in India. The warming of the Pacific Ocean during El Niño affects global atmospheric circulation, leading to changes in the monsoon's behaviour.
    - The 2015-2016 El Niño was one of the strongest on record, rivalling the 1997-1998 event.The 2015 monsoon season was significantly impacted, with a **rainfall deficit of around 14%.** The El Niño led to a delayed onset of the monsoon and poor distribution of rainfall, exacerbating drought conditions in some regions. This led to water shortages, particularly in **central and southern India**.
- **Disruption of Wind Patterns**: During El Niño, the usual **easterly trade winds weaken** or reverse, affecting the transport of moisture from the Indian Ocean to the Indian subcontinent. This disruption often leads to reduced rainfall during the monsoon season.
- **Drought Conditions**: Many of the significant droughts in India have been linked to El Niño events. For example, the severe drought of 1987, which affected large parts of India, coincided with one of the strongest El Niño events of the 20th century.
    - The 2002 monsoon was one of the driest in recent history, with rainfall about 19% below the long-term average. The drought was widespread, affecting most parts of the country.
- **Economic Impact**: Weak monsoon rains due to El Niño can have devastating effects on agriculture, leading to lower crop yields, higher food prices, and stress on rural economies.
    - The 2002 drought led to a sharp decline in agricultural output, particularly in the production of rice, wheat, and other staple crops. The Indian economy, which was more diversified by this time, was still affected, with GDP growth slowing due to the poor agricultural performance.

La Niña and the Indian Monsoon

- **Strengthening of MonsoonRains**: La Niña events are often associated with stronger-than-normal monsoon rains in India. The cooling of the Pacific Ocean during La Niña tends to enhance the monsoon's vigour.
    - August being the second wettest month during Indian monsoon received 15% extra rainfall in 2024 compared to the expected 6% increase predicted by IMD.

- **Enhanced Moisture Transport**: The atmospheric circulation during La Niña typically strengthens the monsoon winds, leading to increased moisture transport from the Indian Ocean to the subcontinent. This results in more intense and widespread rainfall.
    - The 2022 La Niña event was particularly strong and impacted air circulation. In Mumbai, wind currents persisted in one direction for more than a week or 10 days, leading to greater accumulation of pollutants.
- **Flooding and Excess Rainfall**: While La Niña can bring beneficial rains, it can also lead to excessive rainfall and flooding in some regions of India. For instance, the La Niña event of 2010-2011 was associated with unusually heavy monsoon rains and widespread flooding.
    - A triple-dip La Niña is a rare weather phenomenon that occurs when La Niña conditions persist for three consecutive years. The 2020–2023 period was a triple-dip La Niña
- **Positive Agricultural Outcomes**: Generally, La Niña years are favorable for agriculture in India, as the abundant rainfall boosts crop yields and replenishes water resources.

WAY FORWARD TO DEAL WITH ENSO AMID CLIMATE CHANGE:

Short-Term Strategies:

- **Improved Monitoring**: Invest in advanced climate monitoring systems that provide real-time data on sea surface temperatures, atmospheric conditions, and other indicators of El Niño and La Niña. Establish efficient communication channels to disseminate early warnings to governments, communities, and industries, allowing them to prepare for the expected impacts.
    - The Climate Prediction Center (CPC) in the United States and the Indian Meteorological Department (IMD) provide seasonal forecasts and early warnings, helping to prepare for potential droughts or floods.
- **Drought and Flood Preparedness:** Develop and implement contingency plans tailored to the specific risks of El Niño (droughts) and La Niña (floods). This includes stockpiling essential supplies, securing water resources, and preparing emergency response teams.
    - India's National Disaster Management Authority (NDMA) regularly updates its drought and flood management plans, integrating forecasts to minimize damage during ENSO events

- **Water Conservation:** Implement water-saving measures during El Niño events, such as promoting rainwater harvesting, reducing wastage, and optimizing water use in agriculture and industry.Adjust reservoir operations to store water during periods of excess rainfall (La Niña) and ensure adequate supply during droughts (El Niño).
    - Countries like Australia have developed flexible water allocation systems that adjust water distribution based on ENSO forecasts, helping to conserve resources during El Niño.
- **Community Engagement:** Engage local communities through education campaigns about the risks associated with El Niño and La Niña, emphasizing the importance of preparedness and adaptation.Train local leaders, farmers, and community groups in risk management practices and how to respond effectively to early warnings.
    - The Philippines conducts community-based disaster risk reduction programs to educate citizens on how to prepare for and respond to ENSO-induced hazards.

Long-Term Strategies

- **Building Resilience**: Invest in infrastructure that is resilient to the extreme weather events associated with El Niño and La Niña. This includes constructing flood defences, drought-resistant water supply systems, and resilient transportation networks.Develop urban areas with climate resilience in mind, incorporating green spaces, permeable surfaces, and adequate drainage systems to mitigate flood risks.
    - The Netherlands' Room for the River project is an innovative approach to flood management, allowing rivers to overflow into designated areas, reducing the risk of flooding during extreme weather events.
- **Crop Diversification**: Promote the diversification of crops to reduce dependency on single-crop farming, which is more vulnerable to climate variability. Encourage the adoption of climate-resilient crop varieties that can withstand droughts, floods, and temperature extremes.Implement practices such as conservation tillage, agroforestry, and cover cropping to improve soil health and resilience to extreme weather.
    - The International Rice Research Institute (IRRI) has developed rice varieties that are tolerant to flooding and drought, helping farmers adapt to the impacts of ENSO and climate change and recently Japan introduced heat resistant rice variety.

- **Restoration of Natural Ecosystems:** Protect and restore natural ecosystems such as wetlands, mangroves, and forests that act as natural buffers against extreme weather. These ecosystems help regulate water flow, reduce flood risks, and maintain biodiversity.

    - Costa Rica's reforestation efforts and commitment to protecting its natural ecosystems have helped the country manage the impacts of climate variability and maintain biodiversity.

- **Climate-Smart Policies**: Develop and enforce policies that promote climate-smart agriculture, sustainable water management, and energy efficiency. Engage in international cooperation and knowledge exchange on best practices for dealing with ENSO and climate change. Also moot for investing in R&D for technology aid in early warning systems mitigation efforts.

    - The Paris Agreement emphasizes the importance of building resilience to climate impacts, including those caused by ENSO, through national adaptation plans and international support.

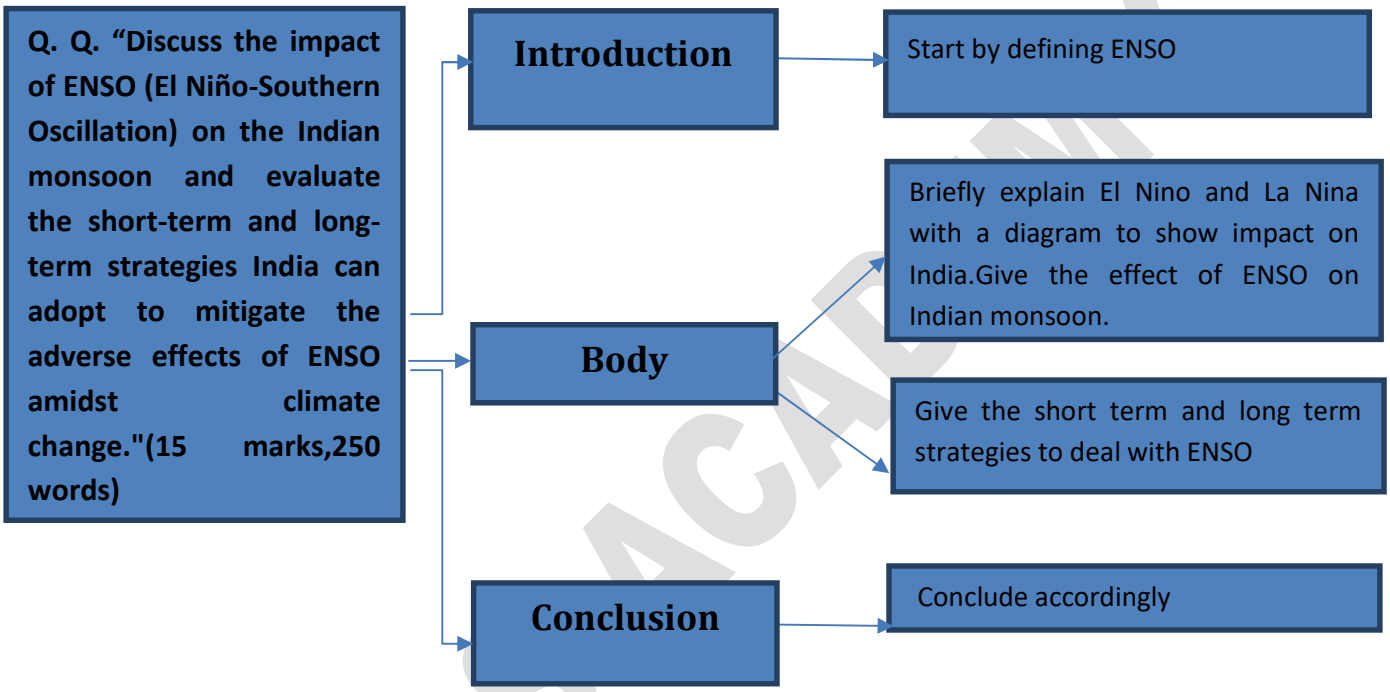
- **Social Safety Nets:** Strengthen social safety nets and insurance schemes to protect vulnerable populations from the economic shocks caused by extreme weather events. This includes crop insurance, unemployment benefits, and disaster relief funds.

    - India's Pradhan Mantri Fasal Bima Yojana (PMFBY) is a crop insurance scheme that helps farmers recover from crop losses due to extreme weather events, including those associated with ENSO.

PRACTICE QUESTION:

Q. "Discuss the impact of ENSO (El Niño-Southern Oscillation) on the Indian monsoon and evaluate the short-term and long-term strategies India can adopt to mitigate the adverse effects of ENSO amidst climate change."(15 marks,250 words)

APPROACH



MODEL ANSWER

The El Niño-Southern Oscillation (ENSO) is a crucial climate phenomenon that significantly influences global weather patterns, including the Indian monsoon. ENSO comprises two phases: El Niño, characterized by the warming of the central and eastern Pacific Ocean, and La Niña, characterized by cooling.

IMPACT OF ENSO ON THE INDIAN MONSOON:

1. **El Niño and Weak Monsoon Rains**:
    - **Weakened Monsoon**: El Niño typically leads to a weakening of the Indian monsoon, resulting in below-normal rainfall. The warming of the Pacific Ocean disrupts the usual wind patterns, reducing moisture transport to the Indian subcontinent.

- **Drought Conditions**: Many significant droughts in India, such as those in 1987 and 2002, have been linked to El Niño events. These droughts severely impact agricultural productivity, leading to food shortages and economic distress.
- **Example**: The 2015-2016 El Niño was one of the strongest on record, causing a 14% rainfall deficit during the monsoon season, leading to water shortages and affecting crop yields in central and southern India.

2. **La Niña and Strong Monsoon Rains**:
   - **Enhanced Monsoon**: La Niña generally strengthens the Indian monsoon, bringing above-normal rainfall. The cooling of the Pacific Ocean enhances the pressure gradient, intensifying the monsoon winds.
   - **Flooding Risks**: While La Niña often leads to beneficial rains, it can also result in excessive rainfall and flooding, as seen during the 2010-2011 La Niña event, which caused widespread flooding in parts of India.
   - **Example**: The 2022 La Niña event led to increased moisture transport and enhanced rainfall, with August receiving 15% extra rainfall compared to the expected 6%, leading to flooding in several regions.

SHORT-TERM STRATEGIES TO MITIGATE ENSO IMPACTS:

1. **Improved Monitoring and Early Warning Systems**:Invest in real-time climate monitoring systems to provide accurate forecasts of ENSO events. Disseminate early warnings to governments and communities to prepare for potential droughts or floods.The Indian Meteorological Department (IMD) provides seasonal forecasts, helping to prepare for ENSO-related impacts.
2. **Contingency Planning**:Develop specific contingency plans tailored to the risks posed by El Niño (drought) and La Niña (flooding). This includes stockpiling essential supplies, securing water resources, and deploying emergency response teams.India's National Disaster Management Authority (NDMA) regularly updates its drought and flood management plans to minimize damage during ENSO events.
3. **Water Conservation Measures**: Implement water-saving techniques, promote rainwater harvesting, and optimize reservoir management to ensure adequate water supply during El Niño-induced droughts and manage excess water during La Niña-induced floods.Countries like Australia have developed flexible water allocation systems that adjust based on ENSO forecasts, which India can adopt.

LONG-TERM STRATEGIES TO ADDRESS ENSO AMIDST CLIMATE CHANGE:

1. **Climate-Resilient Infrastructure**: Develop urban areas with climate resilience in mind, including green spaces and adequate drainage systems.The Netherlands' "Room for the River" project is an innovative approach to managing flood risks, which India can emulate.

2. **Sustainable Agricultural Practices**:Promote the diversification of crops to reduce dependency on single-crop farming, which is more vulnerable to climate variability. The International Rice Research Institute (IRRI) has developed flood-tolerant and drought-resistant rice varieties that can help Indian farmers adapt to ENSO impacts.

3. **Restoration of Natural Ecosystems**:Protect and restore natural ecosystems like wetlands, mangroves, and forests that act as natural buffers against extreme weather events. These ecosystems help regulate water flow and reduce flood risks.Costa Rica's reforestation efforts have helped manage the impacts of climate variability, serving as a model for India.

4. **Climate-Smart Policies and Social Safety Nets**:Develop and enforce policies that promote climate-smart agriculture, sustainable water management, and energy efficiency. Strengthen social safety nets like crop insurance to protect vulnerable populations from ENSO-induced economic shocks.India’s Pradhan Mantri Fasal Bima Yojana (PMFBY) is a crop insurance scheme that helps farmers recover from losses due to extreme weather events associated with ENSO.

The dynamics of El Niño and La Niña play a crucial role in shaping various facets of India’s environmental and socio-economic landscape. To mitigate adverse impacts and harness potential benefits, it is essential for India to enhance its weather forecasting technologies, develop adaptive agricultural practices, and implement effective water management strategies. This comprehensive approach will help safeguard against the unpredictable nature of these climatic phenomena, ensuring sustainable development and resilience in the face of global climate variability.

2. INDUSTRIAL SMART CITIES

iMPACT ANALYSIS

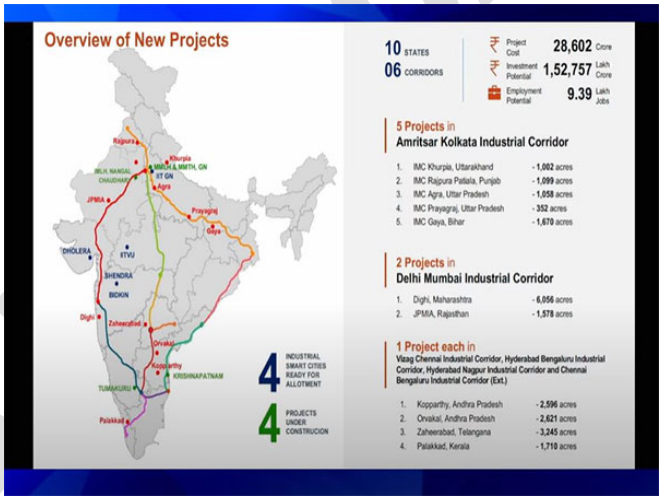
GS 1>Geography >> Industrial Development

REFERENCE NEWS:

The Cabinet Committee on Economic Affairs chaired by Prime Minister Narendra Modi approved setting up of 12 industrial smart cities under the National Industrial Corridor Development Programme (NICDP) with an estimated investment of Rs. 28,602 crore.

GRAND NECKLACE OF INDUSTRIAL SMART CITIES:

The **National Industrial Corridor Development Programme** stands as India's most ambitious infrastructure initiative, aiming to shape the future of urban and industrial development. This visionary programme seeks to create new industrial cities as "**Smart Cities**," where **next-generation technologies seamlessly integrate across various infrastructure sectors**.



Strategic investments: NICDP is designed to foster a vibrant industrial ecosystem by facilitating investments from both large anchor industries and Micro, Small, and Medium Enterprises (MSMEs). These industrial nodes will act as **catalysts for achieving $2 trillion in exports by 2030**, reflecting the government's vision of a self-reliant and globally competitive India.

Smart cities and modern infrastructure: The new industrial cities will be developed as greenfield smart cities of global standards, built "ahead of demand" on the '**plug-n-play' and 'walk-to-work' concepts**. Cities will be equipped with advanced infrastructure that supports sustainable and efficient industrial operations.

Area approach on PM GatiShakti: Aligned with the PM GatiShakti National Master Plan, the projects will feature **robust multi-modal connectivity** infrastructure, ensuring seamless movement of people, goods, and services. The industrial cities are envisioned to be growth centres for transformation of whole region.

Vision for a 'Viksit Bharat': By positioning India as a strong player in the Global Value Chains (GVC), the NICDP will provide developed land parcels ready for immediate allotment, making it easier for domestic and international investors to set up manufacturing units in India. This aligns with the broader objective of creating an 'Atmanirbhar Bharat' or a self-reliant India

Economic impact and employment generation: NICDP is expected to generate significant employment opportunities, with an estimated **1 million direct jobs** and up to 3 million indirect jobs being created through planned industrialization. This will not only provide **livelihood opportunities** but also contribute to the **socio-economic upliftment** of the regions where these projects are being implemented.

Commitment to sustainable development: The projects under the NICDP are designed with a focus on sustainability, incorporating ICT-enabled utilities and green technologies to minimize environmental impact. By providing quality, reliable, and sustainable infrastructure, the government aims to create industrial cities that are not just hubs of economic activity but also **models of environmental stewardship**.

SIGNIFICANCE OF INDUSTRIAL SMART CITIES IN INDIA:

- **Increased Industrial Output**: Industrial smart cities create **specialized industrial zones**, enabling the efficient functioning of industries through technology-driven solutions like automation, smart grids, and logistics. This results in enhanced **industrial output**, contributing to the overall **GDP growth**.
    - The **Delhi-Mumbai Industrial Corridor (DMIC)**, a major smart city and industrial corridor initiative, is expected to increase India's industrial output by 25% and GDP by 1-2% by 2030. The DMIC aims to develop **24 industrial smart cities** with the potential to generate **100 million jobs**.
- **Attracting Foreign Direct Investment (FDI)**:India attracted **$81.72 billion** in FDI in 2020-2021, with industrial infrastructure development,smart cities, being a key driver of investment
- **Employment Opportunities**: The development of industrial smart cities creates a large number of **direct and indirect jobs** across sectors, such as manufacturing, logistics, IT, and services.

- The development of smart cities under India's **Smart Cities Mission** is expected to generate **over 5.4 million jobs** by 2030. Industrial smart cities, such as those planned in the DMIC and **Chennai-Bengaluru Industrial Corridor (CBIC)**, are major contributors to job creation.

- **Skill Development**: Smart cities focus on the **integration of Industry 4.0 technologies**, such as automation, data analytics, and artificial intelligence, which creates a demand for skilled labour. Skill development programs aligned with these industrial zones can help bridge the skills gap in the workforce which is around 13% compared to 96% in South Korea.

- **Sustainable and Systematic Urbanization**: India's rapid urbanization, with an expected **600 million urban population** by 2030, places immense pressure on traditional cities. Industrial smart cities are designed to ease the burden on existing urban centres by providing **integrated infrastructure**, such as smart transportation, waste management, water supply, and energy systems.

- **Planned Urbanization**: By developing smart cities, India can ensure **planned urban growth** and avoid the challenges of unregulated urban sprawl. Cities such as **Amritsar-Kolkata Industrial Corridor** (AKIC), **Aurangabad Industrial Township**are examples of smart city development focused on industrial and urban planning.

- **Digital Transformation of Industries**: Industrial smart cities are key to promoting **Industry 4.0**, which involves the use of automation, artificial intelligence (AI), the Internet of Things (IoT), and cloud computing. Industrial smart cities act as hubs for **smart manufacturing**, where real-time data analysis and automation reduce costs and increase efficiency.

- **Eco-Friendly Industrial Practices**: Industrial smart cities prioritize **sustainability**, incorporating **renewable energy**, **smart waste management**, and **energy-efficient technologies** into their design.The use of **smart grids**, **solar energy**, and **electric vehicles** contributes to sustainability goals reducing carbon footprint. India aims to achieve **40% of its energy from non-fossil fuel sources** by 2030, and industrial smart cities are critical to this transition.

    - **Integrated Industrial Township, Vikram Udyogpuri, MP** and **Dholera** are being developed with renewable energy integration, including large-scale solar parks, contributing to India's climate change mitigation efforts.

- **Efficient Governance**: Smart cities are characterized by **smart governance**, using technology to streamline regulatory processes and improve **transparency**. This results in

faster approvals, reduced bureaucratic delays, and a more conducive environment for businesses to operate enhancing India's Ease of Doing Business.

- **Integrated Supply Chains**: By leveraging digital technologies and real-time data, industrial smart cities facilitate more **efficient supply chains** and reduce operational bottlenecks, making it easier for industries to function smoothly.
    - The **CBIC** and **Bangalore-Mumbai Economic Corridor** (BMEC) are designed to improve logistical connectivity, reducing the time and cost of transportation and increasing the overall ease of doing business.
- **Balanced Regional Development**: Industrial smart cities encourage **balanced regional development** by distributing industrial activities and urbanization across different states and regions. This prevents overburdening of established metros like Mumbai, Delhi, and Bangalore.By developing new industrial hubs in semi-urban or rural areas, industrial smart cities help reduce **migration pressures** on existing urban centres and provide **employment opportunities** in less developed areas.
    - The **DMIC** is spread across six states (Haryana, Uttar Pradesh, Rajasthan, Gujarat, Maharashtra, and Madhya Pradesh) and aims to promote regional industrial development and infrastructure growth across these regions.

CHALLENGES OF INDUSTRIAL SMART CITIES:

- **Capital-Intensive Projects**: Developing industrial smart cities requires substantial **upfront investments** in infrastructure, including smart grids, transportation networks, water management systems, and digital technologies.
    - The **Delhi-Mumbai Industrial Corridor (DMIC)**, one of the most ambitious smart city projects, is estimated to cost over **$90 billion**, which highlights the scale of funding needed for similar projects.
- **Land Acquisition Delays**: Land acquisition in India is complicated by issues related to **displacement**, **compensation disputes**, and **legal battles**. The process of acquiring land for industrial smart cities can face opposition from political groups or local populations, leading to delays and cost escalations.
    - Land acquisition issues delayed the **Dholera Smart City** project in Gujarat, with protests from farmers who demanded better compensation for their land. Displacement protests during the development of the **Navi Mumbai**

International Airport, which is part of the smart city region, delayed construction for several years.

- **Lack of Funding**: While there is substantial demand for smart city projects, the **lack of available funding** from both the public sector and private investors poses a major hurdle. Financial viability is a concern for long-term sustainability, especially for large-scale projects requiring billions in investment.
- **Existing Infrastructure Deficits**: India's urban and industrial infrastructure, including roads, electricity, water, and waste management, is already stretched in many cities. Industrial smart cities require modern, efficient, and scalable infrastructure, which many areas lack.Continuous and reliable power supply and water availability are critical for smart cities. However, many regions face **power shortages** and **water stress**, which could undermine industrial activities in smart cities.
    - Power shortages and inadequate water supply have hampered the development of industrial regions in **Uttar Pradesh** and **Rajasthan**, which are part of the DMIC.
- **Technology Implementation**: India faces challenges in **implementing and maintaining** the technologies due to **infrastructure limitations**, **cybersecurity concerns**, and a **lack of skilled labour** to manage these systems.The **digital divide** between urban and rural areas makes it challenging to ensure that all regions within the smart city are equally integrated into the digital infrastructure.
- **Complex Regulatory Framework**: The creation of industrial smart cities involves coordination between multiple government agencies, departments, and ministries. **Overlapping jurisdictions** and bureaucratic red tape often slow down decision-making processes and create inefficiencies.
- **Sustainability Challenges**: The establishment of large industrial zones often leads to concerns about **pollution**, **deforestation**, and **resource depletion**. The development of industrial areas must focus on reducing the **carbon footprint**, ensuring sustainable energy use, and managing **industrial waste**.
- **Lack of Skilled Labour**: India's **education and vocational training system** is often inadequate in producing a workforce that can meet the demands of Industry 4.0.The industries in smart cities require workers with skills in **data analytics**, **robotics**, and **automation**, but many areas lack access to training programs aligned with these technological advancements.

- The **Bangalore-Mumbai Economic Corridor** faces a shortage of skilled workers in IT and manufacturing, which affects the development of smart industries.

- **Physical and Digital Security**: With the reliance on interconnected systems, industrial smart cities are vulnerable to **cyberattacks**. Ensuring the security of data, industrial operations, and public services is a major concern in digitally integrated smart cities.The presence of cutting-edge technologies and critical infrastructure in smart cities makes them potential targets for **industrial espionage** and **hacking**.

WAY FORWARD FOR A SUSTAINABLE AND INCLUSIVE INFRASTRUCTURAL LEAP:

- **Equitable Access to Resources and Services:** Barcelona's smart city model focuses on ensuring equitable access to public services by using smart technologies for efficient management of water, electricity, transportation, and healthcare.
- **Affordable Housing and Social Infrastructure:** Singapore's Smart Nation initiative incorporates affordable housing into its urban planning, ensuring that citizens across income levels can access housing near their workplaces, reducing commuting times and carbon footprints.
- **Inclusive Job Creation and Skill Development**: Songdo International Business District in South Korea emphasizes skill development programs that target all socio-economic groups, especially in smart manufacturing and IT sectors.
- **Sustainable Energy and Resource Management:** Copenhagen, Denmark, is a leader in sustainable energy management, with an emphasis on carbon neutrality and renewable energy integration into urban infrastructure. The city uses smart grids and district heating systems that minimize carbon emissions and enhance energy efficiency.
- **Sustainable Transportation and Mobility Solutions**: Helsinki, Finland, has implemented a Mobility-as-a-Service (MaaS) platform that integrates various modes of transport into a single mobile app, encouraging the use of public transportation, reducing traffic congestion, and lowering emissions.
- **Inclusive Digital Infrastructure and Connectivity:** Tallinn, Estonia, has become a model for digital inclusivity by providing free Wi-Fi across the city, ensuring that all citizens have access to digital services and online resources. This has helped bridge the digital divide and promoted socio-economic inclusivity.
- **Environmentally Friendly Industrial Practices**: Masdar City in the UAE is a pioneer in sustainable industrial practices, integrating waste recycling, energy-efficient buildings, and green technologies in its development. The city has a zero-waste and carbon-neutral focus.
- **Public-Private Partnerships (PPP) for Inclusivity**: Barcelona has successfully implemented public-private partnerships (PPPs) to develop smart city initiatives, with a

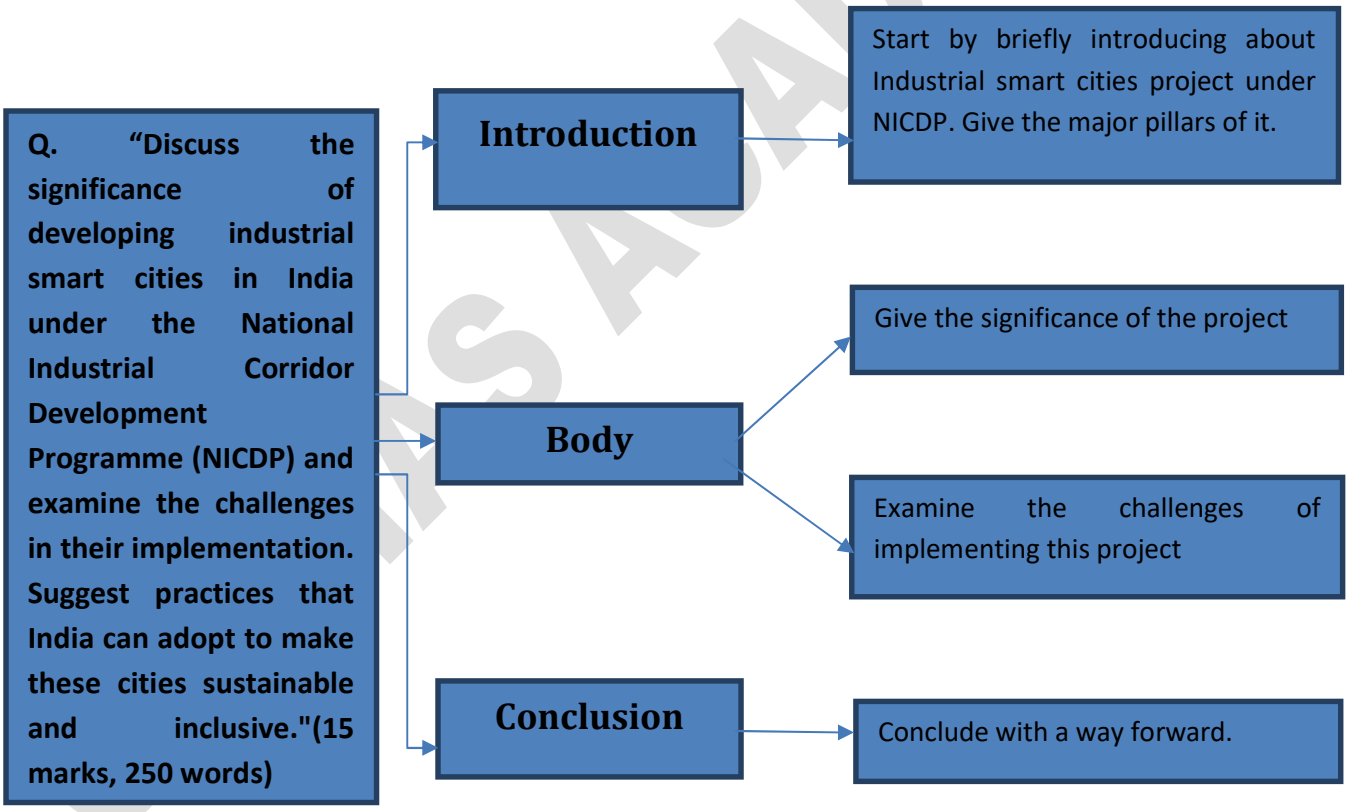
focus on inclusive growth and citizen engagement. These partnerships have fostered innovation and community participation.

- **Citizen Participation and Governance:** Vienna, Austria, has integrated citizen participation into its smart city governance, allowing residents to be actively involved in decision-making processes through digital platforms and public consultations.

PRACTICE QUESTION

Q. "Discuss the significance of developing industrial smart cities in India under the National Industrial Corridor Development Programme (NICDP) and examine the challenges in their implementation. Suggest practices that India can adopt to make these cities sustainable and inclusive."(15 marks, 250 words)

APPROACH



MODEL ANSWER

The **National Industrial Corridor Development Programme (NICDP)** aims to transform India's industrial landscape by creating **12 industrial smart cities**, with an estimated investment of **₹28,602 crore**. These cities are envisioned as hubs of **next-generation technologies**, contributing to India's goal of achieving **$2 trillion in exports by 2030**.

SIGNIFICANCE OF INDUSTRIAL SMART CITIES:

- **Increased Industrial Output**: These smart cities will enhance industrial efficiency through **automation**, **smart logistics**, and **sustainable infrastructure**. The **Delhi-Mumbai Industrial Corridor (DMIC)** is expected to boost India's industrial output by **25%** and create **100 million jobs** by 2030.
- **Employment Opportunities**: The development of these cities will generate **direct and indirect employment**, with projections of **5.4 million jobs** by 2030, particularly in sectors like **manufacturing**, **logistics**, and **IT**.
- **Sustainability**: Industrial smart cities focus on **renewable energy** and **green technologies**, contributing to India's goal of deriving **40% of its energy from non-fossil fuel sources** by 2030.

CHALLENGES:

- **High Capital Costs**: Projects like the **DMIC** require **$90 billion**, posing challenges in financing.
- **Land Acquisition Issues**: Protests, such as those in the **Dholera Smart City** project, delay land acquisition due to compensation disputes.
- **Skilled Labor Shortages**: The gap in skills required for **Industry 4.0** technologies remains a challenge.
- **Technological and Digital Divide**: Integrating advanced technologies in rural areas is hindered by a lack of digital infrastructure.

PRACTICES THAT INDIA CAN FOLLOW:

- **Sustainable Energy**: **Copenhagen** has successfully integrated **smart grids** and **renewable energy**. India can adopt similar models to ensure **energy efficiency** in smart cities.
- **Public-Private Partnerships (PPPs)**: **Barcelona's PPP model** has fostered **inclusive growth** through innovation and community engagement.
- **Inclusive Digital Infrastructure**: **Tallinn**, Estonia, provides **free Wi-Fi** to promote digital inclusivity, which can bridge India's urban-rural divide in smart cities.
- **Inclusive Job Creation and Skill Development**: Songdo International Business District in South Korea emphasizes skill development programs that target all socio-economic groups, especially in smart manufacturing and IT sectors.

- **Citizen Participation and Governance:** Vienna, Austria, has integrated citizen participation into its smart city governance, allowing residents to be actively involved in decision-making processes through digital platforms and public consultations.

Industrial smart cities under the NICDP have the potential to position India as a global manufacturing hub while addressing urbanization challenges. By incorporating **global best practices** such as **sustainable energy management** and **inclusive digital infrastructure**, these cities can be developed to achieve both **economic growth** and **social inclusivity**.

3. RAISING THE LEGAL AGE OF MARRIAGE FOR WOMEN

iMPACT ANALYSIS

SYLLABUS:

GS 1 > Society > Role of women > Women and Child issues

REFERENCE NEWS:

- Recently, the Himachal Pradesh Assembly passed the Prohibition of Child Marriage (Himachal Pradesh Amendment) Bill, 2024, raising the minimum marriageable age for women from **18 to 21 years**.
- The bill, which seeks to amend the **Prohibition of Child Marriage Act, 2006 (2006 Act)**, aims to promote gender equality and encourage higher education among women.

MORE ON NEWS:

- The Bill was first introduced in the Vidhan Sabha during the Budget session in February 2024 but was not passed at that time. Its passage follows the **lapse of a central bill** with similar objectives—**the *Prohibition of Child Marriage (Amendment) Bill, 2021***—which was introduced in the Lok Sabha in December 2021 but failed to progress due to the dissolution of the 17th Lok Sabha.
- Chief Minister Sukhvinder Singh Sukhu highlighted that the passage of the Bill reflects the government's commitment to advancing women's welfare. He emphasized that **Himachal Pradesh is the first state in India** to enact such legislation, marking the Congress's ongoing efforts toward improving women's lives.

KEY PROVISIONS OF THE BILL:

- **Redefinition of "Child":** The Bill amends Section 2(a) of the 2006 Act, which previously defined a "child" as a male under 21 years of age and a female under 18 years of age. The amendment removes this gender-based distinction, redefining a "child" as any person under 21 years of age, regardless of gender.
- **Extended Period for Annulment:** The Bill extends the period within which an individual who was a minor at the time of marriage can file for annulment. Under the 2006 Act, this period was two years after attaining majority (until the age of 20 for women and 23 for men). The Bill extends this period to five years, allowing both women and men to file petitions until they turn 23, in line with the new minimum marriageable age.
- **Override Clause:** A new provision, Section 18A, has been introduced to ensure that the Bill's

provisions take precedence over all other existing laws. This means the new minimum marriageable age will apply uniformly across Himachal Pradesh, irrespective of any conflicting laws or religious and cultural practices.

Constitutional Implications: Need for Presidential Assent:

As marriage and divorce fall under the **Concurrent List of the Seventh Schedule** of the Constitution, both the central and state governments can legislate on these subjects. However, since the Himachal Pradesh Bill introduces **provisions that differ from those in the central 2006 Act**, it may be deemed **"repugnant" under Article 254(1)** of the Constitution.

For the Bill to come into effect, it must receive the **President's assent** under Article 254(2), following which it will take precedence within Himachal Pradesh over the provisions of the central law.

LEGAL AGE OF MARRIAGE:

- Before Independence, the legal marriage age for women in India was set to 14 years in 1929. It was defined in **Child Marriage Restraint Act**. The same act also set the legal marriage age for men to 18 years.
- After independence, the law was amended twice i.e., in 1949 and 1978. In 1978, the legal age of marriage was changed from 15 years for a girl and 18 for a boy to **18 years and 21 years** respectively.
- Today, Personal laws of various religions that deal with marriage have their own standards, often reflecting custom.

The **Hindu Marriage Act, 1955,** and the **Indian Christian Marriage Act, 1872**, prescribe the age of 18 years for the bride and 21 years for the groom.

The **Muslim Personal Law (Shariat) Application Act, 1937**, allows marriage if the boy and the girl have attained puberty.

The **Special Marriage Act, 1954,** which governs inter-faith marriages lays down 18 years for women and 21 years for men as the age of marriage.

- There is also the **Prohibition of Child Marriage Act, 2006,** which prohibits marriage below 18 years for women and 21 years for men.

SIGNIFICANCE OF RAISING MARRIAGE AGE:

- **Women empowerment:**

By raising the age, India is adhering to the **Convention on The Elimination of Discrimination Against Women (CEDAW)** which calls for abolition of all laws developed on the assumption that men and women have differential intellectual and physical rate of growth.

- **Reduce child marriages:**

UNICEF's 2021 report estimates that 1.5 million girls under 18 marry annually in India, making it home to **one-third of the world's child brides**.

Also, a study published in **The Lancet Global Health in 2023** reveals that child marriage remains a significant issue in India, with **one in five girls and nearly one in six boys** still getting married below the legal age.

- **Improved health outcome:**

An early age of marriage, and consequent early pregnancies, have impacts on nutritional levels of mothers and children, and on Infant Mortality Rate and Maternal Mortality Rate. This can be solved by raising the age of marriage.

- **Gender neutrality:**

Raising the age to 21 will equalize the marriageable age of men and women and **breaks the patriarchal stereotyping** that husband should be older than wife.

- **Better human resource development:**

Marriage has direct correlation with lower educational attainment for girls, limiting their employment opportunities, economic security and productive capacity to society.

Also, child of young uneducated mothers is less likely to attain high levels of education, thereby perpetuating cycles of low literacy and limited employment opportunities. These issues can be addressed by raising the marriage age.

- **Reduce risk of domestic violence:**

Girls who are married young often lack status and power within their marriages and households, and so are more likely to experience domestic violence, sexual abuse, and isolation from family and community.

- **Reduce population growth:**

Lower age at marriage directly affects fertility rates. Lower the rate of age at marriage higher is the fertility rate.

Recommendations of the Jaya Jaitly Task Force on Age of Marriage:

- In June 2020, the Ministry for Women and Child Development set up a task force **headed by Jaya Jaitly** to look into the **correlation between the age of marriage with issues of women's nutrition, prevalence of anaemia, IMR, MMR and other social indices**.

- The committee has **recommended the age of marriage be increased to 21 years**.
- The committee has also asked the government to look into:

Increasing access to schools and colleges for girls, including their transportation to these institutes from far-flung areas.

Sex education in schools

Ensuring toilets and sanitary napkins at schools so that girls do not drop out

Skill and business training

Awareness campaign on a massive scale to encourage social acceptance of the new legislation

- The committee said these deliveries must come first, as, unless they are implemented and women are empowered, the law will not be as effective.

CRITICISM:

- **Women's infantalisation:**

All laws that apply to adult citizens, including criminal laws, will apply to a woman at the age of 18. But according to the proposed Bill, a woman is too young to exercise a choice to get married. This is **against the principle of autonomy** in matters of personal choice that an adult woman enjoys.

- **Ineffective law enforcement:**

According to NFHS 5, **23.3% of women aged 20-24 years married before the age of 18**, which shows that the Prohibition of Child Marriage Act (PCMA), 2006, has not been successful in preventing child marriages.

Here, increasing the legal age at marriage will only expand the number of persons deemed underage and render them with ineffective legal protection.

- **Discrimination against vulnerable sections:**

70% of early marriages take place in deprived communities such as SCs and STs, who also happen to be the largest bearers of poverty. The new legislation would simply push a large portion of the population into illegal marriages.

- **Aggravates misuse of legislations:**

Currently, many cases under PCMA are registered by parents to punish their daughters who marry against their wishes or elope to evade forced marriages, domestic abuse and housework. Raising

the legal age could exacerbate this misuse, further entrenching parental control and leading to increased criminal prosecutions against young couples, particularly in a patriarchal society.

- **Abdication of Government Responsibilities:**

Critics argue that by focusing solely on raising the legal marriage age, the government overlooks the deeper issues like poverty, dowry demands, and fear of sexual assault that often drive early marriages. This approach is seen as an abdication of the government's responsibility to address these root causes.

- **Opposition from Law Commission and NHRC:**

The **2008 Law Commission Report** and the National Human Rights Commission (NHRC) have recommended keeping the marriage age at 18 for both genders, opposing any increase.

WAY FORWARD:

- **Development is the best contraceptive:** Maternal and infant mortality, malnutrition and women's safety are problems linked to public policy. To attain the targets of women empowerment, improvements on these indicators are the need of the hour.
- **Focus on education:** The marriage age at 18 was set in 1978, but child marriage started to decline only in the 1990s, when the government stressed primary education of the girl child and took measures to reduce poverty. Hence, emphasis must be given on reducing drop out rates and encouraging skill training and higher education among women.
- **Promote reproductive health:** Steps must be taken to address early pregnancies by extending **family planning and reproductive health support** which focus on preparation for pregnancy and delaying the first birth.
- **Assure safety:** It is also important to ensure a safe environment free from the constant threat of rape and sexual assault in the country.
- **Adopt successful models:** Guaranteed employment opportunities and access to education are critical factors in enabling young women to make informed choices. States which have ensured higher levels of access to education for girls have successfully addressed the challenge of child marriage, for example in **Kerala**.
- **Implement other recommendations of the committee:** Raising the age of marriage is one of the many recommendations of the committee. Unless other recommendations in matters of education, skill development, sex education and reforming patriarchy go with it, the objective of raising marriage remains unfulfilled.

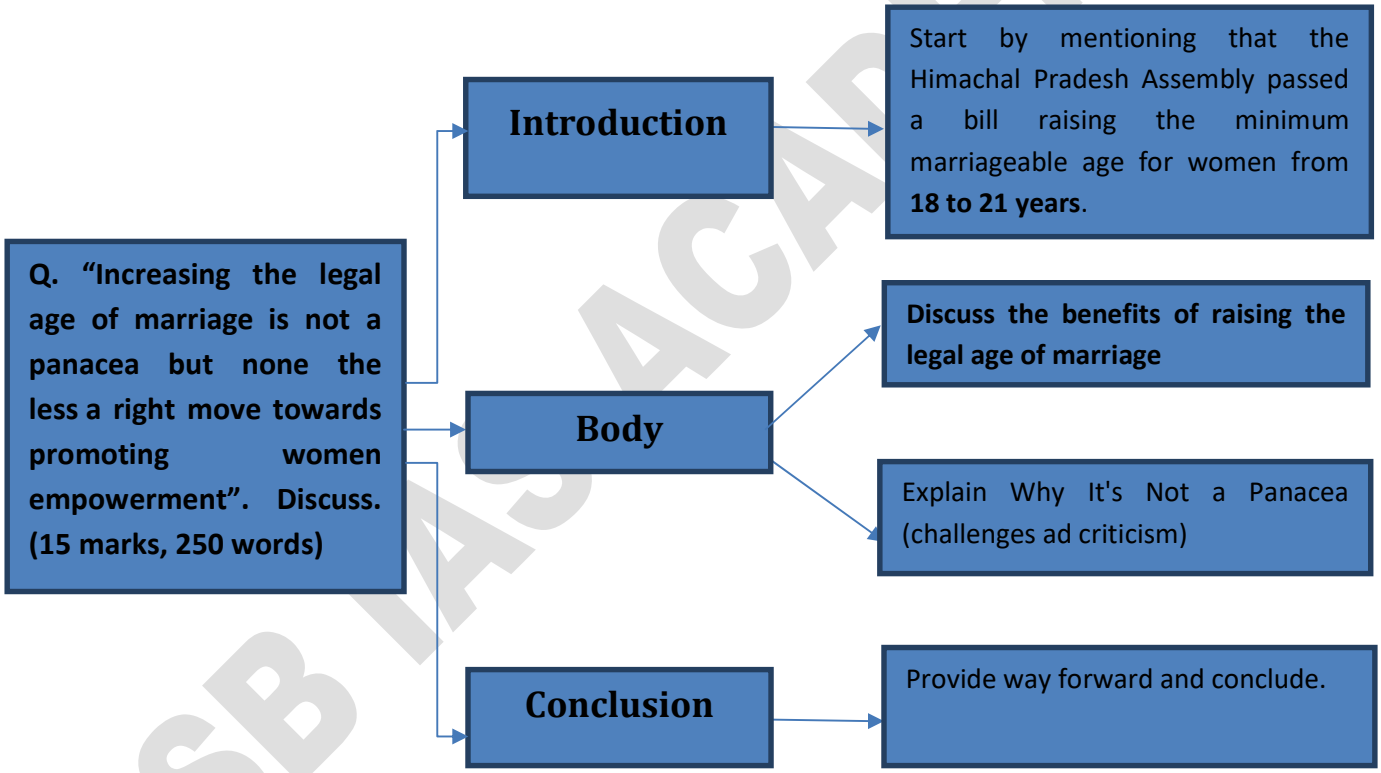
CONCLUSION

- The passage of the Prohibition of Child Marriage (Himachal Pradesh Amendment) Bill, 2024 is a significant legislative step towards gender equality and the empowerment of women. However, the Bill's broader implications, especially in terms of its potential misuse and the impact on marginalized communities, remain points of contention. The Bill's enactment now hinges on receiving the President's assent, which will determine its final application within the state.

PRACTICE QUESTION

Q. "Increasing the legal age of marriage is not a panacea but none the less a right move towards promoting women empowerment". Discuss. (15 marks, 250 words)

APPROACH



MODEL ANSWER

Recently, the Himachal Pradesh Assembly passed the *Prohibition of Child Marriage (Himachal Pradesh Amendment) Bill, 2024*, raising the minimum marriageable age for women from 18 to 21 years. This Bill aims to promote gender equality and encourage higher education among women by amending the *Prohibition of Child Marriage Act, 2006*. The move has reignited the debate on whether raising the legal marriage age is a comprehensive solution to promoting women empowerment.

The Benefits of Raising the Legal Age of Marriage

1. **Women Empowerment:** Raising the marriage age to 21 aligns with the *Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW)*, which advocates for abolishing laws that assume different maturity rates for men and women. This change promotes gender equality.

2. **Reducing Child Marriages:** India, home to one-third of the world's child brides, sees 1.5 million girls under 18 marry annually, according to UNICEF's 2021 report. A 2023 study in *The Lancet Global Health* found that one in five girls and nearly one in six boys still marry below the legal age. Raising the marriage age can help reduce these figures.

3. **Improved Health Outcomes:** Early marriages lead to early pregnancies, negatively impacting maternal and child health, contributing to higher Infant Mortality Rates (IMR) and Maternal Mortality Rates (MMR). Delaying marriage can improve these health outcomes.

4. **Gender Neutrality:** Raising the marriage age to 21 for both men and women ensures gender parity and challenges patriarchal norms that dictate husbands should be older than wives.

5. **Human Resource Development:** Child marriage is linked to lower educational attainment for girls, limiting their economic opportunities. Raising the marriage age increases the likelihood that women will complete their education, contributing more effectively to society and breaking the cycle of low literacy and limited employment opportunities.

6. **Reducing Domestic Violence:** Young brides often lack power within their marriages, making them vulnerable to domestic violence and isolation. Raising the marriage age can empower women to assert their rights within households.

Challenges and Criticisms: Why It's Not a Panacea

1. **Women's Infantilization:** Critics argue that raising the marriage age to 21 undermines women's autonomy. While women are considered adults at 18 for all other legal purposes, the Bill suggests they aren't mature enough to decide on marriage, which is seen as paternalistic.

2. **Ineffective Law Enforcement:** Data from NFHS-5 shows that 23.3% of women aged 20-24 were married before 18, indicating that the *Prohibition of Child Marriage Act (PCMA), 2006* has not been fully effective. Increasing the marriage age might expand the number of underage marriages without offering effective legal protection.

3. **Discrimination Against Vulnerable Sections:** Early marriages mostly occur in marginalized communities like Scheduled Castes (SCs) and Scheduled Tribes (STs). Raising the marriage age could push these communities into illegal marriages, worsening their marginalization.

4. **Misuse of Legislation:** The *PCMA* is often misused by parents to punish daughters who pursue inter-caste or inter-religious marriages or elope to escape forced marriages and domestic abuse. Raising the legal age could increase such misuse, further entrenching parental control in a patriarchal society.

5. **Opposition from Law Commission and NHRC:** The 2008 *Law Commission Report* and the *National Human Rights Commission (NHRC)* recommend keeping the marriage age at 18 for both genders, opposing any increase. They argue that raising the age could lead to unintended negative consequences, particularly for marginalized communities.

6. **Recommendations of the Jaya Jaitly Task Force:** In June 2020, the Ministry for Women and Child Development set up a task force led by Jaya Jaitly to examine the correlation between the age of marriage and women's health issues. The committee recommended increasing the marriage age to 21 years but emphasized the need for supporting measures like improving access to education, providing sex education, and ensuring safety in schools to make the law effective.

To ensure the effectiveness of raising the marriage age**, it should be supported by:**

- **Enhancing Education:** Improve access to education and skill training for girls.
- **Promoting Health:** Expand family planning and reproductive health services.
- **Ensuring Safety:** Strengthen protections against violence and exploitation.
- **Addressing Root Causes:** Implement comprehensive reforms to tackle poverty and gender inequality.

Raising the legal age of marriage can be a transformative step towards empowering women and reshaping India's future. By ensuring that young women have the opportunity to pursue education, health, and economic independence, this reform has the potential to create a **more equitable societywhere women are key drivers of progress and change.**

4. DIAMOND INDUSTRY OF INDIA

iMPACT ANALYSIS

SYLLABUS:

GS 1 > Indian Geography >> Distribution of natural resources >>> Industries

REFERENCE NEWS:

Even after being the world's largest exporter of polished diamonds and employing over a million workers, the Indian diamond sector is currently going through a downward slope at a rapid pace. The think tank Global Trade Research Initiative (GTRI) noted India's diamond sector is facing a severe crisis as both imports and exports have sharply declined in the past three years, which has triggered defaults, factory closures, and widespread job losses.

DIAMONDS IN INDIA:

Diamonds as precious stones are mostly used for ornamental purpose. Industrial diamonds are used for drill bits. India was once the single largest exporter of cut and polished diamonds in the world, though its domestic production of raw diamond is very insignificant.

- Diamond occurs in two types of deposits, primarily in **igneous rocks** of basic or ultrabasic composition and in **alluvial deposits** derived from the primary sources.
- Its composition is pure carbon and has cubic crystal system and common form octahedron.
- Diamond has a **high refractive index** and strong dispersion which gives it exciting brilliance when cut as a faceted stone.
- **The estimated resources of diamond are concentrated only in three states.** Of these, **Madhya Pradesh** is credited with 28,709,136 carats (90.17%) having unclassified grade only, followed by **Andhra Pradesh** with 1,822,955 carats (5.73%), having 235,165 carats gem grade, 58,423 carats industrial grade and 1,529,367 carats unclassified grade and **Chhattisgarh** with 1,304,000 carats (4.10%) having 521,600 carats gem grade and 782,400 carats industrial grade.

Diamond occurrences are reported since prehistoric times in the country. Presently, diamond fields of India are grouped into four regions:

- South Indian tract of Andhra Pradesh, comprising parts of Anantapur, Kadapa, Guntur, Krishna, Mahabubnagar and Kurnool districts;
- Central Indian tract of Madhya Pradesh, comprising Panna belt;

- Behradin-Kodawali area in Raipur district and Tokapal, Dugapal, etc. areas in Bastar district of Chhattisgarh; and
- Eastern Indian tract mostly of Odisha, lying between Mahanadi and Godavari valleys.

The world reserves of industrial diamond are about 1,100 million carats located mainly in Russia (59%), Congo (Kinshasa) (14%), Botswana (8%), South Africa (5%) and Australia (4%). The principal producers were Russia (29%), Botswana (18%), Canada (16%), Congo Dem. Republic (10%), Australia (9%), South Africa (7%) and Angola (6%).

India's diamond industry is a major player in the global diamond market, accounting for a large share of the world's diamond exports and processing:

- **Exports**: India is responsible for 70–75% of the world's diamond exports. There is a wide gap between net imports of rough diamonds and net exports of cut and polished diamonds, from USD 1.6 billion in FY 2022 to USD 4.4 billion in FY 2024.
- **Processing**: India processes over 90% of the world's rough diamonds.
- **Employment**: The diamond industry provides direct employment to 1.3 million workers but has been hit hard leading to joblessness and suicides.
- **Growth**: The industry is expected to grow by 10–15% annually over the next five years.

SIGNIFICANCE OF INDIAN DIAMOND INDUSTRY:

Global Leader in Diamond Cutting and Polishing: India is the **world's largest centre for cutting and polishing diamonds**, processing approximately **90%** of the world's rough diamonds by volume.

- The city of **Surat in Gujarat** is the hub of the global diamond polishing industry, handling nearly 80% of the world's diamonds. It is often referred to as the "diamond capital of the world."According to the **Gems and Jewellery Export Promotion Council (GJEPC)**, India processed **$23 billion** worth of diamonds in 2022-23, further cementing its dominance in the global diamond supply chain.

Major Contributor to Exports: The diamond industry is one of India's largest export sectors, contributing significantly to the country's foreign exchange earnings.

- In 2022-23, **India's gem and jewellery exports** (including diamonds) amounted to around **$40 billion**, with cut and polished diamonds accounting for the largest share at **$23 billion**.India exports diamonds to several global markets, including the **United**

States, **Hong Kong**, **Belgium**, and **Israel**, which are among the top importers of Indian diamonds.

Employment Generation: The diamond industry provides substantial employment, especially in the state of Gujarat, and contributes to the socio-economic development of local communities.

- The diamond industry in India employs over **1.3 million people**, predominantly in small and medium-sized enterprises (SMEs) in Surat and other regions.Many workers in Surat's diamond industry are skilled laborers who have been involved in the trade for generations, further embedding the industry into the socio-economic fabric of the region.

Technological Advancements and Innovation: India's diamond industry has embraced technological innovations to improve precision and efficiency in cutting and polishing processes, making it a global leader in this regard.

- Indian firms use **laser technology** for cutting diamonds, and **computer-aided design (CAD)** software is widely used for diamond sorting and grading. These advancements allow India to handle even the most complex and valuable diamonds.Companies in Surat have introduced **automated diamond polishing machines**, boosting productivity and reducing wastage.

Cultural and Historical Significance: India has a rich history in diamond mining and trade, with the country historically being the only source of diamonds until the 18th century.

- Famous diamonds like the **Kohinoor** and **Hope Diamond** were discovered in Indian mines, particularly in the **Golconda** region.Diamonds have long been associated with Indian royalty and culture, symbolizing power, status, and wealth. Even today, diamonds are a significant part of Indian bridal jewellery and traditional ceremonies.

Contribution to India's Economy: The diamond industry is a key contributor to the **Make in India** initiative, playing a crucial role in the country's manufacturing sector.The **Gems and Jewellery sector** contributes around **7% of India's GDP** and over **15% of the country's total merchandise exports**.

Sustainability and Ethical Practices: India has increasingly adopted sustainable and ethical practices in the diamond industry, complying with global standards like the **Kimberley Process** to ensure that diamonds are conflict-free.

- India is a participant in the **Kimberley Process Certification Scheme (KPCS)**, which is designed to prevent the trade of conflict diamonds. This strengthens India's reputation as a responsible player in the global diamond industry.India has embraced the

production of **lab-grown diamonds**, which have a lower environmental footprint than mined diamonds. The **lab-grown diamond industry** is projected to grow significantly, complementing the natural diamond sector.

CHALLENGES FACED BY DIAMOND SECTOR OF INDIA:

Global Economic Slowdown: The slowdown in major economies, such as the **United States**, **China**, and the **European Union**, has directly impacted the demand for diamonds, leading to a reduction in orders for polished diamonds from India.

- The **U.S.**, which accounts for over **40%** of India's diamond exports, has seen reduced consumer spending due to inflationary pressures and recessionary fears, leading to fewer diamond purchases.

Declining Consumer Demand: There has been a shift in consumer preferences, with a growing focus on **sustainability** and **lab-grown diamonds**. Traditional mined diamonds, particularly those that are more expensive, are seeing a decline in demand.

- **Lab-grown diamonds** are gaining popularity due to their lower environmental impact and affordability, diverting demand from natural diamonds. India's diamond industry, primarily focused on natural diamonds, has been slow to fully capitalize on this shift.The declining demand for natural diamonds has resulted in **falling prices** and **reduced profitability** for Indian exporters, leading to factory closures.

Rising Cost of Rough Diamonds: The cost of rough diamonds has increased due to **reduced global mining output** and **supply chain disruptions**, making it more expensive for Indian companies to source raw materials.

- Leading diamond miners like **De Beers** and **Alrosa** have reported lower production, limiting the supply of rough diamonds to the global market, including India.The Russia-Ukraine conflict has also disrupted the global diamond supply chain, with sanctions on Russia, a major rough diamond producer, further complicating trade and slowing down the global diamond trade.

Unfavourable Trade Policies and Regulations: Indian diamond exporters face several regulatory challenges, including **high import duties** on rough diamonds and stringent **compliance requirements** for export shipments.

- The Indian government imposes a **7.5% import duty** on rough diamonds, making it expensive for polishing units to acquire raw materials. Moreover, compliance with regulations like the **Kimberley Process Certification Scheme** adds complexity to exports.

Labour Issues and Job Losses: The diamond industry is heavily labour-intensive, and with the reduction in demand and rising costs, many factories have had to reduce their workforce or shut down entirely.

- Surat, the hub of the diamond industry, has witnessed **massive job losses** in the past year. According to estimates, over **50,000 workers** have lost their jobs as factories have closed or downsized operations.

Competition from Other Countries: India faces increasing competition from **China** and other Southeast Asian countries, where labour costs are lower, and governments provide more favourable trade incentives.

- China has been aggressively expanding its diamond-cutting and polishing sector, benefiting from lower labor costs and technological advancements in diamond processing.

Fluctuating Currency Exchange Rates: The volatility in currency exchange rates, particularly the depreciation of the Indian rupee against the U.S. dollar, has affected the profitability of diamond exports.

Environmental and Ethical Concerns: The global diamond industry faces increasing scrutiny over its environmental impact, ethical sourcing practices, and its role in **conflict zones**.

- The rise of the **ethical consumer** and the promotion of **conflict-free diamonds** (under the Kimberley Process) have put pressure on traditional diamond sources. Indian diamond companies, while adhering to the Kimberley Process, still face competition from the **lab-grown diamond** sector, which is marketed as more sustainable.

Lack of Technological Upgradation: Many small and medium enterprises (SMEs) in India's diamond industry still rely on traditional methods of cutting and polishing, while global competitors have embraced **automation** and advanced technology.

- **Israeli and Belgian diamond industries** have adopted cutting-edge technologies like **automated cutting machines** and **laser-guided polishing**, making their operations more efficient.

WAY FORWARD:

- **Diversification into Lab-Grown Diamonds:** Encourage **investment in R&D** for lab-grown diamonds.Offer **incentives and subsidies** to industries adopting lab-grown diamond technologies.Establish **dedicated clusters** or SEZs for lab-grown diamond production.

- The lab-grown diamond market is expected to grow at a significant rate globally, and countries like **China** and **Singapore** have already capitalized on this trend. India can leverage its expertise in cutting and polishing to expand into this market.

- **Technological Upgradation:** Provide **low-interest loans** or **technology grants** for SMEs to upgrade machinery.Establish**skill development centers** for workers to learn about modern diamond processing technologies such as **laser-guided cutting** and **automated polishing**.

    - The diamond industries in **Belgium** and **Israel** have adopted cutting-edge technologies, making them highly efficient.

- **Reduction in Import Duties:** The government should consider **temporary tax reliefs** or **duty reductions** on the import of rough diamonds to help the industry recover.Negotiate **bilateral trade agreements** with diamond-producing countries to secure rough diamonds at more competitive prices.

    - Countries like **Belgium** and **Israel** benefit from lower import duties and favourable trade agreements, making their diamond industries more competitive.

- **Enhanced Marketing and Branding of Indian Diamonds:** The **Gems and Jewellery Export Promotion Council (GJEPC)** can lead global marketing campaigns, showcasing India's craftsmanship and heritage in diamond polishing.Use platforms like **international trade shows** and **online marketplaces** to increase the visibility of Indian diamonds.Create a national **"Brand India Diamond"** campaign to build trust and recognition for Indian diamonds globally.
- **Promoting Ethical and Sustainable Practices:** Encourage the **use of renewable energy** in diamond processing units and adopt **eco-friendly technologies**.Promote **certification and traceability** for diamonds to assure buyers of their ethical sourcing.Collaborate with **international ethical diamond certification bodies** to strengthen India's reputation in the global market.

    - Countries like **Canada** and **Botswana** have successfully marketed their diamonds as ethically sourced, commanding premium prices in the global market.

- **Strengthening Trade and Export Policies:** Reduce **compliance burdens** for diamond exporters by simplifying procedures.Negotiate **free trade agreements** with major diamond markets like the **United States**, **Hong Kong**, and **China** to reduce tariffs and

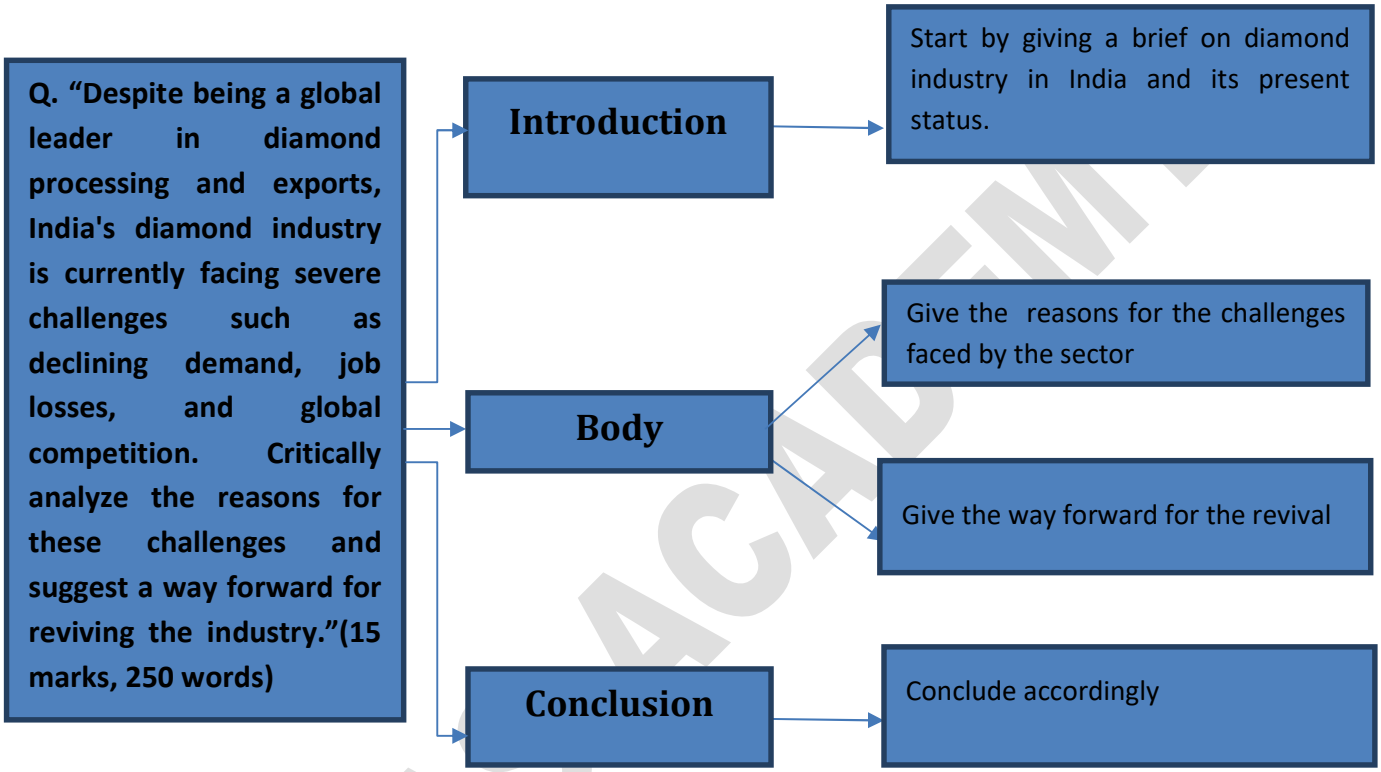
improve market access.Offer **export incentives** to encourage Indian firms to tap into new markets, especially in the **Middle East** and **Southeast Asia**.

- **Developing Domestic Demand for Diamonds:** Launch campaigns to promote **diamonds as a symbol of tradition** in weddings and cultural events, particularly targeting the **growing middle class**.Encourage **affordable diamond jewellery** through partnerships with retail brands to make diamonds accessible to a wider audience.
    - India can replicate **De Beers' "A Diamond is Forever" campaign**, focusing on making diamonds more desirable to the domestic market, especially for **millennials** and **Gen Z**.
- **Addressing Global Economic Trends:** Monitor global economic conditions and adapt marketing strategies to capture consumer demand in growing economies.Build partnerships with **e-commerce platforms** to tap into the increasing trend of **online luxury goods shopping**.
    - In times of global downturns, Indian diamond companies can focus on emerging markets like **Africa** and **Latin America**, which present opportunities for growth.
    - receiving the President's assent, which will determine its final application within the state.

PRACTICE QUESTION

Q. "Despite being a global leader in diamond processing and exports, India's diamond industry is currently facing severe challenges such as declining demand, job losses, and global competition. Critically analyze the reasons for these challenges and suggest a way forward for reviving the industry."(15 marks, 250 words)

APPROACH



MODEL ANSWER

India's diamond industry processes over **90% of the world's rough diamonds** and employs more than **1.3 million workers**. However, it is currently facing a crisis due to declining exports, factory closures, and job losses. The **Global Trade Research Initiative (GTRI)** has highlighted that both imports and exports have dropped sharply, triggering defaults and a slowdown in the sector

REASONS FOR THE CHALLENGES FACED BY THE DIAMOND INDUSTRY:

1. **Global Economic Slowdown**:The economic downturn in major markets like the **U.S. and Europe** has reduced consumer demand for diamonds, affecting India's exports
2. **Shift to Lab-Grown Diamonds**:There has been a **growing preference for lab-grown diamonds**, which are cheaper and more sustainable. India's industry, primarily focused on natural diamonds, has been slow to adapt

3. **Rising Cost of Rough Diamonds**:Reduced global mining output and the **Russia-Ukraine conflict** have increased the cost of rough diamonds, making it difficult for Indian firms to source affordable raw materials

4. **Labor and Employment Crisis**:Job losses have been rampant, especially in **Surat**, where over **50,000 workers** have lost their jobs due to factory closures

5. **Competition from Other Countries**:India faces increasing competition from **China** and Southeast Asia, where labour costs are lower and governments provide better incentives

WAY FORWARD:

1. **Diversification into Lab-Grown Diamonds**:India should focus on **R&D and investment** in lab-grown diamond production to capture this growing market

2. **Technological Upgradation**:Provide **low-interest loans** for SMEs to adopt **automated cutting and polishing** technologies, improving efficiency and reducing costs

3. **Reduction in Import Duties**:The government should **lower the 7.5% import duty** on rough diamonds and negotiate trade agreements with diamond-producing nations to secure raw materials at competitive prices

4. **Enhanced Marketing and Branding**:Launch a **"Brand India Diamond" campaign**, promoting India's craftsmanship and ethical sourcing globally, while tapping into new markets in the **Middle East** and **Southeast Asia**

5. **Promoting Sustainability and Ethical Sourcing**:Collaborate with international bodies to ensure **conflict-free diamonds**, and promote India's adherence to the **Kimberley Process**, attracting environmentally-conscious consumers

The revival of India's diamond industry requires **technological upgrades, market diversification, and sustainability initiatives**. By focusing on lab-grown diamonds, reducing costs, and enhancing its global brand, India can reclaim its leadership in the diamond sector while ensuring employment for millions of workers.

5. GROUNDWATER CRISIS

iMPACT ANALYSIS

SYLLABUS:

GS 1 > Geography > Resource geography > water

REFERENCE NEWS:

- A recent study conducted by the National Remote Sensing Centre (NRSC) in Hyderabad has revealed alarming levels of fluoride contamination in groundwater across various regions of India. The study analyzed 6.66 lakh groundwater samples from different states and found that fluoride contamination often exceeded the permissible limits, posing significant health risks, particularly in arid regions.

KEY FINDINGS OF THE STUDY

- Geographical Distribution of Contamination: The study identified high levels of fluoride contamination in groundwater in several states, including Rajasthan, Telangana, western Andhra Pradesh, eastern Karnataka, Haryana, Gujarat, Madhya Pradesh, Tamil Nadu, Uttar Pradesh, Jharkhand, Bihar, and Chhattisgarh. The most severe contamination was found in Rajasthan, particularly in the Jaisalmer district, which recorded the highest fluoride levels in the country.
- Seasonal Variation in Fluoride Levels: The study noted that fluoride contamination was highest during the dry, pre-monsoon summer months (March-May), with concentrations jumping to 8.65% above the permissible limit. Post-monsoon, the concentration remained significantly high at 7.1% above normal levels.
- Health Implications of Fluoride Contamination: The study highlighted a high risk of skeletal fluorosis, a condition that affects bones and joints, when fluoride concentration in groundwater reaches as low as 2%. Increased fluoride levels, particularly when reaching 40% concentration in groundwater, can accelerate dental decay, especially among children.
- Role of Lithology and Geomorphology: Geological factors like lithology, soil type, and geomorphology contribute to higher fluoride levels in regions with specific formations prone to leaching fluoride-bearing minerals.
- Climatic Influence: Arid and dry areas, especially in western India, have higher fluoride contamination compared to humid regions.

WHAT IS GROUNDWATER?

- Groundwater is water that exists underground in saturated zones beneath the land surface.
- It fills the pores and fractures in underground materials such as sand, gravel, and other rock. This layer where water is held in appreciable amount is called an aquifer. The upper surface of the saturated zone is called the water table.

INDIA'S GROUNDWATER SCENARIO:

The hydro-geological setting of ground water in India can be divided into two:

- **Hard-rock Aquifers of Peninsular India:**
  - Cover 65% of India's aquifer area, mostly in central peninsular regions.
  - Have limited groundwater storage due to hard-rock formations.
  - Water levels drop rapidly after a 2-6 meter decline, with poor permeability limiting recharge, making these aquifers vulnerable to drying out.
- **Alluvial Aquifers of the Indo-Gangetic Plains**:
  - Found in the Gangetic and Indus plains of Northern India with significant storage capacity.
  - Critical for fresh water supply but face risks of irreversible overexploitation due to excessive extraction and low recharge rates.

GROUND WATER AVAILABILITY

- As per the 2023 Dynamic Ground Water Resource Assessment Report released by the Central Ground Water Board (CGWB), the total annual groundwater recharge for the entire country is 449.08 billion cubic meters (BCM), marking an increase of 11.48 BCM compared to the previous year (2022).

  Annual Extractable Groundwater Resources: 407.21 BCM

Annual Groundwater Extraction: 241.34 BCM, indicating a stage of groundwater extraction of approximately 59.23% across the country.

- Rainfall contributes about 61% of the total annual groundwater recharge, with the remaining 39% coming from other sources like canal seepage, return flow from

irrigation, and recharge from water conservation structures (Source: Vikaspedia, 2023 Dynamic Groundwater Resources Assessment)

INDIA AS A GROUND WATER ECONOMY:

- India is a groundwater economy. UNESCO 'World Water Development Report' 2020 states that India is the largest extractor of groundwater in the world.
- India uses 25% of all groundwater extracted globally. (Source: UNESCO, *World Water Development Report* 2020).
- Groundwater is one of the most important water sources in India:

Overall, some 60% of the irrigated land in India is supported primarily by groundwater supplies and approximately 90 million rural households are directly dependent on groundwater irrigation.

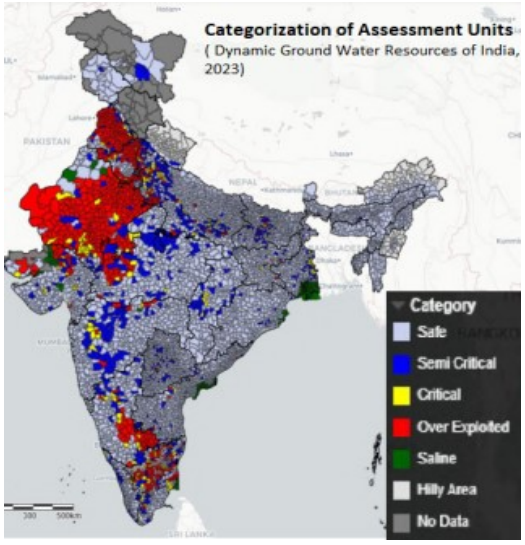
Over 80% of the rural and urban domestic water supplies are met through groundwater.

About 90% of the groundwater extracted is used by irrigation.

(Sources: Ministry of Water Resources, Central Ground Water Board, Groundwater Yearbook 2022-23)

GROUND WATER CRISIS

- Experts believe that India is fast moving towards a crisis of ground water overuse and contamination.
- As per the 2023 Dynamic Ground Water Resource Assessment Report, out of the total 6,553 assessment units across the country, 736 units (approximately 11%) have been categorized as 'Over-exploited.' Additionally, when combined with the 'critical' and 'semi-critical' categories, these concerning categories account for more than 35% of the total assessed units.



- Groundwater overexploitation occurs when extraction exceeds recharge over time. Although surface water is more abundant, groundwater's decentralized availability

makes it the primary source for agriculture and drinking water in India.

- Northern and eastern India are major hotspots of groundwater depletion.

REASONS FOR THE CRISIS:

- **Groundwater energy nexus:**

Subsidized or free electricity for agriculture in many states, such as Punjab and Haryana, leads to unmetered groundwater pumps and flat-rate tariffs. This has resulted in inefficient and excessive groundwater use, contributing to a significant depletion of water tables. According to a 2018 report by the World Bank, around 90% of groundwater extraction in these states is linked to subsidized electricity.

- **Green revolution and inapt cropping patterns:**

Over 80% of India's net irrigated area added since the Green Revolution relies on groundwater (World Bank).

Government incentives, like higher MSPs for water-intensive crops (e.g., rice, sugarcane), push farmers to grow them in water-stressed regions like Punjab, leading to severe groundwater depletion.

- **Inadequate regulations:**

Currently, the Easement Act, 1882 provides every landowner with the right to collect and dispose, within his own limits, all water under the land and on the surface. This makes it difficult to regulate extraction of ground water as it is owned by the person to whom the land belongs.

- **Lack of uniformity in regulation**

Water falls under the State List of the Constitution. This implies that state legislative assemblies can make laws on the subject.

Hence there is no uniformity in the laws across the country. Also, the central government can only make recommendations to the states in matters related to groundwater.

- **Fragmented institutional arrangement:**

Multiple ministries, including Jal Shakti, Rural Development, and Environment, along with institutions like the Central Water Commission (CWC), Central Ground Water Board (CGWB), Central Ground Water Authority (CGWA), and Central Pollution Control Board (CPCB),

manage groundwater. However, they often operate independently, leading to a lack of coordination in groundwater management.

- **Pollution:**

Groundwater Pollution: Contaminants like arsenic, nitrate, fluoride, and salinity can pollute groundwater through both natural and human activities. The recent study by the National Remote Sensing Centre (NRSC) highlighted severe fluoride contamination, especially in regions like Rajasthan, where it poses serious health risks such as skeletal fluorosis.

Natural Causes: In certain areas, rocks with mineral compounds naturally leach contaminants like arsenic into groundwater. This is a major issue in India.

Anthropogenic Causes: Human activities such as discharge of untreated effluents, landfills, chemical-laden agricultural runoff, and over-extraction contribute significantly to groundwater pollution.

- **Climate Change:**

Changes in rainfall patterns, intensity, and temperature affect groundwater replenishment, with climate change acting as a force multiplier by reducing infiltration and recharge.

- **Inaccurate Estimation:**

The current method using 15,640 wells struggles to accurately assess groundwater, not fully accounting for rising urban/rural use or climate change impacts.

- **Rising Demand:**

Increasing water demand for domestic, industrial, and agricultural needs, coupled with limited surface water, leads to over-exploitation of groundwater.

IMPACT OF GROUNDWATER DEPLETION/CRISIS:

- **On Individuals:**
  - Reduced groundwater availability can cause potable water shortages and eventually lead to droughts.
  - Polluted groundwater can result in health issues such as Hepatitis, Fluorosis, Itai-Itai disease, and Arsenic poisoning. Notably, fluoride contamination, as highlighted in a

recent study by the NRSC, poses severe health risks, including skeletal fluorosis and accelerated dental decay.

- **On Agriculture:**
    - **Over-dependence**: India heavily relies on groundwater for agriculture, so any change in its quantity or quality can severely affect crop production and productivity.
    - **Decreasing Farmer Income**: Water scarcity forces farmers to invest more in deeper wells or purchasing water, reducing profits. This is a significant factor in the increasing number of farmer suicides in India.
    - **Increasing Pest Attacks**: Groundwater depletion can lead to pest infestations, as seen in Harchandpur village, Haryana, where a drop in groundwater led to a rise in termite attacks. The lack of water allows termites to thrive, forcing farmers to shift from growing pulses to more water-intensive crops like mustard and wheat, which are less susceptible to termite damage.
- **On Economy:**
    - By 2030, India's water demand is projected to be twice the available supply, leading to severe water scarcity for millions and potentially causing a 6% loss in GDP.(source: NITI Aayog's 2018 Composite Water Management Index (CWMI) report)
- **On Society:**
    - Groundwater depletion can cause land subsidence, forcing relocations. Jakarta, for example, is sinking due to excessive groundwater extraction, prompting Indonesia to move its capital to East Kalimantan.
    - Water scarcity disproportionately affects the poor and vulnerable, increasing their costs and exposing them to greater risks of contagious diseases like Cholera and Hepatitis, thereby deepening poverty and widening societal inequalities.
- **On Environment and Ecology:**
    - Reduced Water Flow: Groundwater depletion prevents water from replenishing lakes, rivers, and seas, leading to declining water levels and negatively affecting aquatic life and ecosystems.

- **Loss of Soil Moisture**: The depletion leads to loss of soil moisture, making soil less cohesive and more prone to erosion, contributing to desertification.
- **Impact on Air Quality**: As soil cohesion decreases, more dust is released into the air, worsening air quality. This is particularly evident in New Delhi, where desertification around the Northern Aravallis and Sutlej-Yamuna plains contributes to severe air pollution.

Government Initiatives Related to Groundwater Management:

- Atal Bhujal Yojana (ABY): Focuses on improving groundwater management through community participation in seven states.
- National Project on Aquifer Management (NAQUIM): Aims to map and manage aquifers for equitable and sustainable groundwater use.
- Pradhan Mantri Krishi Sinchayee Yojana (PMKSY): Enhances water access for agriculture and promotes sustainable conservation practices.
- Jal Shakti Abhiyan - Catch the Rain Campaign: Launched by the government to encourage rainwater harvesting, especially during the monsoon season.
- Mission Amrit Sarovar: Focuses on developing and rejuvenating water bodies to increase groundwater recharge.
- India-Groundwater Resource Estimation System (IN-GRES): A government-developed software for dynamic annual groundwater assessments.

WAY FORWARD:

- We need to think of groundwater as a common pool resource: For this, legislative changes, such as changes in the Easement Act, are essential. In this regard, the model groundwater bill promises immense potential.
- Community water management: States can draw inspiration from community water management which is followed in Andhra Pradesh which has already shown how aquifer management and sharing of borewells can ensure equitable distribution of water.
- Two-pronged approach: Both technological solutions (Eg: groundwater injection, micro irrigation) and traditional water management practices must be suitably incorporated in the development and conservation of groundwater resources.
- Addressing over-exploitation in agriculture sector

Curbing extensive groundwater withdrawals will require limiting agricultural electricity subsidies provided by state governments and rationing of power.

The CWMI report recommends solutions like persuading farmers to adopt more efficient technologies such as drip irrigation.

The government should promote alternatives to water-intensive crops. For example, Maize requires only one-third of water than paddy.

Further there is need for training farmers on water conservation practices.

- Need to set up National Water Commission

It should be a body with multidisciplinary expertise including in hydrology (surface water), hydrogeology (groundwater), meteorology (atmosphere), river ecology, agronomy, environmental economics and participatory resource management.

- Mihir Shah Committee recommendations: The Mihir Shah Committee recommended merging CGWB and CWC into a unified National Water Commission (NWC). It emphasized aquifer mapping, community-based management, a decentralized approach, sustainable practices, legal reforms, and robust data management. The committee also advocated for capacity building, public awareness, an interdisciplinary approach, and financial mechanisms like water conservation incentives and potential water pricing.

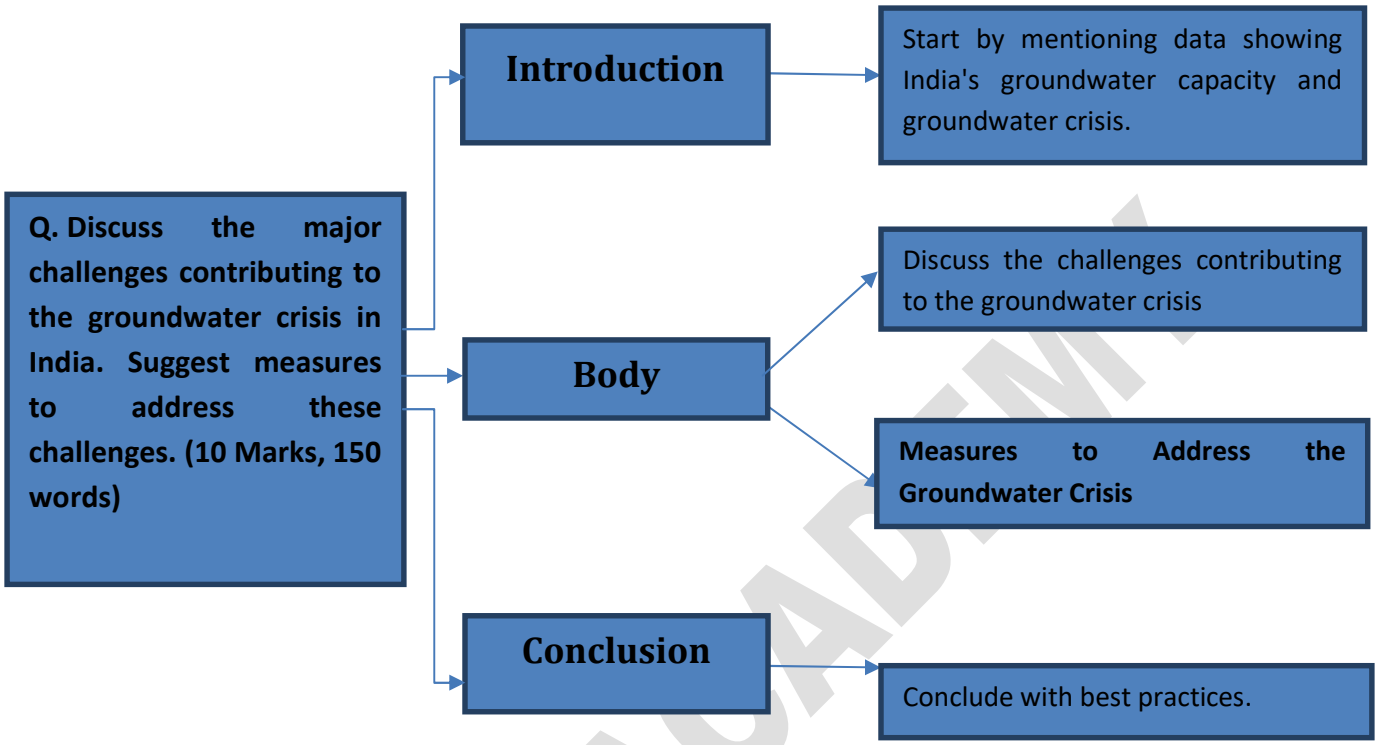
BEST PRACTICE:

- M**azhapolima Initiative,** Kerala: It is an artificial groundwater recharge program. Under this initiative, employees of 100 NGOs received training to install roof water harvesting systems. In the rainy season, the rooftop rain water is led through pipes with sand filter at the end, to open dug well to replenish the aquifer. The intervention gives subsidies to poorer households especially in overexploited groundwater blocks and in areas of high salinity.
- **'Bhungroo'**- Ground Water Injection Well: Bhungroo' is a water management system in Gujarat that injects and stores excess rainfall water underground. This water is then used for irrigation during summers

PRACTICE QUESTION

Q. Discuss the major challenges contributing to the groundwater crisis in India. Suggest measures to address these challenges. (10 Marks, 150 words)

APPROACH



MODEL ANSWER

India's groundwater potential is vast, with the **2023 Dynamic Ground Water Resource Assessment Report** estimating the total annual groundwater recharge at **449.08 billion cubic meters (BCM).** Despite this significant potential, the country faces a severe groundwater crisis due to over-extraction and contamination. Groundwater supports **60% of irrigated land** and provides over **80% of rural and urban domestic water supplies**. However, over-reliance on this resource has led to widespread depletion, threatening India's water security.

Challenges Contributing to the Groundwater Crisis

- **Groundwater Overexploitation**: India is the largest extractor of groundwater globally, using 25% of all groundwater extracted (UNESCO, World Water Development Report 2020). Over 90% of this extraction is for irrigation, leading to severe depletion of water tables. The 2023 Dynamic Ground Water Resource Assessment Report states that 11% of assessment units are 'over-exploited.'
- **Energy-Water Nexus**: Subsidized or free electricity for agriculture in states like Punjab and Haryana promotes excessive groundwater use for irrigation. According to a 2018 World Bank report, 90% of groundwater extraction in these states is linked to these subsidies, leading to unsustainable use.

- **Inapt Cropping Patterns**: Government incentives for water-intensive crops like rice and sugarcane, particularly in semi-arid regions like Punjab, have exacerbated groundwater depletion. Over 80% of the irrigated area added since the Green Revolution relies on groundwater (World Bank).
- **Inadequate and Fragmented Regulation**: The Easement Act, 1882 grants landowners the right to all water under their land, making regulation difficult. Moreover, fragmented management across multiple agencies, such as the Central Water Commission (CWC) and Central Ground Water Board (CGWB), results in a lack of coordinated efforts.
- **Pollution and Contamination**: Groundwater pollution from contaminants like arsenic, nitrate, and fluoride poses severe health risks, as highlighted by the National Remote Sensing Centre (NRSC) study. The study identified high fluoride contamination in states like Rajasthan, Telangana, and Haryana, particularly during the dry pre-monsoon months, exacerbating the groundwater crisis.
- **Climate Change Impacts**: Climate change affects groundwater replenishment by altering rainfall patterns and intensifying temperature fluctuations. This reduces infiltration and recharge, exacerbating the groundwater crisis.

Measures to Address the Groundwater Crisis

- **Legislative Reforms**: Revising the Easement Act and implementing the model groundwater bill are crucial to regulate groundwater as a common pool resource and curb over-extraction.
- **Promotion of Water-Efficient Technologies**: The CWMI report recommends adopting efficient irrigation technologies like drip irrigation. Additionally, promoting alternatives to water-intensive crops, such as maize, which requires one-third the water of paddy, can help reduce groundwater use.
- **Community-Based Water Management**: States can learn from Andhra Pradesh's community water management practices, where aquifer management and borewell sharing ensure equitable distribution of water.

Government Initiatives Related to Groundwater Management:

- Atal Bhujal Yojana (ABY)

- **Integrated Water Resources Management (IWRM)**: An integrated approach involving all stakeholders, including central and state governments, NGOs, and local communities, is essential to manage water resources effectively. This includes better coordination among agencies like the CWC, CGWB, and CPCB.

  - National Project on Aquifer Management (NAQUIM)
  - Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)
  - Jal Shakti Abhiyan - Catch the Rain Campaign
  - Mission Amrit Sarovar
  - India-Groundwater Resource Estimation System (IN-GRES)

- **Climate-Resilient Water Management**: Developing and implementing climate-resilient water management practices, such as enhancing groundwater recharge and adopting drought-resistant crop varieties, can mitigate the adverse impacts of climate change on groundwater resources.

Best Practices: Initiatives like the **Mazhapolima program** in Kerala, which involves artificial groundwater recharge through rooftop rainwater harvesting, and the **'Bhungroo'** groundwater injection wells in Gujarat, are successful models for sustainable groundwater management.

The groundwater crisis in India demands a comprehensive approach that includes regulatory reforms, technological advancements, community participation, and integrated management. By addressing the key challenges and implementing sustainable measures, India can secure its groundwater resources and ensure **long-term water security for its population.**

6. 100 YEARS OF DISCOVERY OF THE INDUS VALLEY CIVILIZATION

iMPACT ANALYSIS

SYLLABUS:

GS 1 > History and Culture

REFERENCE NEWS:

- A century ago, on September 20, 1924, John Marshall, the Director General of the Archaeological Survey of India, published an article in The Illustrated London News that announced the discovery of the Indus Valley Civilization. This marked a pivotal moment in the study of South Asian archaeology and history, introducing the world to an ancient, urbanized civilization that paralleled those of Egypt and Mesopotamia.

ABOUT THE INDUS VALLEY CIVILISATION (IVC)

- The Indus Valley Civilization (IVC), also known as the **Harappan Civilization** after one of its major sites, Harappa, was a Bronze Age civilization that spanned across **2,000 sites over 1.5 million sq. km** in what is now **India, Pakistan, and Afghanistan**.
- The Indus Valley Civilization is celebrated for its advanced urban planning, water management, and metallurgy. Known for its detailed seals, pottery, and terracotta artifacts, its structured city layouts and sophisticated drainage systems highlight its technological and organizational skills, making it a pivotal example of ancient urban development.
- **Key Figures in Discovery**:
    - Archaeologists **Daya Ram Sahni and Rakhal Das Banerji** were pivotal in uncovering the first artifacts at Harappa and Mohenjo-daro, respectively. Their findings led to Marshall's 1924 publication that changed the perception of prehistoric civilization in South Asia.
- **Civilization Phases**:
    - **Early Phase (3200 BCE - 2600 BCE)**: Formation and initial urbanization.
    - **Mature Period (2600 BCE - 1900 BCE)**: Peak with advanced city planning and extensive trade.

- **Late Phase (1900 BCE - 1500 BCE)**: Around 1900 BCE, the major cities of the Indus Valley saw a gradual decline. The reasons for this decline are not entirely clear but may include changes in the river patterns, climate change leading to drought, overuse of resources, or invasions. By around 1500 BCE, much of the civilization was in decline, and many of the cities were abandoned.

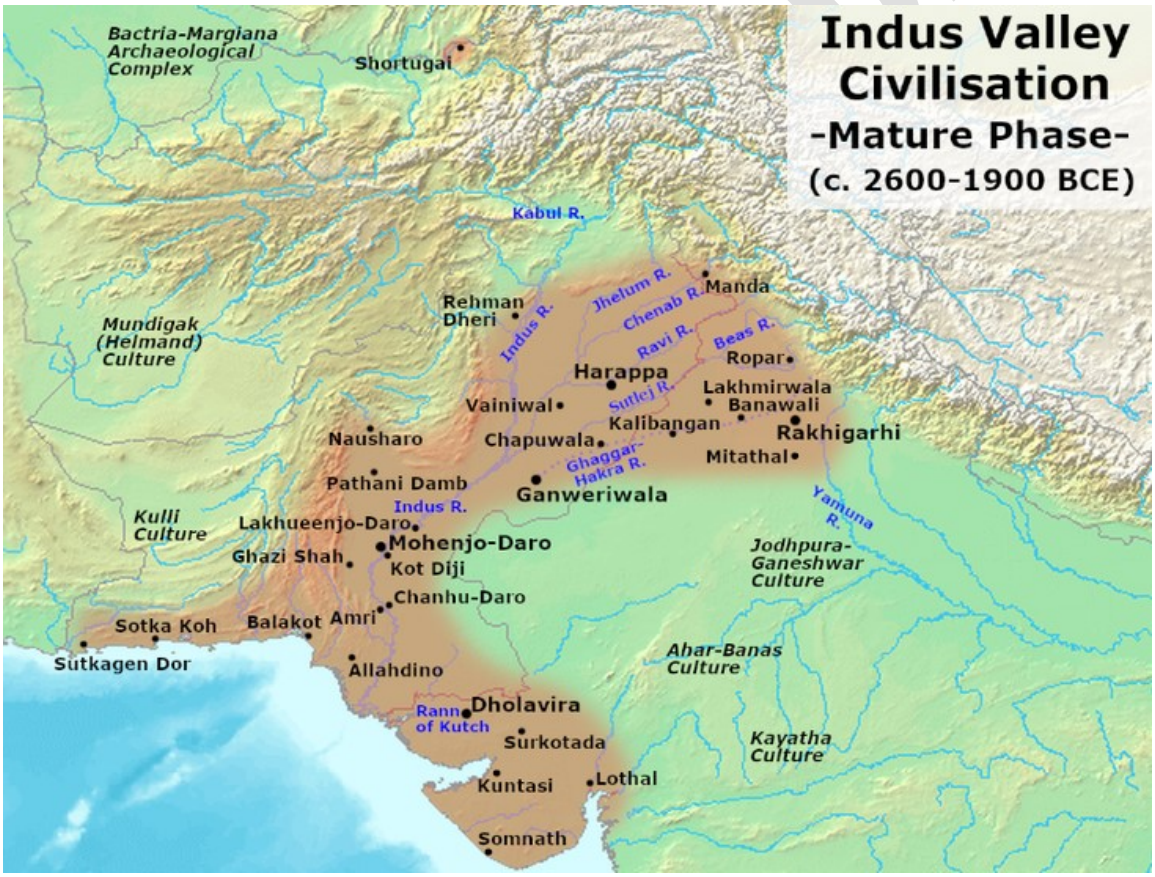
- **Cultural and Linguistic Aspects**:
  - Research suggests the **possible use of Dravidian languages** among the populace. The linguistic and cultural dimensions of the Harappan people continue to intrigue scholars, pointing towards a complex societal structure **prior to the arrival of Indo-Aryan languages**.

- **Maritime and Trade Links**: Evidence of maritime trade links with West Asia from around 3000 BCE underscores the Harappan civilization's role in early global trade networks. These connections facilitated not only the exchange of goods but also of ideas and technologies.

IMPORTANT SITES:

SITE	EXCAVATED BY	LOCATION	IMPORTANT FINDINGS
Harappa	Daya Ram Sahni, 1921	Bank of river Ravi, Punjab, Pakistan	Sandstone statues, granaries, evidence of bullock carts
Mohenjo-Daro	R.D. Banerjee, 1922	Bank of river Indus, Larkana, Punjab, Pakistan	Great Bath, granaries, bronze dancing girl, seals, woven cotton
Sutkagendor	Stein, 1929	Southwestern Balochistan, Pakistan, on Dast river	Trade point between Harappa and Babylon
Chanhu Daro	N.G. Majumdar, 1931	Sindh on the Indus river	Bead maker's shop, footprint of a dog chasing a cat
Amri	N.G. Majumdar, 1935	On the bank of the Indus river	Evidence of antelope
Kalibangan	Ghose, 1953	Rajasthan on the bank of the Ghaggar river	Fire altar, camel's bones, wooden plough

SITE	EXCAVATED BY	LOCATION	IMPORTANT FINDINGS
Lothal	R. Rao, 1953	Gujarat on Bhogva river near Gulf of Cambay	First manmade port, dockyard, rice husk, fire altars, chess-playing
Surkotada	J.P. Joshi, 1964	Gujarat	Bones of horses, beads
Banawali	R.S. Bisht, 1974	Hisar district, Haryana	Beads, barley, evidence of pre-Harappan and Harappan culture
Dholavira	R.S. Bisht, 1985	Gujarat in Rann of Kachchh	Water harnessing system, water reservoir



THE SIGNIFICANCE OF THE INDUS VALLEY CIVILIZATION (IVC):

- **Urban Planning and Infrastructure:**

- The Indus Valley Civilization's advanced urban planning is exemplified by the cities of Harappa and Mohenjo-Daro, which were designed with precise **grid patterns, advanced drainage systems**, and **sophisticated water management facilities.**
- For example, Harappa's urban layout, featuring **granaries**, reflects a well-organized approach to food storage essential for sustaining a large urban population. Also, Mohenjo-Daro boasted the **Great Bath**, suggesting a complex understanding of **hydraulics and public sanitation** that rivals modern standards.

- **Technological and Artistic Innovation:**
  - The civilization demonstrated considerable skill in **metallurgy and craftsmanship**, evident from discoveries such as the **bronze dancing girl and seal of Pashupati** from Mohenjo-Daro, which highlight their proficiency in metal work and seal-making.
  - Additionally, the find of a **piece of woven cotton** suggests advanced textile production. These items not only served practical purposes but also bore cultural and artistic significance, showcasing the Indus Valley's rich artistic heritage.
- **Economic and Trade Networks:**
  - The trade relationships of the Indus Valley Civilization are highlighted by the discovery of a trade point between Harappa and Babylon **at Sutkagendor**. This site illustrates the extensive trade networks that facilitated economic exchanges with distant regions, promoting not only economic prosperity but also cultural exchanges that enriched the civilization's social fabric.
  - Also, **Lothal, known for its dockyards**, facilitated maritime trade.
- **Social Organization and Cultural Impact:**
  - The egalitarian nature of the Indus Valley society is underscored by the **uniformity in urban housing** and the **absence of grand palaces or temples**. The planned neighborhoods across various sites, such as the sophisticated **urban layout at Dholavira**, reflect a society where **social stratification was minimal,** promoting a more equitable distribution of resources and communal living.
- **Environmental Management:**

- **Dholavira's sophisticated water harnessing system and reservoir** demonstrate the Indus Valley's integration with their environment. These innovations in water management are indicative of a deep understanding of environmental sustainability, providing lessons on the importance of **resource management in supporting urban life.**

- **Legacy and Influence:**

  - The **cultural practices and technologies** developed by the Indus Valley Civilization have left a lasting impact on subsequent cultures within the Indian subcontinent. The architectural designs, urban layouts, and religious practices evident in artifacts and city planning have echoed through history, influencing the cultural landscape of South Asia.

CONCLUSION:

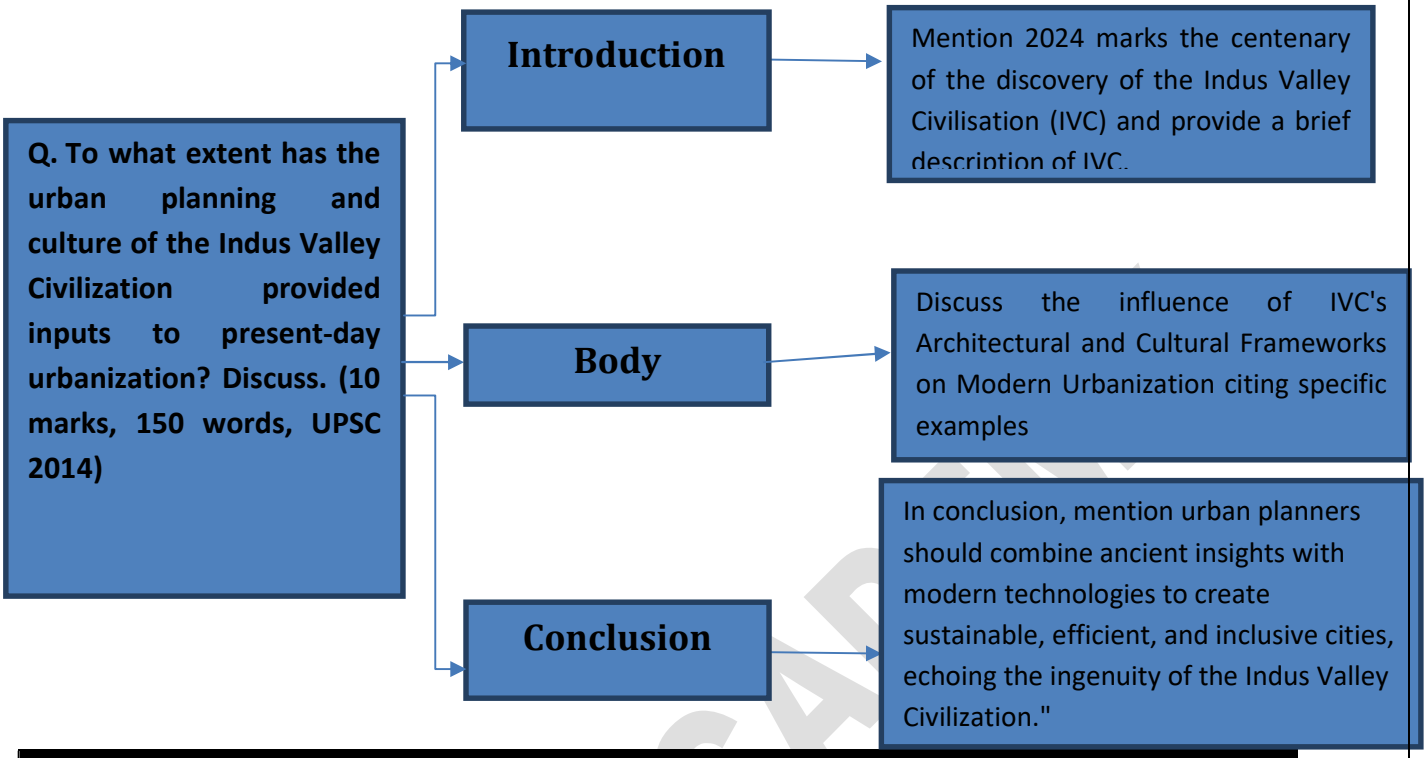
- As we mark the centennial of the Indus Valley Civilization's discovery, we celebrate its substantial contributions to our understanding of ancient societies. Positioned **alongside Egypt and Mesopotamia asone of the three early cradles of civilization,** the Indus Valley Civilization was distinguished by its meticulous urban planning, innovative water management, and extensive trade networks.

- Despite the **script remaining undeciphered and many mysteries still unsolved**, the civilization offers invaluable insights into ancient urbanism, technology, and economic systems. It laid foundational cultural elements that have persisted throughout the region, profoundly influencing South Asian culture. As discoveries continue to unveil the complexities of this civilization, it serves as a timeless testament to **human ingenuity and adaptability, providing enduring lessons in urban planning, cultural integration, and environmental stewardship relevant to modern global society.**

PRACTICE QUESTION

Q. To what extent has the urban planning and culture of the Indus Valley Civilization provided inputs to present-day urbanization? Discuss. (10 marks, 150 words, UPSC 2014)

APPROACH



MODEL ANSWER

2024 marks the centenary of the discovery of the Indus Valley Civilisation (IVC). Known as the Harappan Civilisation, this **Bronze Age society** spanned across **2,000 sites over 1.5 million sq. km** in present-day India, Pakistan, and Afghanistan. Renowned for its sophisticated urban planning, water management, and metalurgy, the IVC offers invaluable insights into ancient urbanism, technology, and economic systems.

Influence of IVC's Architectural and Cultural Frameworks on Modern Urbanization:

- **Advanced Urban Layouts:**
  - Harappa and Mohenjo-Daro exemplify the IVC's advanced urban planning with their structured city layouts, **precise grid patterns, and robust drainage systems.** These designs facilitated efficient transportation and effective space utilization, setting precedents for contemporary urban development.
  - For instance, Harappa's layout included **granaries for large-scale food storage** and **well-organized streets**, which supported efficient transportation and trade, enhancing the city's economic stability and societal well-being.
- **Water Management and Sanitation:**

- The **Great Bath at Mohenjo-Daro** highlights the IVC's mastery in hydraulic engineering and sanitation. This sophisticated water management system underscores the importance of **public hygiene and environmental health** in urban settings, providing a foundation for modern sanitation technologies.

- **Architectural Innovation**:
  - The use of **baked brick and uniform architectural designs in IVC** has influenced the use of durable materials and standardized construction practices in modern housing developments.

- **Economic Integration through Trade:**
  - The strategic economic planning evident in **Lothal, a port city of the IVC,** with its extensive maritime trade routes, demonstrates the civilization's foresight in economic globalization and diversification, which remains relevant to modern economic strategies.

- **Cultural and Social Innovations:**
  - The **architectural uniformity** in sites like Dholavira and Kalibangan reflects a **cohesive society with minimal social stratification**, promoting communal harmony and inclusivity—values that modern urban centers strive to embody today.

- **Environmental Sustainability:**
  - **Dholavira's innovative water reservoirs** showcase the IVC's commitment to sustainable urban living. These environmental management practices provide lessons for contemporary cities dealing with similar challenges.

- **Technological Proficiency:**
  - The IVC's metallurgical advancements and craftsmanship, particularly **in tools and jewelry making**, have parallels in today's high-precision industries, such as Switzerland's watchmaking.

As we celebrate the 100th anniversary of the IVC's unveiling to the world, we recognize its profound impact on our understanding of ancient and modern urbanization. The civilization's legacy in city planning, environmental management, and socio-economic structures continues to inspire and inform current urban development strategies. By integrating ancient wisdom

with modern technologies, today's urban planners **can create more sustainable, efficient, and inclusive cities,** echoing the ingenuity of the Indus Valley Civilization.

GENERAL STUDIES-II

7. SHARPENING INDIA'S ANTI-TUBERCULOSIS FIGHT

iMPACT ANALYSIS

SYLLABUS:

GS 2 >Social Justice >> Health

REFERENCE NEWS:

The omnipresence of tuberculosis (TB) in the pages of history and literature is testimony to how the disease has plagued generations across the world and continues to be a major problem even today. Political will in India has helped drive a great deal of progress in the fight against the disease. For example, in 2023, addressing the big challenge of 'missed' TB cases, 25.1 lakh patients were diagnosed in India as having TB, highlighting strengthened case finding efforts. However, as we work toward the goal of TB elimination — the Prime Minister has urged citizens to work towards TB elimination — we must look to innovate and deploy proven technologies and tools at our disposal.

TUBERCULOSIS BURDEN OF INDIA:

The Ministry of Health and Family Welfare's **India TB Report 2024**, highlights that

- The mortality rate due to Tuberculosis had declined from 28 per lakh population in 2015 to 23 per lakh population in 2022.
- Nearly 33% or 8.4 lakh of the 25.5 lakh cases reported in 2023 came from the private sector.To compare, only 1.9 lakh cases were reported by the private sector in 2015, the year considered to be the baseline by the programme that is geared towards the elimination of the disease.
- The estimated incidence of TB in 2023 increased slightly to 27.8 lakh from the previous year's estimate of 27.4 lakh.
- **The mortality due to the infection remained the same at 3.2 lakh.**
- India's **TB mortality dropped** from 4.94 lakhs in 2021 to 3.31 lakhs in 2022.
- India reached its 2023 target of initiating treatment in 95% of patients diagnosed with the infection.
- **India bears a quarter of the global TB burden**

TB CASES IN INDIA OVER THE YEARS

	India TB Report 2020	2023	2024
Estimated TB cases	26.9 lakh	27.4 lakh	27.8 lakh
Number of cases reported	24.04 lakh	24.2 lakh	25.5 lakh
Reporting from private sector	6.8 lakh	7.3 lakh	8.4 lakh
% cases from private sector	28.20%	30%	32.90%
Estimated mortality	4.36 lakh	3.2 lakh	3.2 lakh

Tuberculosis:

A bacterial infection caused by Mycobacterium tuberculosis. It can affect any organ of the body. It is an airborne infection. Every year, 10 million people fall ill with TB. Despite being a preventable and curable disease, **1.5 million people die from TB each year** – making it the world's top infectious killer.

TB is the **leading cause of death of people with HIV** and also a major contributor to antimicrobial resistance.Most of the people who fall ill with TB live in low- and middle-income countries, but TB is present all over the world. **About half of all people with TB can be found in 8 countries:** Bangladesh, China, India, Indonesia, Nigeria, Pakistan, Philippines and South Africa.

TB is treated with a standard 6-month course of 4 antimicrobial drugs. Multi-drug-resistant Tuberculosis is a form of TB caused by **bacteria that do not respond to isoniazid and rifampicin**, the 2 most powerful, first-line anti-TB drugs.MDR-TB is treatable and **curable by using second-line drugs** such as bedaquiline.**Extensively drug-resistant TB (XDR-TB)** is a more serious form of MDR-TB caused by bacteria that **do not respond to the most effective second-line anti-TB drugs,** often leaving patients without any further treatment options.

Global Efforts to tackle TB include:

- WHO initiative to FIND.TREAT.ALL. #EndTB with Global Fund and Stop TB Partnership
- WHO releases Global Tuberculosis Report
- The Global Plan to End TB 2023-2030 a goal adopted by all UN member states and WHO

India's Efforts:

- PM TB Mukt Bharat Abhiyan-**It's an initiative of Ministry of Health and Family Welfare (MOHFW)** to accelerate the country's progress towards TB elimination by 2025.
- National Strategic Plan for Tuberculosis Elimination (2017-2025)
- TB Harega DeshJeetega Campaign-It has **three strong pillars** which include **clinical approach, public health component** and **active community participation.**It aims to improve and **expand the reach of TB care services** across the country **by 2022.**
- Nikshay Poshan Yojna-It provides Rs 500 support through **direct benefit transfer to the patients.**
- The National TB Elimination Programme (NTEP) serves as the cornerstone of these efforts, complemented by the TB-Free India Campaign and the Nikshay Poshan Yojana, which provides nutritional support to TB patients.

CHALLENGES OF INDIA'S ANTI-TUBERCULOSIS FIGHT:

- **High Burden of TB Cases: India** has a large number of TB cases, with millions of new cases reported annually. The sheer volume of cases poses a challenge for the healthcare system to diagnose, treat, and monitor patients effectively.Many TB cases go unreported or are misdiagnosed, particularly in rural areas where access to healthcare services is limited. This contributes to the persistence of the disease and hampers control efforts.
- **Drug-Resistant TB**: The emergence of drug-resistant TB, particularly MDR-TB and extensively drug-resistant TB (XDR-TB), is a significant challenge. These strains are harder and more expensive to treat, requiring longer treatment durations with more toxic drugs. Ensuring that patients adhere to the lengthy and often difficult treatment regimens is a major challenge. Poor adherence leads to treatment failure and the development of drug resistance.
- **Healthcare Infrastructure and Access:** In many parts of India, especially rural and remote areas, healthcare infrastructure is inadequate. This includes a lack of diagnostic facilities, trained healthcare workers, and proper medical supplies.Socioeconomic disparities, geographical barriers, and the stigma associated with TB prevent many people from accessing timely and effective healthcare services.
- **Social Determinants and Stigma**: TB is closely linked to poverty, malnutrition, and poor living conditions. These factors contribute to the spread and persistence of the disease, particularly in overcrowded and unsanitary environments.TB carries a significant social stigma, which discourages individuals from seeking diagnosis and treatment. This leads to delays in care, increased transmission, and poor treatment outcomes.
- **Awareness and Education**: Many people, particularly in rural areas, have limited awareness of TB symptoms, transmission, and the importance of completing treatment. This lack of knowledge contributes to delays in diagnosis and treatment, as well as non-adherence to treatment regimens.Misinformation about TB, including its causes, treatment, and prevention, is prevalent in some communities. This further complicates efforts to control the disease.
- **Coordination and Implementation Challenges**: Despite the presence of national programs like the National TB Elimination Program (NTEP), the implementation of TB control measures faces challenges related to coordination among various stakeholders, including public and private healthcare providers.A significant proportion of TB patients in India seek care in the private sector, where reporting and adherence to national treatment guidelines may be inconsistent. Engaging and regulating the private sector is crucial for comprehensive TB control.

- **Emerging Threats**: TB is the leading cause of death among people with HIV. The co-infection of TB and HIV presents a complex challenge, as HIV-positive individuals are more susceptible to TB, and managing both diseases simultaneously is difficult.The COVID-19 pandemic has disrupted TB services, including diagnosis, treatment, and follow-up. The pandemic has also diverted resources and attention away from TB control efforts, potentially leading to an increase in cases and deaths.
- **Research and Development**: The development of new TB treatments, diagnostics, and vaccines has been slow. Existing treatment regimens are lengthy, and there is an urgent need for more effective and shorter-duration treatments. The BCG vaccine, currently used for TB prevention, has limited efficacy, particularly in adults. The development of a more effective vaccine is crucial for long-term TB control.

HOW TO SHARPEN INDIA'S ANTI-TB FIGHT?

- **Strengthening Healthcare Infrastructure and Access:** Increase the number of diagnostic centers and ensure that quality TB diagnosis is available even in remote areas. This includes expanding the use of molecular diagnostics like GeneXpert, which provides rapid and accurate TB diagnosis, including drug-resistant TB.
    - China has effectively used rapid molecular tests and expanded access to TB diagnostic services through a network of TB-specific health facilities. This has helped in early detection and prompt treatment, especially in rural areas.
- **Integration of TB Services into Primary Healthcare:**Integrate TB diagnosis and treatment into the broader primary healthcare system, ensuring that every primary health center can diagnose and manage TB. This includes training healthcare workers at all levels.
    - Brazil's Unified Health System integrates TB care into primary healthcare services, ensuring widespread access to TB diagnosis and treatment, which has been key to controlling the disease in the country.
- **Enhancing Drug-Resistant TB Management**:Scale up the use of shorter, more effective treatment regimens for MDR-TB and XDR-TB, reducing the burden on patients and improving adherence.
    - South Africa has successfully implemented shorter regimens for drug-resistant TB, such as the nine-month regimen recommended by WHO, leading to improved treatment outcomes and reduced transmission.
- **Strengthen Patient Support Systems**:Enhance support systems for TB patients, including nutritional support, counseling, and adherence monitoring, to ensure that patients complete their treatment.
    - Peru's community-based DOTS (Directly Observed Treatment, Short-course) program, combined with nutritional and psychosocial support, has significantly

improved treatment adherence and success rates, especially for drug-resistant TB.

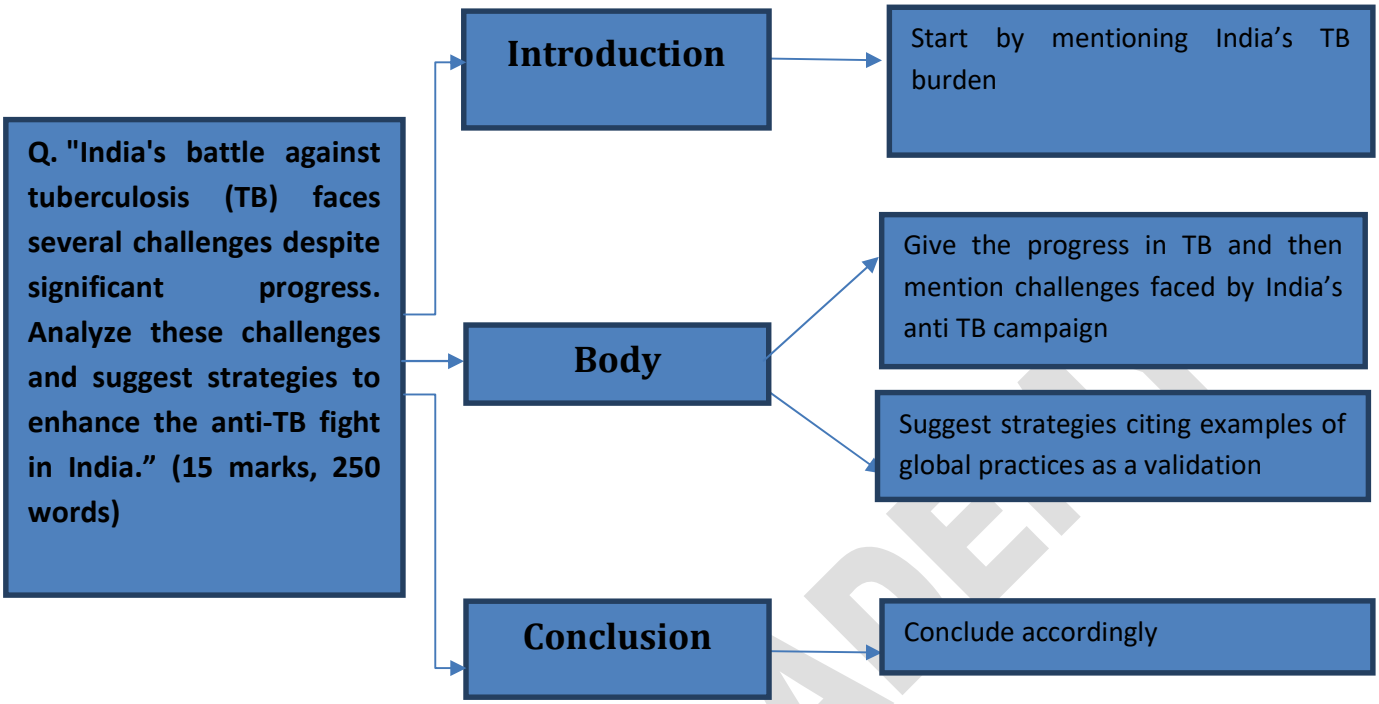
- **National Campaigns and Community Engagement:**Launch comprehensive national campaigns to raise awareness about TB symptoms, treatment options, and the importance of completing treatment. Engage communities to reduce stigma associated with TB.
    - Vietnam's National TB Program includes extensive public education campaigns and community engagement initiatives that have successfully reduced stigma and improved early diagnosis and treatment adherence.
- **School and Workplace Education Programs**:Implement TB education programs in schools and workplaces, focusing on prevention, early detection, and reducing discrimination against TB patients.
    - The U.S. implements TB education in schools and workplaces, particularly in high-risk communities, to ensure widespread awareness and reduce stigma associated with TB.
- **Digital Tools for TB Monitoring**: Expand the use of digital tools for monitoring TB cases, treatment adherence, and outcomes. Platforms like Nikshay, which tracks TB patients, can be enhanced with features for real-time data collection and analysis.
    - Kenya has implemented digital health solutions like the mHealth platform, which supports real-time reporting and tracking of TB cases, improving the efficiency of TB control programs.
- **Use of Artificial Intelligence (AI) and Machine Learning**: Integrate AI and machine learning into TB diagnostic processes to identify patterns in large datasets, improve diagnostic accuracy, and predict treatment outcomes.
    - Japan uses AI to analyze chest X-rays and other diagnostic data, improving early detection of TB, especially in cases that might be missed by traditional methods.
- **Engaging Private Healthcare Providers:**Strengthen partnerships with private healthcare providers to ensure that TB cases diagnosed and treated in the private sector are properly reported and managed according to national guidelines.
    - The Philippines has effectively engaged private healthcare providers in its TB control program through public-private mix (PPM) initiatives, improving case detection and treatment outcomes.
- **Incentivizing Private Sector Participation**: Provide financial incentives to private healthcare providers for reporting TB cases and adhering to national treatment protocols.
    - Indonesia's TB control program includes financial incentives for private sector providers who comply with national TB guidelines, resulting in better integration of private care into the national TB control efforts.

- **Investment in New Diagnostics, Drugs, and Vaccines**: Increase investment in research and development of new TB diagnostics, chest Xray machines, drugs, and vaccines. Collaborate with international research organizations to accelerate the development of these tools.
    - The UK has invested significantly in TB research, leading to the development of new TB diagnostics and treatment options that are now being used globally.
- **Collaboration with International Research Networks:**Strengthen collaboration with international research networks and institutions to share knowledge, resources, and innovations in TB research.
    - The Netherlands collaborates extensively with international research networks like the European & Developing Countries Clinical Trials Partnership (EDCTP) to drive TB research and innovation.
- **Ensuring Sustainable Financing:** Secure long-term funding for TB programs through government budgets, international aid, and public-private partnerships, ensuring that TB control efforts are sustainable.
    - Ghana's National TB Program has successfully secured sustainable financing through a combination of government funding and international support, ensuring continuous TB control efforts.
- **Utilizing Global Funding Mechanisms:**Leverage global funding mechanisms like the Global Fund to Fight AIDS, Tuberculosis, and Malaria, to support national TB control efforts, particularly in scaling up interventions for drug-resistant TB.
    - Ethiopia has effectively utilized funds from the Global Fund and other international donors to strengthen its TB control program, particularly in scaling up MDR-TB treatment.

PRACTICE QUESTION

Q. "India's battle against tuberculosis (TB) faces several challenges despite significant progress. Analyze these challenges and suggest strategies to enhance the anti-TB fight in India." (15 marks, 250 words)

APPROACH



MODEL ANSWER

India accounts for nearly a quarter of the global TB burden, with millions of new cases reported annually. The country has made notable progress in the fight against TB, with strengthened case-finding efforts and initiatives like the PM TB Mukt Bharat Abhiyan. However, several challenges continue to impede India's goal of eliminating TB by 2025, as envisioned in the National Strategic Plan for Tuberculosis Elimination.

PROGRESS IN TB ELIMINATION:

As per India TB Report 2024, there has been a decline in mortality rate due to TB from 28 lakh to 23 lakh in 2022.Engagement of private sector in TB diagnosis have increased to 33%. Also due to national level campaigns and awareness programmes, TB related stigma has been gradually removed and there is an increase in initiation of treatment in infected persons.

CHALLENGES IN INDIA'S ANTI-TB FIGHT:

1. **High Burden of TB Cases:**India has a large number of TB cases, with an estimated 27.8 lakh cases reported in 2023. The healthcare system is overwhelmed by the sheer volume, leading to delays in diagnosis and treatment. Moreover, a significant proportion of TB cases remain undiagnosed or misdiagnosed, particularly in rural areas where access to healthcare is limited.

2. **Drug-Resistant TB:**The emergence of multi-drug resistant TB (MDR-TB) and extensively drug-resistant TB (XDR-TB) poses a significant challenge. These forms of TB are harder and more expensive to treat, requiring longer treatment durations with more toxic drugs. Ensuring patient adherence to these lengthy regimens is difficult, leading to treatment failures and further drug resistance.

3. **Healthcare Infrastructure and Access:**Inadequate healthcare infrastructure, particularly in rural and remote areas, hampers TB control efforts. The lack of diagnostic facilities, trained healthcare workers, and medical supplies exacerbates the situation. Socioeconomic disparities and geographical barriers further limit access to timely and effective TB care.

4. **Social Determinants and Stigma:**TB is closely linked to poverty, malnutrition, and poor living conditions. These factors contribute to the spread and persistence of the disease, particularly in overcrowded and unsanitary environments. Social stigma associated with TB discourages individuals from seeking diagnosis and treatment, leading to increased transmission and poor treatment outcomes.

5. **Emerging Threats:**Co-infection with HIV complicates TB management, as HIV-positive individuals are more susceptible to TB. The COVID-19 pandemic has further disrupted TB services, diverting resources and attention away from TB control efforts.

6. **Research and Development:**The development of new TB treatments, diagnostics, and vaccines has been slow. Existing treatment regimens are lengthy, and the BCG vaccine currently used for TB prevention has limited efficacy, particularly in adults.

STRATEGIES TO ENHANCE THE ANTI-TB FIGHT IN INDIA:

1. **Strengthening Healthcare Infrastructure and Access:** Increase the number of diagnostic centers and ensure quality TB diagnosis is available in remote areas. Utilize rapid molecular tests like GeneXpert, as successfully implemented in **China**, to ensure early detection and prompt treatment.Integrate TB diagnosis and treatment into the broader primary healthcare system, similar to **Brazil's Unified Health System**, to ensure widespread access to TB care.

2. **Enhancing Drug-Resistant TB Management:**Scale up the use of shorter regimens for MDR-TB and XDR-TB, as practiced in **South Africa**, to reduce the burden on patients and improve adherence.Provide nutritional support, counseling, and adherence monitoring, similar to **Peru's community-based DOTS program**, to ensure that patients complete their treatment.

3. **Increasing Public Awareness and Reducing Stigma:**Conduct comprehensive public education campaigns, similar to **Vietnam's National TB Program**, to raise awareness about TB and reduce stigma.Educate students and employees about TB prevention and early detection, following the **U.S. model** of TB education in schools and workplaces.

4. **Leveraging Technology and Data Management:** Enhance platforms like Nikshay for real-time data collection and analysis, similar to the **mHealth platform in Kenya**, to improve TB case monitoring and treatment outcomes. Integrate AI and machine learning into TB diagnostic processes, following **Japan's approach** of using AI to analyze chest X-rays, to improve early detection of TB.

5. **Strengthening Public-Private Partnerships:**Strengthen partnerships with private healthcare providers to ensure consistent reporting and management of TB cases, as successfully done in the **Philippines**.Provide financial incentives to private healthcare providers for adhering to national TB guidelines, similar to **Indonesia's TB control program**.

6. **Expanding Research and Development:**Increase investment in TB research, as seen in the **UK**, to develop new diagnostics and treatments.

7. **Ensuring Sustainable Financing:** Ensure sustainable financing for TB programs through government budgets and international aid, similar to **Ghana's National TB Program**.Utilize global funding mechanisms like the Global Fund to Fight AIDS, Tuberculosis, and Malaria, as effectively done by **Ethiopia**, to support national TB control efforts.

India's fight against tuberculosis can be significantly enhanced by adopting a multi-faceted approach that addresses the existing challenges and incorporates global best practices. Strengthening healthcare infrastructure, improving drug-resistant TB management, increasing public awareness, leveraging technology, fostering public-private partnerships, expanding research, and ensuring sustainable financing are crucial steps toward achieving the goal of TB elimination by 2025.

8. ANTI-MICROBIAL RESISTANCE

iMPACT ANALYSIS

SYLLABUS:

GS 2 >Social Justice >> Health

REFERENCE NEWS:

Ahead of the September 26 UN General Assembly High-Level Meeting on antimicrobial resistance, the World Health Organization last week published its **first-ever guidance on antibiotic pollution from manufacturing.**The emergence and spread of AMR (antimicrobial resistance) caused by antibiotic pollution could undermine the effectiveness of antibiotics globally, including the medicines produced at the manufacturing sites.

ANTI-MICROBIAL RESISTANCE:

AMR is a condition in which a pathogen acquires the ability to survive and cause infection even in the presence of an antimicrobial drug. AMR is the result of evolution of microbes in a situation where there is a misuse or overuse of antibiotics. Excessive use of antimicrobial drugs can lead to the creation of resistant or extremely resistant **superbugs,** which can circulate in hospitals, through drinking water, or sewers. Infections caused by these pathogens will not respond to commonly prescribed antibiotics.

It is estimated that bacterial **AMR was directly responsiblefor 1.27 million global deaths in 2019 and 4,95 million deaths were associated with drug-resistant infections.** The main drivers of antimicrobial resistance include the misuse and overuse of antimicrobials and, the lack of access to clean **water, sanitation, and hygiene (WASH)** for both humans and animals.

CAUSES OF RISING AMR IN INDIA:

Overuse and Misuse of Antibiotics: A 2018 study in India showed that many doctors prescribed antibiotics for respiratory infections even when not needed.A study found that almost 50% of people in India self-medicate with antibiotics for ailments such as cough, cold, and diarrhoea.

Inadequate Regulation of Antibiotics: Despite India introducing Schedule H1 drugs in 2014 to regulate antibiotics, enforcement remains weak. Unregulated pharmacies often sell antibiotics without proper prescriptions.

- **Low-cost unregulated antibiotic use in veterinary medicine** contributes to AMR in both animals and humans. The widespread use of antibiotics to promote growth in livestock exacerbates the problem.
- India has one of the highest rates of AMR in the world, with **more than 60,000 newborns dying each year from antibiotic-resistant infections.**

Poor Infection Control in Healthcare Facilities: Infection control practices in many Indian hospitals are suboptimal, leading to the spread of resistant strains of bacteria. Outbreaks of multi-drug-resistant Klebsiella pneumoniae have been reported in hospital settings, including neonatal intensive care units, resulting in higher mortality rates.

- India faces a significant burden of infectious diseases like tuberculosis, malaria, typhoid, cholera, and pneumonia. The **emergence of AMR makes these diseases more difficult to treat effectively.**
- A survey on prescribing trends for antibiotics released by the National Centre for Disease Control (NCDC) last year found that 71.9% of patients coming to hospitals were prescribed antibiotics on average, with only a 10-percentage point difference in antibiotic use between intensive care units that have the sickest patients and the other wards. 55% of the antibiotics were prescribed not for the treatment of an infection, but to prevent one.

Environmental Contamination: Poor sanitation and inadequate wastewater treatment lead to the contamination of water bodies with pharmaceutical waste, including antibiotic residues. A study found high levels of antibiotic residues in the Ganges River, particularly around pharmaceutical manufacturing hubs like Hyderabad, contributing to environmental AMR.

- The WHO's guidelines on antibiotic pollution from manufacturing released last week provides guidance on wastewater and solid waste management for antibiotic manufacturing facilities. Despite the high levels of antibiotic pollution that have been widely documented, the issue is largely unregulated.

Use of Antibiotics in Agriculture: The agricultural sector, particularly poultry and aquaculture, often uses antibiotics as growth promoters and to prevent infections, contributing to resistance that can transfer to humans through the food chain. A 2017 study found high levels of antibiotic-resistant bacteria in poultry farms in India, with significant implications for public health.

Lack of Public Awareness:A survey by the World Health Organization in 2015 revealed that over 75% of Indians believed antibiotics could cure viral infections, demonstrating widespread misinformation.

- 94% of patients received antibiotics before a definitive medical diagnosis was confirmed, highlighting the prevalent use of antibiotics without precise knowledge of the infection's cause as per NCDC.

Emergence of Superbugs: Superbugs—bacteria resistant to multiple antibiotics—pose an increasing threat in India. Strains of bacteria such as Methicillin-resistant Staphylococcus aureus

Measures by Government of India:

National Programme on AMR containment: Launched in 2012. Under this programme, AMR Surveillance Network has been strengthened by establishing labs in State Medical College.

National Action Plan on AMR: It focuses on One Health Approach and was launched in April 2017 with the aim of involving various stakeholder ministries/departments.

AMR Surveillance and Research Network (AMRSN): It was launched in 2013, to generate evidence and capture trends and patterns of drug resistant infections in the country.

AMR Research & International Collaboration: ICMR has taken initiatives to develop new drugs /medicines through international collaborations in order to strengthen medical research in AMR.

- ICMR along with Research Council of Norway (RCN) initiated a joint call for research in antimicrobial resistance in 2017.
- ICMR along with the Federal Ministry of Education and Research (BMBF), Germany has a joint Indo-German collaboration for research on AMR.

Antibiotic Stewardship Program: ICMR has initiated antibiotic stewardship program (AMSP) on a pilot project across India to control misuse and overuse of antibiotics in hospital wards and ICUs.

DCGI has banned 40 Fixed Dose Combinations (FDCs) which were found inappropriate.

GlobalMeasures:

World Antimicrobial Awareness Week (WAAW): Held annually since 2015, WAAW is a global campaign that aims to raise awareness of AMR worldwide and encourage best practices among the general public, health workers and policymakers to slow the development and spread of drug-resistant infections.

The Global Antimicrobial Resistance and Use Surveillance System (GLASS): WHO launched the GLASS in 2015 to continue filling knowledge gaps and to inform strategies at all levels.

Global Point Prevalence SurveyMethodology: To deal with the challenge of limited information on how antibiotics are prescribed and used at the patient level, WHO has introduced the global point prevalence survey methodology to understand the prescribing patterns in hospitals, with repeated surveys showing the changes in antibiotic use over time.

CHALLENGES OF AMR IN INDIA:

Healthcare Sector

- **Increased Morbidity and Mortality**: As bacteria become resistant to antibiotics, common infections become harder to treat, leading to longer hospital stays, increased healthcare costs, and higher death rates.
    - Multi-drug resistant tuberculosis (MDR-TB) is a growing concern in India, with about 130,000 new cases every year. MDR-TB is harder to treat, requiring longer and more expensive therapies with a higher chance of failure.
- **Higher Treatment Costs**: AMR forces healthcare providers to use more expensive and complex treatments. The use of second-line or third-line drugs, which are more costly and have more side effects, increases the burden on both patients and the healthcare system.
    - A study conducted in Indian hospitals revealed that the cost of treating drug-resistant infections is 2 to 3 times higher than that of treating drug-sensitive infections.
- **Increased Burden on Healthcare Infrastructure:** The rise of AMR results in more patients requiring intensive care and longer hospital stays. This puts additional strain on an already overburdened public healthcare system.
    - Hospitals in urban centers such as Delhi and Mumbai frequently report outbreaks of resistant infections like MRSA (Methicillin-resistant *Staphylococcus aureus*), leading to higher ICU admissions and longer hospital stays.

Agriculture and Livestock Sector

- **Reduced Livestock Productivity**: Antibiotics are widely used in livestock to promote growth and prevent infections. The poultry industry in India, which frequently uses antibiotics, faces increasing resistance, resulting in higher mortality rates among chickens and decreased egg production.
- **Impact on Food Safety**: The presence of antibiotic-resistant bacteria in food-producing animals can lead to the contamination of meat, milk, and other animal products, posing a risk to consumers.Studies have found high levels of antibiotic-resistant bacteria in

chicken meat in India, including resistance to drugs like colistin, which is often used as a last-resort antibiotic in human medicine.

- **Trade Restrictions**: Countries with stricter regulations on antibiotic use in agriculture may impose bans or restrictions on Indian exports, particularly for poultry, seafood, and dairy products, due to concerns about AMR.In 2016, the European Union imposed restrictions on the import of Indian shrimp due to concerns over the excessive use of antibiotics in aquaculture.

Economic Sector

- **Increased Healthcare Costs and Economic Burden**: AMR leads to increased costs for treating infections, longer hospital stays, and more complex care. This can result in a significant economic burden on families and the nation as a whole.
    - According to a 2019 study, India is expected to lose up to $5 trillion in GDP by 2050 due to AMR-related healthcare costs and loss of productivity.
- **Impact on Workforce Productivity:** As more people fall ill due to drug-resistant infections, the workforce is impacted by absenteeism, reduced productivity, and premature deaths.Drug-resistant infections can significantly affect the agricultural and industrial labour force in rural India, where access to advanced healthcare is limited, leading to long-term impacts on the local economy.

Pharmaceutical Sector

- **R&D Challenges**: The rise of AMR has outpaced the development of new antibiotics, leaving pharmaceutical companies in a dilemma. The financial incentives to develop new antibiotics are limited because new drugs are often reserved for critical use, resulting in low profitability.
- **Regulatory Challenges**: The Indian government has attempted to curb the overuse of antibiotics through measures like Schedule H1, but enforcement is weak. The pharmaceutical industry faces challenges in ensuring compliance with these regulations.
    - In 2014, the government restricted the sale of certain antibiotics, but they continue to be sold without prescription in many parts of the country due to poor regulatory enforcement.

Environmental Sector

- **Environmental Pollution and Ecosystem Impact**: Improper disposal of pharmaceutical waste and effluents from pharmaceutical factories contaminates water bodies and soil with antibiotic residues, fostering the development of resistant bacteria.
    - Water samples from areas near pharmaceutical manufacturing units in Hyderabad and other cities have shown dangerously high levels of antibiotics, contributing to AMR in the environment.

Public Health and Social Impact

- **Increased Inequality in Healthcare Access**: The rise of AMR disproportionately affects poorer populations, particularly in rural areas, where access to second-line treatments is limited and often unaffordable. This worsens health inequities in India.
    - Typhoid caused by *Salmonella typhi* is increasingly resistant to first-line antibiotics, causing outbreaks in several Indian states and putting public health systems under strain.

WAY FORWARD FOR INDIA:

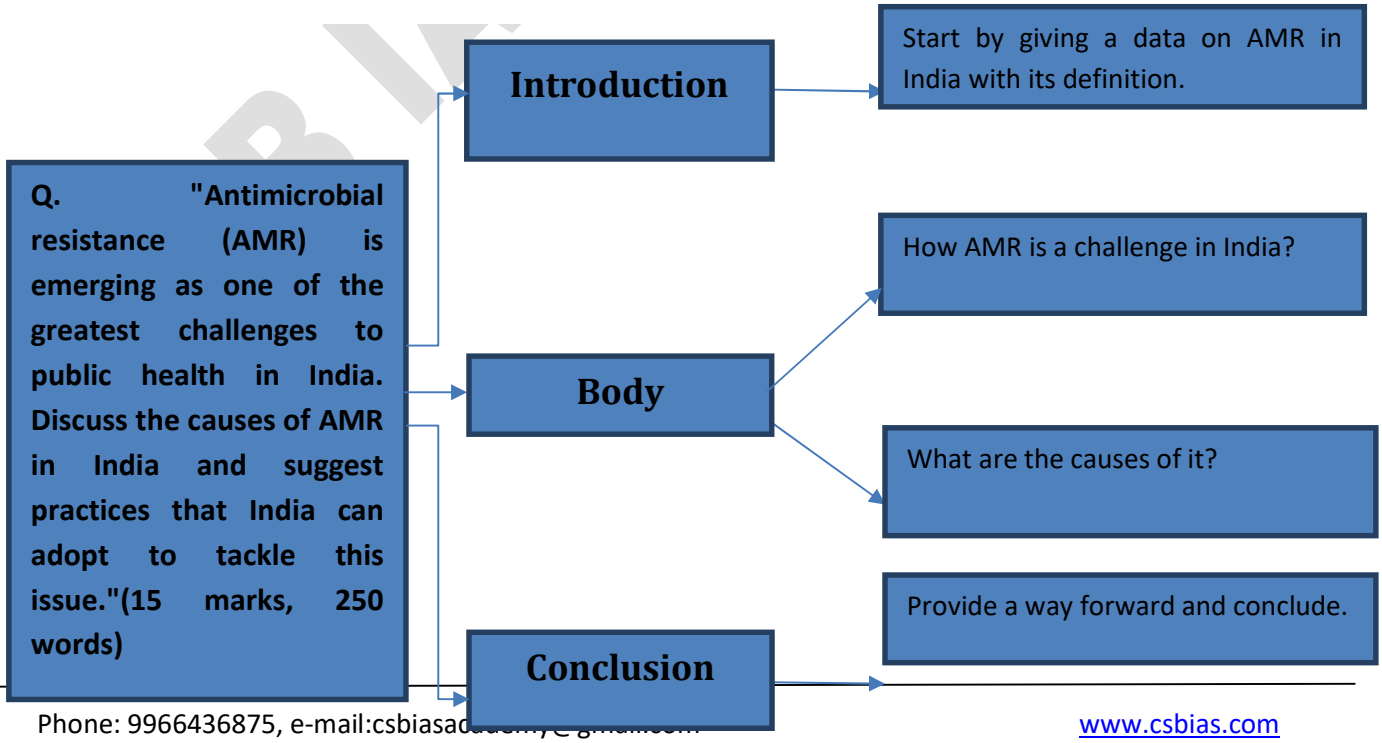
- **Strengthening Surveillance and Data Collection :** The European Union has also implemented the European Antimicrobial Resistance Surveillance Network (EARS-Net) for collecting data across multiple countries. India needs to strengthen its surveillance system for AMR, especially in rural and semi-urban areas, through the Indian Council of Medical Research's (ICMR) National AMR Surveillance Network.
- **Antibiotic Stewardship Programs (ASPs):** Countries like the United States and Sweden have implemented Antibiotic Stewardship Programs that promote the rational use of antibiotics**. Sweden's Strama program** has been particularly successful in reducing antibiotic prescriptions by setting clear guidelines.
- **Public Awareness Campaigns:** Countries like Australia and the UK have launched public awareness campaigns to educate people on the proper use of antibiotics. The UK's Keep Antibiotics Working campaign is aimed at reducing public demand for antibiotics when they are unnecessary.
- **Tighter Regulation of Antibiotic Sales:** Scandinavian countries like Denmark and Norway have stringent regulations around the sale of antibiotics, ensuring that they are only available with a prescription. They also monitor the use of antibiotics in agriculture closely.
- **Reducing Antibiotic Use in Agriculture:** The Netherlands and Denmark have successfully reduced antibiotic use in agriculture by setting legal limits, banning the use of antibiotics as growth promoters, and improving livestock management.

- **Infection Prevention and Control (IPC):** The United Kingdom and Germany have implemented stringent infection control measures in hospitals and healthcare facilities, including hand hygiene, regular disinfection, and isolation of infected patients. This limits the spread of resistant bacteria.
- **Research and Development of New Antibiotics**: Countries like Germany and the US provide financial incentives and public-private partnerships to encourage the development of new antibiotics. The CARB-X initiative is a global accelerator focused on funding research in new antibiotics and diagnostics.
- **Improving Waste Management in Pharmaceutical Industry:** Countries like Sweden and Norway have implemented strict guidelines for pharmaceutical waste management to prevent antibiotic residues from contaminating water bodies. Their regulations ensure that pharmaceutical companies treat wastewater before disposal.
- **Multisectoral Collaboration (One Health Approach)**: The One Health approach promoted by the WHO, FAO, and OIE integrates efforts across human health, animal health, and environmental sectors to tackle AMR holistically.

PRACTICE QUESTION

Q. "Antimicrobial resistance (AMR) is emerging as one of the greatest challenges to public health in India. Discuss the causes of AMR in India and suggest practices that India can adopt to tackle this issue."(15 marks, 250 words)

APPROACH



MODEL ANSWER

Antimicrobial resistance (AMR) is a significant public health concern in India, where pathogens have developed the ability to survive in the presence of antimicrobial drugs, rendering common infections harder to treat. India has one of the highest burdens of AMR globally, contributing to over 60,000 neonatal deaths annually due to antibiotic-resistant infections. The rise of AMR could lead to untreatable infections and undermine global health systems, including India's.

CAUSES OF AMR IN INDIA:

1. **Overuse and Misuse of Antibiotics**:Misuse in humans through over-prescription, often for viral infections, and self-medication contribute significantly to AMR.A 2018 study showed that nearly 50% of Indians self-medicate with antibiotics

2. **Inadequate Regulation of Antibiotics**:Despite Schedule H1 introduced in 2014, enforcement remains weak, and antibiotics are often available without a prescription.The misuse of antibiotics in veterinary medicine also exacerbates the problem by promoting drug-resistant bacteria in animals

3. **Poor Infection Control in Healthcare Settings**:Hospitals in India, particularly in rural areas, often have suboptimal infection control practices. This leads to the spread of drug-resistant bacteria such as *Klebsiella pneumoniae*

4. **Environmental Contamination**:Poor wastewater treatment from pharmaceutical industries has led to high levels of antibiotic residues in water bodies such as the Ganges, contributing to the development of resistant bacteria in the environment

5. **Use of Antibiotics in Agriculture**:The widespread use of antibiotics in agriculture, particularly for growth promotion in poultry, leads to the transmission of drug-resistant bacteria through the food chain

6. **Lack of Public Awareness**:Many people in India incorrectly believe that antibiotics can cure viral infections. A WHO survey found that over 75% of Indians had this misconception

CHALLENGES OF AMR IN INDIA:

1. **Healthcare Sector**: As AMR makes common infections harder to treat, the healthcare system experiences higher death rates and longer hospital stays. For instance, Multi-drug-resistant tuberculosis (MDR-TB) affects over 130,000 people annually Drug-resistant infections require second-line and third-line antibiotics, which are more expensive and often come with more severe side effects

2. **Agriculture and Livestock Sector:**Antibiotic resistance in livestock leads to higher mortality rates, especially in poultry, and reduces yields of animal products like eggs and milk. Countries may impose bans on imports of Indian agricultural products due to antibiotic overuse concerns. In 2016, the EU restricted Indian shrimp imports due to excessive antibiotic use in aquaculture

3. **Economic Sector:**AMR could lead to a projected $5 trillion loss in India's GDP by 2050 due to higher healthcare costs and loss of productivity

4. **Environmental Sector:**

    - **Antibiotic Pollution**: Pharmaceutical waste and effluents containing antibiotic residues contaminate rivers and soil, fostering the development of resistant bacteria

    - **Impact on Aquatic Life**: Antibiotic contamination in water bodies, particularly near industrial hubs like Hyderabad, has been linked to high levels of resistant bacteria in aquatic species

5. **Public Health and Social Impact:**

    - **Increased Health Inequity**: AMR disproportionately affects poorer populations, particularly in rural areas, where access to advanced treatments is limited and unaffordable

    - **Potential Public Health Crises**: The spread of drug-resistant infections like typhoid and tuberculosis can overwhelm public health systems and lead to mass outbreaks

PRACTICES FOR TACKLING AMR:

1. **Antibiotic Stewardship Programs (ASPs)**:Sweden's **Strama program** has been effective in reducing antibiotic prescriptions through clear guidelines and monitoring.

2. **Public Awareness Campaigns**:The UK's **Keep Antibiotics Working** campaign successfully educated the public on the risks of antibiotic misuse.

3. **Tighter Regulation of Antibiotic Sales**:Scandinavian countries like **Denmark** and **Norway** strictly regulate antibiotic sales, ensuring they are only available with prescriptions.

4. **Reducing Antibiotic Use in Agriculture**:**The Netherlands** and **Denmark** have effectively banned antibiotics as growth promoters and improved livestock management.

5. **Infection Prevention and Control (IPC**: The **United Kingdom** implements strict hygiene and infection control protocols in healthcare settings.

6. **Research and Development of New Antibiotics**:The **CARB-X initiative** provides funding for new antibiotics and diagnostics research globally.

AMR is a complex issue that requires a multi-sectoral response, encompassing human health, agriculture, and the environment. A holistic approach involving the One Health framework will ensure a coordinated effort between sectors to effectively manage this growing threat.

9. TAPI PIPELINE

iMPACT ANALYSIS

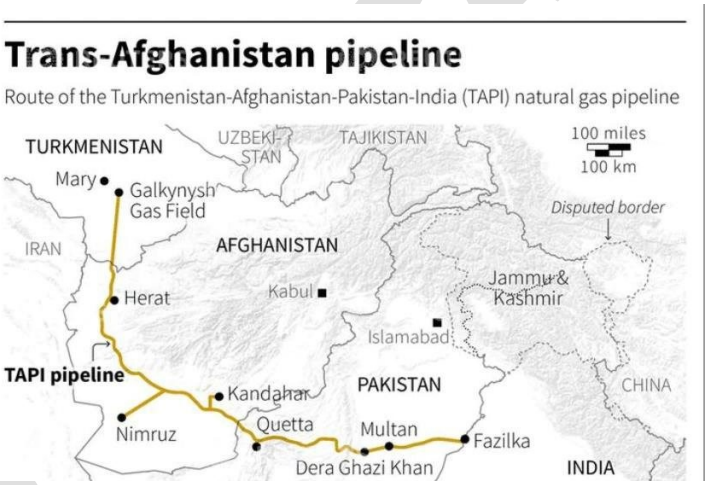
SYLLABUS:

GS 2>International Relations >> Regional Cooperation

REFERENCE NEWS:

Afghanistan said work would begin on a $10 billion gas pipeline traversing South Asia as officials joined dignitaries in neighbouring Turkmenistan to celebrate its completion on that side of the border. Progress on the **TAPI Pipeline** — running through Turkmenistan, Afghanistan, Pakistan, and India — has been repeatedly delayed because of security issues in conflict-ravaged Afghanistan.

TURKMENISTAN-AFGHANISTAN-PAKISTAN-INDIA PIPELINE:



The TAPI pipeline is a major infrastructure project designed to transport natural gas **from the Galkynysh gas field** in Turkmenistan through Afghanistan, Pakistan, and India.

- The pipeline will span approximately **1,814-kilometres** and is expected to deliver around **33 billion cubic metres (BCM) of natural gas annually.**
- It will supply gas to Afghanistan (5%), Pakistan (47.5%), and India (47.5%) during its 30-year operational period.
- The pipeline is also known as the **'Peace Pipeline'** due to its potential to foster regional cooperation and stability.

- The project's origins trace back to the 1990s, with significant progress made in 2003, supported by the Asian Development Bank. **India joined the initiative in 2008,** marking a major milestone in its development.
- The **TAPI Pipeline Company Limited (TPCL),** is responsible for the construction and operation of the pipeline. The company is a joint venture of Turkmenistan, Afghanistan, Pakistan, and India, each holding shares in the project.

SIGNIFICANCE OF TAPI PIPELINE:

The TAPI (Turkmenistan-Afghanistan-Pakistan-India) pipeline is a transnational gas pipeline project aimed at transporting natural gas from Turkmenistan to South Asia.

Energy Security

- **Diversification of Energy Supply**:The TAPI pipeline would allow India and Pakistan to diversify their energy sources, reducing dependence on traditional suppliers such as the Middle East. This would contribute to greater energy security in a region where energy demand is rapidly increasing.
    - India, which is the second-largest importer of natural gas in the world, needs secure and diversified sources to meet its growing demand. The TAPI pipeline would supply 33 billion cubic meters (bcm) of natural gas annually, with India and Pakistan each receiving 14 bcm.
- **Access to Turkmen Gas:**Turkmenistan has the world's fourth-largest natural gas reserves (approximately 19.5 trillion cubic meters). TAPI enables Turkmenistan to tap into a new market, while India and Pakistan gain reliable access to these resources.

Economic Development

- **Job Creation and Infrastructure Development**:The construction of the pipeline would spur local infrastructure development and job creation, particularly in Afghanistan and Pakistan. This would have long-term economic benefits in terms of improved infrastructure and industrial growth.
    - The project has the potential to create thousands of jobs in Afghanistan during the construction phase, helping to boost the war-torn country's economy.
- **Revenue for Transit Countries**:Afghanistan and Pakistan would benefit economically from transit fees for the pipeline. Afghanistan, which is a critical transit country, is expected to receive around $500 million annually in transit fees, a significant boost to its struggling economy.

Geopolitical Significance

- **Regional Cooperation:**TAPI promotes regional cooperation by bringing together countries that have historically had strained relations, such as India and Pakistan.The project represents one of the few initiatives where Afghanistan, Pakistan, and India are working collaboratively, especially in light of strained relations between India and Pakistan.
- **Central Asia's Integration with South Asia:**TAPI is critical for integrating Central Asia's rich energy resources with South Asia's growing economies. It establishes Turkmenistan as a key player in the energy market and strengthens Central Asia's connection with global energy consumers.
    - TAPI provides a direct and stable supply of natural gas, crucial for India's energy security and industrial growth.
- **Strategic Balance with China:**TAPI provides a counterbalance to China's influence in the region, particularly with its China-Central Asia Gas Pipeline, which transports gas from Turkmenistan to China. By securing energy through the TAPI pipeline, India and other South Asian countries reduce reliance on China-dominated infrastructure.

Energy Transition and Environmental Impact

- **Cleaner Energy Option:**Natural gas is a cleaner fossil fuel compared to coal and oil, and the TAPI pipeline will help India and Pakistan in their transition toward cleaner energy sources.
    - According to the International Energy Agency (IEA), natural gas produces 40% fewer CO_2 emissions than coal when used for electricity generation.
- **Reduction in Import of LNG:**Currently, India and Pakistan rely on Liquefied Natural Gas (LNG) imports, which are costlier and environmentally less friendly due to the energy-intensive liquefaction and regasification processes.
    - India imports about 50% of its gas needs in the form of LNG, and TAPI offers a stable overland route for natural gas supplies, potentially reducing import costs.

Stabilization of Afghanistan

- **Economic Stability and Peacebuilding:**The TAPI pipeline passes through Afghanistan, providing it with much-needed revenue through transit fees.

- The Afghan government has endorsed TAPI as a key part of its economic recovery, and the project could potentially create jobs and infrastructure in provinces affected by conflict, fostering peacebuilding efforts.

- **Strategic Importance for Regional Stability:**As a regionally cooperative project, TAPI could reduce cross-border tensions and encourage dialogue, especially between Afghanistan and Pakistan. Improved relations could contribute to broader regional stability.

CHALLENGES OF TAPI PIPELINE FROM INDIAN PERSPECTIVE:

- **Instability in Afghanistan**: India's investments in Afghanistan's infrastructure, including the TAPI pipeline, are at risk due to the unstable political and security situation.

  - Despite the Taliban's stated support for the pipeline post their takeover in 2021, the lack of centralized control in Afghanistan raises doubts about the pipeline's safety. The project needs security guarantees, but continued conflict poses a significant risk to pipeline infrastructure.

- **Security Issues in Pakistan**:Parts of the pipeline pass through Balochistan in Pakistan, a region known for separatist movements and frequent insurgent attacks.

  - The 2020 attack on the Makran Coastal Highway in Balochistan by insurgents highlights the volatility of the region. Indian interests could be jeopardized if militants target the pipeline to disrupt Indo-Pak energy cooperation.

- **Political and Diplomatic Tensions**:India's tense relations with Pakistan have been a longstanding challenge for regional cooperation projects like TAPI. Any bilateral tensions could lead to delays or disruptions in the pipeline's operations.

  - After the 2019 Pulwama attack, India-Pakistan relations further deteriorated, raising concerns over the feasibility of a transnational project that relies heavily on cooperation between both countries. Projects like TAPI are vulnerable to becoming political hostages amid escalating tensions.

- **Trust Deficit**:India is wary of depending on Pakistan as a transit country for such a strategic resource.

  - Pakistan has, in the past, blocked Indian access to Central Asian energy resources, including the Iran-Pakistan-India (IPI) gas pipeline project.

- **High Project Costs**:The estimated cost of the TAPI pipeline is **around $10 billion**, a significant financial burden.
    - India is a major LNG importer, and the pricing structure of gas through the TAPI pipeline could be less competitive, especially if project delays lead to cost escalations.
- **Transit Fees and Tariffs**:India would need to pay significant transit fees to both Afghanistan and Pakistan, raising concerns about the overall cost of importing gas through the TAPI pipeline. Transit costs could make the gas less economically attractive.
    - Afghanistan is expected to receive **around $500 million** annually in transit fees, which adds to the overall cost of the gas supply for India.
- **Chinese Influence in Central Asia**:China has a strong energy presence in Central Asia, particularly in Turkmenistan, through the **China-Central Asia Gas Pipeline**. China's close ties with Turkmenistan could influence the dynamics of TAPI, as Turkmenistan might prioritize its relationship with China over other countries, including India.
    - China already imports a significant portion of Turkmenistan's gas. In 2020, Turkmenistan exported about **40 billion cubic meters** (bcm) of natural gas to China, overshadowing the projected **33 bcm** capacity of TAPI. India's concerns center on whether Turkmenistan can ensure a steady supply to TAPI given its commitments to China.
- **Regional Power Struggles**:India has strategic concerns about the TAPI project being dominated by regional rivalries, especially with Pakistan and China having considerable influence over Central Asia. This dynamic could affect India's bargaining power and position within the project.
    - India's participation in TAPI is perceived as a counterbalance to China's Belt and Road Initiative (BRI), and any geopolitical maneuvering by China or Pakistan could undermine India's position.
- **Challenging Terrain**:The pipeline route passes through difficult terrain, including mountainous regions and areas prone to natural disasters, making construction and maintenance complex and costly.
    - The route through Afghanistan includes the rugged Hindu Kush mountains, making pipeline construction and security arrangements logistically difficult.

- **Delays in Project Implementation**:The TAPI project has already faced several delays due to financial, security, and political issues. Further delays in construction will increase costs and reduce confidence in the project's completion.
    - Initially proposed in the 1990s, the TAPI project has been repeatedly delayed, with the latest completion target now set for the late 2020s. India is wary of committing to a project that may face indefinite delays.
- **Strategic Autonomy**:India has strategic concerns about becoming overly dependent on a single pipeline for its natural gas supply, especially one that passes through politically unstable regions. This could undermine India's energy security if transit countries, particularly Pakistan, decide to cut off supply during a political crisis.
    - India's efforts to diversify its energy imports, such as through LNG from the United States, Qatar, and Australia, indicate a desire to avoid reliance on a single source or route, especially one involving Pakistan.
- **Alternative Energy Sources**:The increasing availability of renewable energy sources, along with India's emphasis on energy diversification, poses a challenge to the long-term relevance of the TAPI pipeline.
    - India's **International Solar Alliance** and focus on renewable energy projects like the **National Hydrogen Mission** aim to reduce dependency on fossil fuels, including natural gas.

WAY FORWARD FOR INDIA TO ENHANCE ENERGY SECURITY AND REGIONAL DEVELOPMENT:

- **Strengthening Regional Cooperation and Diplomacy**: The Nord Stream Pipeline, which transports natural gas from Russia to Germany, is an example of successful regional cooperation despite political tensions. The countries involved established diplomatic channels, ensuring continuous dialogue and mutual benefits.
- **Ensuring Security of the Pipeline:**The Trans-Anatolian Natural Gas Pipeline (TANAP), which runs through politically unstable regions in Turkey, uses sophisticated monitoring systems and multi-level security arrangements to ensure uninterrupted operations.
- **Enhancing Financial and Economic Viability:** The Southern Gas Corridor project in Europe attracted diverse financial backing, including investments from the European Union, international development banks, and private companies, making the project economically sustainable.
- **Adopting a Multisectoral Approach (One Health/One Energy Approach**): The One Belt One Road (OBOR) Energy Corridors by China emphasize a multisectoral approach to

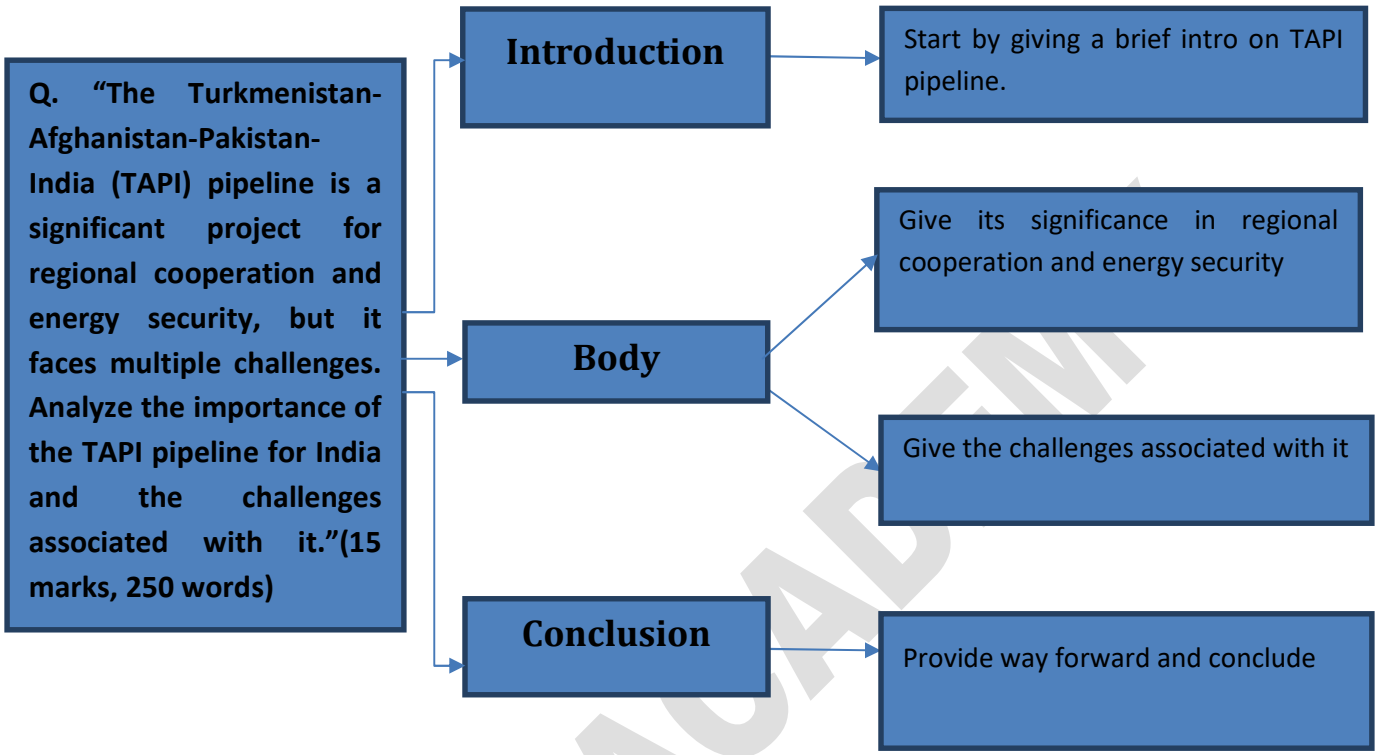
large-scale energy projects, integrating energy, infrastructure, trade, and environmental goals across sectors.

- **Leveraging Technology for Sustainability and Monitoring**: The Nord Stream 2 pipeline between Russia and Europe uses advanced technologies like real-time monitoring, automated control systems, and environmental impact assessments to ensure operational efficiency and minimize disruptions. India could implement digital twin models of the TAPI pipeline, which allow for real-time simulations and predictive analytics, reducing operational risks and ensuring timely interventions during emergencies.
- **Building a Geopolitical Buffer:** The Baku-Tbilisi-Ceyhan (BTC) pipeline, which connects oil fields in the Caspian Sea to the Mediterranean, navigated complex geopolitical challenges through regional agreements that ensured transit countries shared the economic benefits and political risks.
- **Reducing Dependency by Diversifying Energy Sources:** Germany has successfully diversified its energy imports by investing in renewable energy (solar, wind) alongside fossil fuel imports from Russia, reducing dependency on any single source of energy.
- **Implementing Environmental Safeguards:** The Trans-Adriatic Pipeline (TAP) integrates environmental considerations into its planning and construction, using environmental impact assessments and green energy offsets to reduce carbon footprints.

PRACTICE QUESTION

Q. "The Turkmenistan-Afghanistan-Pakistan-India (TAPI) pipeline is a significant project for regional cooperation and energy security, but it faces multiple challenges. Analyze the importance of the TAPI pipeline for India and the challenges associated with it."(15 marks, 250 words)

APPROACH



MODEL ANSWER

The Turkmenistan-Afghanistan-Pakistan-India (TAPI) pipeline is a transnational natural gas pipeline project aimed at delivering 33 billion cubic meters (BCM) of gas annually from Turkmenistan's Galkynysh gas field to Afghanistan, Pakistan, and India. It is seen as a critical initiative for energy security and regional cooperation, especially for energy-hungry nations like India.

SIGNIFICANCE OF TAPI PIPELINE FOR INDIA:

- **Diversification of Energy Supply:** TAPI provides India with a direct overland route to access Turkmenistan's vast natural gas reserves, helping reduce dependence on volatile Middle Eastern supplies and costly Liquefied Natural Gas (LNG) imports.
- **Cleaner Energy Transition:** Natural gas is a cleaner energy alternative to coal and oil. The International Energy Agency (IEA) estimates that natural gas emits 40% fewer CO_2 emissions than coal.
- **Reduction in LNG Imports**: By providing a stable gas supply, TAPI can reduce India's reliance on more expensive LNG imports, enhancing the country's industrial competitiveness and lowering energy costs.

- **Job Creation and Infrastructure Development**: TAPI is expected to spur infrastructure development and job creation in the transit countries, especially Pakistan and Afghanistan, indirectly benefiting regional stability
- **Regional Cooperation**: TAPI is one of the few projects that brings India, Pakistan, and Afghanistan together, promoting peace and stability. It can act as a confidence-building measure between India and Pakistan
- **Counterbalance to Chinese Influence**: The pipeline also serves as a strategic counterbalance to China's growing dominance in Central Asia, particularly through its China-Central Asia Gas Pipeline

CHALLENGES ASSOCIATED WITH THE TAPI PIPELINE FROM INDIA'S PERSPECTIVE:

- I**nstability in Afghanistan**: The pipeline passes through war-torn Afghanistan, where insurgent groups like the Taliban and ISIS continue to pose a significant security threat. Despite the Taliban's assurance of support for TAPI post-2021, the lack of centralized control raises doubts about pipeline safety
- **Security in Pakistan**: The pipeline crosses through Pakistan's Balochistan province, which is known for separatist movements and insurgent attacks. Indian investments could be jeopardized by militant attacks aimed at disrupting Indo-Pak cooperation.
- **Trust Deficit:** India remains wary of relying on Pakistan for the transit of such a strategic energy supply. Given Pakistan's past actions, such as blocking the Iran-Pakistan-India (IPI) gas pipeline, there is a risk of TAPI becoming a political hostage in case of deteriorating bilateral relations
- **High Project Costs**: The estimated cost of the TAPI pipeline is $10 billion, which presents a significant financial burden. Rising project costs due to delays and security concerns could make gas from the pipeline less competitive compared to LNG imports
- **Challenging Terrain and Logistical Issues**: The pipeline route traverses rugged terrain, including the Hindu Kush mountains in Afghanistan. This makes construction, maintenance, and security extremely challenging, further delaying project completion

WAY FORWARD FOR INDIA:

- **Strengthening Regional Cooperation and Diplomacy**: The Nord Stream Pipeline (Russia-Germany) exemplifies how continuous diplomatic dialogue can overcome political challenges. India should engage in consistent multilateral discussions with Pakistan, Afghanistan, and Turkmenistan to ensure the project's sustainability
- **Ensuring Pipeline Security:** The Trans-Anatolian Natural Gas Pipeline (TANAP) in Turkey ensures security through multi-level security arrangements. India should collaborate

with regional stakeholders to implement advanced security measures like real-time monitoring and joint security forces

- **Diversifying Energy Sources**: Germany's energy diversification strategy, which balances renewable energy and gas imports, reduces dependency on any single source. India should also focus on integrating renewable energy with gas imports from TAPI
- **Leveraging Technology for Monitoring:** The Nord Stream 2 Pipeline employs real-time monitoring systems and digital twin models to enhance operational efficiency. India can implement similar technology for the TAPI pipeline to detect potential risks early and reduce disruptions
- **Expanding Financial Partnerships**: The Southern Gas Corridor project attracted international funding from multilateral banks and private investors. India should seek financial backing from institutions like the Asian Development Bank (ADB) and World Bank to reduce financial risks
- **Environmental Sustainability:** The Trans-Adriatic Pipeline (TAP) incorporates environmental impact assessments and green energy offsets. India should ensure that the TAPI project adheres to environmental standards and promotes sustainable gas practices

The TAPI pipeline holds significant potential for enhancing India's energy security and fostering regional cooperation. However, to overcome the security, political, and financial challenges, India must adopt a multi-dimensional strategy rooted in global best practices. By ensuring regional collaboration, leveraging technology, and diversifying its energy sources, India can make the TAPI project a cornerstone of its energy and diplomatic strategy in South Asia and Central Asia.

10. CAPITAL PUNISHMENT

iMPACT ANALYSIS

SYLLABUS:

GS 2 > Constitution >> Fundamental Rights

REFERENCE NEWS:

The life of the death sentence in India has been unending, and like a phoenix revives itself in different forms every now and then. The latest addition to this is the Aparajita Women and Child (West Bengal Criminal Laws Amendment) Bill,2024, , adopted by West Bengal government, the reason being the brutal rape and murder of a doctor at Kolkata's R.G. Kar Medical College and Hospital. It seeks to amend the Bharatiya Nyaya Sanhita, 2023 (BNS), the Bharatiya Nagarik Suraksha Sanhita, 2023 and the Protection of Children from Sexual Offences Act, 2012, in their application to the State of West Bengal. Among other things, it **introduces the death penalty for the offence of rape.**

CAPITAL PUNISHMENT:

- With 561 prisoners on death row at the end of 2023, India's death row population has continued to rise to reach its highest-ever numbers since 2004.
- In an unprecedented trend, the Supreme Court of India acquitted nearly 55% of the death row prisoners (six prisoners) in the cases it heard in 2023. This development must be understood alongside the Court initiative (in September 2022) to convene a Constitution Bench to reform death penalty sentencing.
- Data from Project 39A's 2023 annual statistics on the death penalty show that the Court's attempts to reform sentencing through its directions in **Manoj vs The State Of Madhya Pradesh (**May 2022) have failed to trickle down to trial courts for the second year in a row.
- In 2023, trial courts imposed 86.96% of death sentences in the absence of information pertaining to the accused that was mandated in Manoj.
- The High Courts continued their reluctance in confirming death sentences in 2023. While the Supreme Court did not confirm the death sentence in any of the 10 cases it decided, only one death sentence was confirmed across High Courts.
- This follows the findings from the Death Penalty India Report (2016) that ultimately, 4.9% of the death sentences imposed by trial courts between 2000-15 were confirmed at the appellate level.
- Over the years, a majority of the death cases before the Court have resulted in the Court upholding convictions, but commuting the death sentences to life imprisonment.

Capital punishment, also called the death penalty, is the execution of an offender sentenced to death after conviction by a court of law of a criminal offence. It is the highest penalty

awardable to an accused. Generally, it is awarded in extremely severe cases of murder, rapes, treason etc. The death penalty is seen as the most suitable punishment and effective deterrent for the worst crimes. Those who oppose it, however, see it as inhumane. Thus, the morality of the death penalty is debatable and many criminologists and socialists all across the globe, have been long demanding abolition of the death penalty.

DEATH PENALTY IN THE INDIAN CONTEXT:

The death penalty has been a contentious issue in India, where it remains a legal form of punishment despite growing debates around its morality, efficacy, and fairness. India is among the few countries that still retain the death penalty, although it is only applied in the **"rarest of rare" cases.**

Constitutional and Legal Framework

- **Article 21** of the Indian Constitution guarantees the **right to life and personal liberty**, except according to the procedure established by law. This implies that the state has the authority to take away life in cases where the law allows for it, such as capital punishment.

- The Supreme Court of India, in **Bachan Singh vs. State of Punjab (1980)**, established the "**rarest of rare" doctrine**, holding that the death penalty should be applied only in the most exceptional cases where the alternative of life imprisonment is inadequate.

- **Machhi Singh vs. State of Punjab (1983)** further refined this doctrine, outlining criteria like the manner of the crime, the motive, the severity, and the impact on society as considerations for awarding the death penalty.

Crimes Punishable by Death: Under Indian law, the death penalty can be imposed for crimes likeMurder (Section 302, IPC)**,**Terrorist acts (Unlawful Activities Prevention Act)**,** Kidnapping for ransom (Section 364A, IPC)**,** Rape that leads to the death of the victim or involves repeated offenses (Criminal Law (Amendment) Act, 2013)**,** Certain cases of drug trafficking (NDPS Act)**,** Espionage, treason, and mutiny (various acts).

Major Cases Involving Death Penalty

- **Nirbhaya Gang Rape Case (2012)**:In this high-profile case of gang rape and murder, four convicts were sentenced to death in 2013, with their execution taking place in 2020. The case fuelled debates on the necessity of the death penalty to deter such heinous crimes.

- **Ajmal Kasab (2008 Mumbai Attacks)**:Ajmal Kasab, a Pakistani terrorist involved in the 26/11 Mumbai attacks, was sentenced to death and executed in 2012. This was viewed as a just response to terrorism, with widespread public support.

- **Yakub Memon (1993 Mumbai Bombings)**:Yakub Memon, convicted for his role in the 1993 bomb blasts in Mumbai, was executed in 2015. His execution was controversial, with many arguing that he was being unfairly targeted, while others believed it was necessary for justice.

- **Jagmohan Singh v. State of UP 1973 case:** The Supreme Court held that according to Article 21 deprivation of life is constitutionally permissible if that is done according to the **procedure established by law.**

- In the **Rajender Prasad v. State of UttarPradesh Case** of 1979, the court held that the death penalty directly affects the life of the people guaranteed under Article 21 of the Constitution. It mentioned two things that are required to impose the death penalty. The special reasons should be recorded for imposing the death penalty in a case and the death penalty must be imposed only in extraordinary circumstances.

- In the Deena Dayal vs Union of India and Others Case of 1983, the Supreme Court upheld capital punishment by ruling that hanging is "as painless as possible" and "causes no greater pain than any other known method".

ARGUMENTS IN FAVOUR OF DEATH PENALTY:

- **Deterrence Against Heinous Crimes:**The death penalty is often seen as a deterrent to the most serious crimes like murder, terrorism, and rape. The fear of death may prevent potential criminals from committing such offenses.

    - In cases like the 2012 Nirbhaya gang rape, public outcry for the death penalty was based on the argument that severe punishment is necessary to prevent similar crimes.

- **Justice for Victims and Their Families**:The death penalty is seen as delivering justice for the victims and their families, especially in cases of heinous crimes. It provides closure and ensures the criminal cannot re-offend.

    - Victims' families, particularly in brutal cases like the 1993 Mumbai blasts, often demand capital punishment as the ultimate form of justice.

- **Incapacitation of Dangerous Criminals**:The death penalty ensures that individuals who commit particularly egregious crimes are permanently removed from society, preventing them from harming others.

    - Death sentences in cases of terrorism, like the Ajmal Kasab case (2008 Mumbai attacks), are viewed as necessary to incapacitate threats to national security.

- **Symbolic Value in Severe Cases:**In crimes that deeply shock the conscience of society, the death penalty serves a symbolic purpose, showing that the state is taking the most severe action possible.

    - The death penalty awarded to Dhananjoy Chatterjee for the rape and murder of Hetal Parekh in 1990 was seen as a strong statement against such crimes.

- **Legal Safeguards in India**:India has legal safeguards in place, such as the principle of awarding the death penalty only in the "rarest of rare" cases, ensuring that capital punishment is not applied arbitrarily.

    - Supreme Court Verdicts: Cases like Bachan Singh vs. State of Punjab (1980) established guidelines on the "rarest of rare" doctrine, providing safeguards against misuse.

ARGUMENTS AGAINST DEATH PENALTY:

- **Lack of Evidence for Deterrence:**There is no conclusive evidence that the death penalty acts as a better deterrent than life imprisonment. Studies in various countries have shown little correlation between capital punishment and crime reduction.

    - A **National Law University report (2016)** found that there was no significant decrease in crimes punishable by death despite the existence of the death penalty.

- **Possibility of Wrongful Convictions:**The risk of wrongful convictions is a significant concern. Once executed, a person cannot be exonerated, even if new evidence later proves their innocence.

    - In 2012, **the Supreme Court of India** admitted that the death penalty had been wrongly awarded in several cases due to judicial errors, raising concerns about irreversible mistakes.

- **Discriminatory Application:** Critics argue that the death penalty in India is often applied disproportionately to individuals from marginalized sections of society, such as the poor, minorities, and the less educated, who may not have access to proper legal representation.

    - A 2016 study by the **Death Penalty Research Project** found that a significant majority of death row inmates were from economically disadvantaged backgrounds or minority communities.

- **Human Rights Concerns:**Many human rights activists and organizations view the death penalty as a violation of the right to life, which is enshrined in Article 21 of the Indian Constitution. They argue that the state should not have the power to take a person's life, regardless of the crime.

    - Many countries, including **140 UN member states**, have either abolished the death penalty or implemented a moratorium on executions, viewing it as cruel and inhuman punishment.

- **Rehabilitation vs. Retribution:**Opponents of the death penalty argue that it focuses on retribution rather than rehabilitation, which should be the primary goal of the criminal justice system. Life imprisonment without parole allows for the possibility of rehabilitation and remorse.

    - **Moral Argument:** Mahatma Gandhi's philosophy of non-violence and respect for life has often been cited to argue against capital punishment, as even criminals should be given a chance to reform.

- The report of the Justice J.S. Verma Committee said that capital punishment is a regressive step and may not provide deterrence. It recommended the life sentence for the most grievous of crimes. It gives arbitrary power to the government for taking a human life is a violation of the right to life guaranteed under Article 21 of the constitution.

WAY FORWARD:

- **Impose a Moratorium on Executions:** Over **140 countries** have abolished the death penalty either in law or in practice. Countries like **Brazil**, **Russia**, and **Morocco** have imposed a **moratorium** on executions without fully abolishing the death penalty.In 2007, the **United Nations General Assembly** adopted a resolution calling for a moratorium on the use of the death penalty with a view to abolishing it globally.

- **Restrict Death Penalty to Extremely Limited Cases:** While the death penalty is still in use in some states, states like **California** and **New York** have abolished or restricted its use. The **Supreme Court of the U.S.** has also imposed restrictions, prohibiting the death penalty for juveniles and the mentally ill (e.g., **Atkins v. Virginia**, 2002).

- **Establish Stronger Safeguards Against Wrongful Convictions**: Prior to abolishing the death penalty in 1965, the UK introduced significant legal safeguards to ensure that no innocent person would be wrongfully executed, including thorough judicial reviews. Countries like **Japan** and **South Korea**, although still retaining capital punishment, have heightened judicial reviews to minimize the risk of wrongful convictions.

- **Introduce Alternatives to the Death Penalty:** Many countries that have abolished the death penalty, like **Norway** and **Germany**, offer **life imprisonment without parole** as an alternative punishment. This ensures public safety while avoiding ethical issues associated with taking a life.**Canada** abolished the death penalty in 1976, replacing it with life imprisonment without parole for heinous crimes. This maintains societal protection while respecting human rights.

- **Enhance Rehabilitation and Reformation Programs:** Countries like **Sweden** and **Norway** focus heavily on **rehabilitation** rather than punitive justice. Their prison systems are designed to reintegrate prisoners back into society by focusing on education, mental health, and skill development. In **Norway**, even those convicted of serious crimes like murder receive rehabilitation aimed at reintegrating them into society, with the longest sentence being 21 years.

- **Encourage Public Debate and Increase Awareness:** Countries like **New Zealand** and **France** abolished the death penalty following extensive **public debates** and consultation with stakeholders, including civil society, human rights organizations, and legal experts.

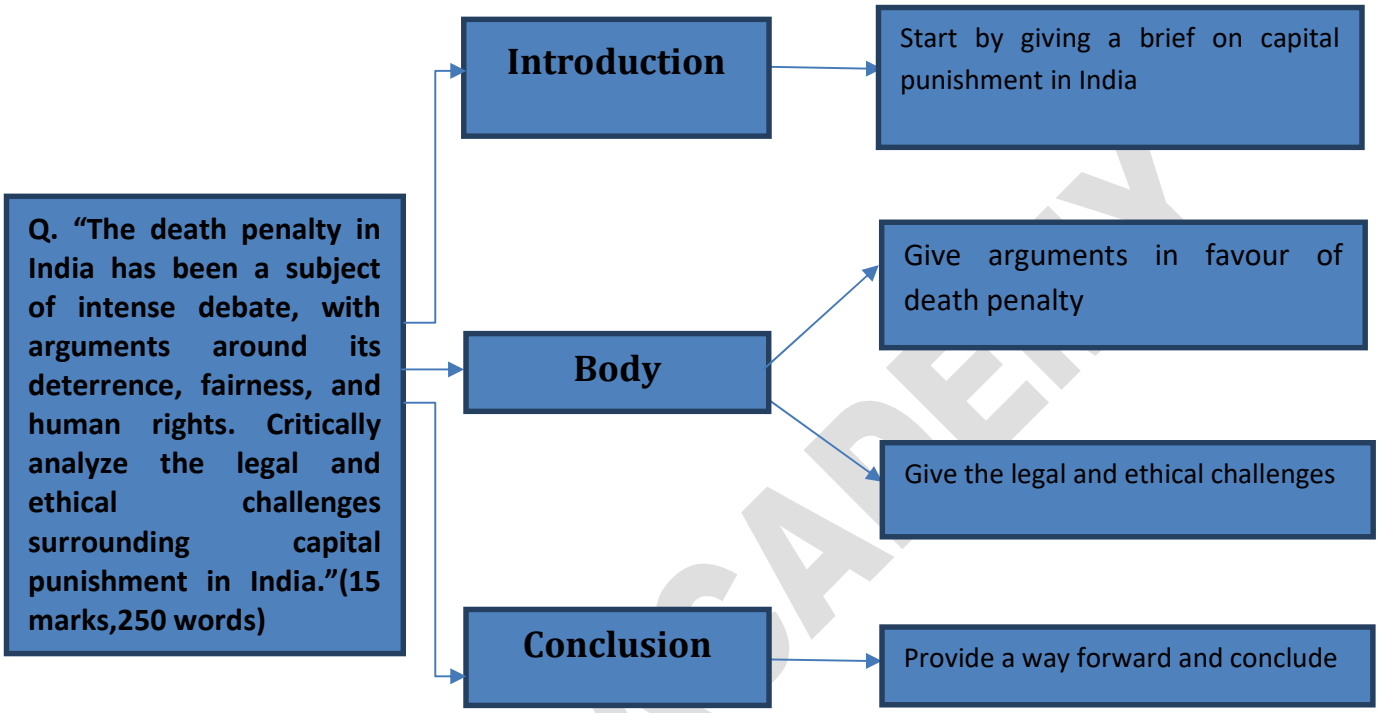
- **Implementing International Human Rights Recommendations: UN General Assembly Resolution** on the **moratorium on the death penalty** encourages member states to reduce the number of crimes punishable by death and move toward abolition.**South Africa**, following its new constitution in 1994, abolished the death penalty, aligning with international human rights norms and emphasizing the right to life.

- **Fair Representation and Elimination of Bias:** In cases of racial and economic bias, the U.S. introduced measures like **racial justice acts** in certain states (e.g., **North Carolina**) to ensure fairer application of capital punishment.

PRACTICE QUESTION

"The death penalty in India has been a subject of intense debate, with arguments around its deterrence, fairness, and human rights. Critically analyze the legal and ethical challenges surrounding capital punishment in India."(15 marks,250 words)

APPROACH



MODEL ANSWER

The death penalty, also known as capital punishment, continues to exist in India under the principle of the "rarest of rare" cases, established by the **Bachan Singh vs. State of Punjab (1980)** ruling. Despite its legal basis, the death penalty faces significant ethical and legal challenges, particularly regarding fairness, deterrence, and human rights concerns

ARGUMENTS IN FAVOUR OF DEATH PENALTY:

1. **Deterrence Against Heinous Crimes:**The death penalty is often seen as a deterrent to the most serious crimes like murder, terrorism, and rape. The fear of death may prevent potential criminals from committing such offenses.

    - In cases like the 2012 Nirbhaya gang rape, public outcry for the death penalty was based on the argument that severe punishment is necessary to prevent similar crimes.

2. **Justice for Victims and Their Families**:The death penalty is seen as delivering justice for the victims and their families, especially in cases of heinous crimes. It provides closure and ensures the criminal cannot re-offend.

- Victims' families, particularly in brutal cases like the 1993 Mumbai blasts, often demand capital punishment as the ultimate form of justice.

3. **Incapacitation of Dangerous Criminals**:The death penalty ensures that individuals who commit particularly egregious crimes are permanently removed from society, preventing them from harming others.

    - Death sentences in cases of terrorism, like the Ajmal Kasab case (2008 Mumbai attacks), are viewed as necessary to incapacitate threats to national security.

4. **Legal Safeguards in India**:India has legal safeguards in place, such as the principle of awarding the death penalty only in the "rarest of rare" cases, ensuring that capital punishment is not applied arbitrarily.

    - Supreme Court Verdicts: Cases like Bachan Singh vs. State of Punjab (1980) established guidelines on the "rarest of rare" doctrine, providing safeguards against misuse.

LEGAL AND ETHICAL CHALLENGES:

1. **Judicial Errors and Wrongful Convictions**:There have been instances of wrongful convictions, where the accused was later acquitted by higher courts. In 2023, the Supreme Court acquitted nearly **55% of death row prisoners** it reviewed, highlighting issues in lower courts' death penalty sentencing

2. **Lack of Deterrence**:Research, including the **Death Penalty India Report (2016)**, has shown no substantial evidence that the death penalty acts as a better deterrent than life imprisonment

3. **Discriminatory Application**:The death penalty disproportionately affects marginalized communities, with many prisoners on death row coming from economically disadvantaged backgrounds or minority communities

4. **Human Rights Violations**: The death penalty raises concerns about violating the right to life under **Article 21 of the Indian Constitution**. Internationally, over **140 countries** have abolished or imposed a moratorium on capital punishment, citing human rights concerns

WAY FORWARD:

1. **Moratorium on Executions**: India could follow global trends by imposing a **moratorium** on executions, as practiced by countries like **Brazil** and **Morocco**, allowing time for public consultation and legal reforms

2. **Stronger Safeguards Against Wrongful Convictions**:India should improve the **judicial review process**, ensuring that death penalty cases undergo thorough scrutiny, as seen in **Japan** and **South Korea**

3. **Introduce Alternatives**:Alternatives like **life imprisonment without parole**, practiced in **Germany** and **Norway**, can ensure justice without ethical concerns

4. **Public Debate and Legal Reforms**:Engage in national discussions involving civil society and legal experts to re-evaluate capital punishment, similar to the process in **New Zealand** before abolition

While the death penalty is legally permissible in India, its application raises ethical and legal questions. By incorporating global best practices such as moratoriums, stronger safeguards, and alternative punishments, India can address these concerns while upholding justice and human rights.

11. COLLEGIUM SYSTEM

iMPACT ANALYSIS

SYLLABUS:

GS 2 > Constitution>> Judiciary

REFERENCE NEWS:

The Supreme Court asked the government to explain its reasons for sitting on names reiterated by the apex court Collegium for months or even years together, reminding the Centre that it cannot treat the Collegium like a mere "search committee" whose recommendations can be ignored or accepted at the Union's discretion.

A three-judge Bench headed by Chief Justice D.Y. Chandrachud asked Attorney General R. Venkataramani, appearing for the government, to place on record, within a week, a tabulated chart of every pending name reiterated by the Collegium, why they were still pending and at what level they were stuck in the government machinery.

CONSTITUTIONAL PROVISIONS BEHIND JUDICIAL APPOINTMENTS:

The appointment of judges in India, particularly to the Supreme Court and High Courts, is governed by the Constitution of India. The relevant provisions include:

- **Article 124(2**): Deals with the appointment of judges to the Supreme Court. It states that the judges of the Supreme Court shall be appointed by the President after consultation with such judges of the Supreme Court and High Courts as the President may deem necessary. For the appointment of the Chief Justice of India (CJI), the President shall consult the judges of the Supreme Court.
- **Article 217(1**):Governs the appointment of High Court judges. The President appoints the judges after consulting the Chief Justice of India, the Governor of the concerned state, and the Chief Justice of the High Court.
- **Article 222**:Deals with the transfer of judges from one High Court to another by the President after consulting the Chief Justice of India.
- **Article 124(4**) and **Article 217(1)(b):**Provide for the removal of judges from the Supreme Court and High Courts by impeachment on the grounds of **proven misbehaviour or incapacity.**

EVOLUTION OF COLLEGIUM SYSTEM IN INDIA:

The **Collegium System** evolved as a method for judicial appointments in India, as the **Constitution does not explicitly provide for this mechanism**. The system emerged through a series of landmark Supreme Court judgments, popularly known as the **"Judges Cases."**

First Judges Case (1981) – S.P. Gupta vs. Union of India: The case addressed the extent of the President's powers and the role of the Chief Justice of India (CJI) in judicial appointments.

- **Verdict**: The Supreme Court ruled that the **Executive (President)** has the **final say** in judicial appointments, and the CJI's consultation was not binding on the President. This effectively gave more power to the Executive in the appointment of judges.
- **Outcome**: This judgment diminished the judiciary's role in judicial appointments and led to concerns about executive overreach.

Second Judges Case (1993) – Supreme Court Advocates-on-Record Association vs. Union of India: This case was filed to reconsider the decision of the First Judges Case, particularly regarding the role of the CJI in judicial appointments.

- **Verdict**: The Supreme Court overruled the First Judges Case and established the **Collegium System**. The court held that **judicial primacy** in appointments was essential to maintain the independence of the judiciary.
    - The CJI's recommendation was given primacy in judicial appointments.
    - The recommendation of the CJI would be made in **consultation with a Collegium of the two seniormost judges** of the Supreme Court.
- **Outcome**: This gave the judiciary a significant role in the appointment process, minimizing executive influence.

Third Judges Case (1998) – Presidential Reference to the Supreme Court: Clarification was sought from the Supreme Court on the Collegium System, particularly on the consultation process and the number of judges involved in the Collegium.

- **Verdict**: The Supreme Court expanded the Collegium from **three** members to **five** members:
    - The CJI and the **four seniormost judges** of the Supreme Court.
    - For High Court appointments, the Collegium would include the CJI, the two seniormost Supreme Court judges, and the Chief Justice of the concerned High Court.

- **Outcome**: This solidified the Collegium System, ensuring a wider consultation among judges before appointments were made.

National Judicial Appointments Commission (NJAC) (2014) – Constitutional Amendment and Striking Down: To replace the Collegium System, the **NJAC** was introduced via the **99th Constitutional Amendment Act, 2014**, which aimed to involve both the judiciary and executive in the appointment process. The NJAC comprised the CJI, two senior judges of the Supreme Court, the Law Minister, and two eminent persons.

- **Supreme Court Judgment (2015)**: In the **Fourth Judges Case**, the Supreme Court struck down the NJAC, holding that it violated the **independence of the judiciary**. The court emphasized the need for the judiciary to have the final say in appointments to protect its autonomy.

- **Outcome**: The **Collegium System was reinstated**, with the court reiterating its importance in maintaining judicial independence.

PROS OF COLLEGIUM SYSTEM	CONS OF COLLEGIUM SYSTEM
Judicial Independence: The Collegium System ensures that the **executive does not have undue influence** over judicial appointments. This separation is essential for maintaining the autonomy of the judiciary and preventing political interference. • **Example**: Judicial Independence is absolutely essential to safeguard the Constitution and underlying principles like Right to Life, Right to Privacy etc.	**Lack of Transparency**: One of the most significant criticisms of the Collegium System is its **opaque nature**. There is no formal procedure for decision-making, and the reasons for selecting or rejecting a judge are often not disclosed. • **Example**: Appointments and transfers are often perceived as secretive, with no public disclosure of the criteria or rationale behind decisions.
Safeguards Against Executive Overreach: Prior to the Collegium System, the executive had significant control over judicial appointments, which could have compromised the independence of judges. The Collegium System prevents the concentration of appointment powers in the executive. • **Case Reference**: The **Second Judges Case (1993)** established judicial primacy in appointments, safeguarding the judiciary against political influence.	**Absence of Accountability**: The system lacks a structured mechanism for **accountability**. Since the Collegium operates without external oversight, there is no clear avenue for challenging or questioning its decisions. • **Criticism**: The judiciary appointing its own members without transparency raises concerns about the **concentration of power** within the judiciary, and the absence of checks and balances.

Collective Decision-Making: The system involves multiple senior judges in decision-making, which minimizes the risk of **arbitrary or biased appointments** by a single authority. The collective wisdom of senior judges theoretically leads to more balanced decisions. • **Example**: The Collegium comprises the Chief Justice of India and the next four seniormost judges, promoting a broad consensus in appointments.	**Arbitrary Decision-Making**: There have been instances where decisions made by the Collegium appear to be **subjective** or influenced by **personal preferences**, rather than being based solely on merit. • **Example**: The lack of a defined selection criterion sometimes leads to accusations of favoritism or **nepotism**, particularly when judges' relatives are appointed.
Ensures Meritocracy: The Collegium System is meant to ensure that appointments are made on the basis of **merit and competence** rather than political considerations, fostering judicial excellence. • **Example**: Judges are appointed after thorough consultations within the judiciary, ensuring the consideration of judicial expertise and performance.	**Delays in Appointments**: The Collegium System has led to **delays in appointments**, particularly in filling vacancies in High Courts and the Supreme Court. These delays can exacerbate the backlog of cases in the judicial system. • **Data**: As of 2023, there were **over 500 judicial vacancies** in India's High Courts, contributing to the judicial backlog.
Protection from Political Retribution: Judges appointed through the Collegium System are insulated from potential **political retribution** for their decisions, allowing them to act independently in delivering justice. • **Example**: Judges can pass rulings without the fear of executive backlash, ensuring the judiciary remains impartial.	**Marginalization of the Executive**: Critics argue that the Collegium System **undermines the role of the executive** in appointments, leading to an imbalance between the judiciary and other branches of government. The exclusion of the executive from the process has been questioned in terms of accountability and the democratic process. • **Example**: The **National Judicial Appointments Commission (NJAC)** was introduced to bring transparency by including members from the executive and civil society, but it was struck down by the Supreme Court, restoring judicial dominance.
Executive as the main litigant: The Government is the main litigant in	**Lack of Diversity**: The Collegium System has been criticized for

Courts accounting for ~50% of the cases. Prominence to the Executive in appointments may impact impartiality of the Judiciary in adjudication.	**failing to ensure diversity** in judicial appointments. The lack of representation from marginalized groups, women, and regional backgrounds is seen as a limitation. • **Data**: Women make up less than **10% of judges** in High Courts and the Supreme Court, reflecting a significant gender imbalance.
	Lack of constitutional status: The Collegium is not prescribed in the Constitution. Article 124 mentions consultation, which the SC interpreted as 'concurrence' in Second Judges Case (1993).

WAY FORWARD:

Establish a Judicial Appointments Commission (JAC) with Clear Safeguards

- **United Kingdom:** The Judicial Appointments Commission (JAC) was established to make the judicial appointments process independent and transparent. It includes members from the judiciary, legal professionals, and laypersons, with clear criteria for merit-based selection.
- **South Africa:** The Judicial Service Commission (JSC) includes judges, legal practitioners, and members of the executive and civil society, promoting diversity and accountability in judicial appointments.

Ensure Transparency in the Collegium's Functioning

- **Canada:** The Judicial Appointments Committee in Canada publishes the names of shortlisted candidates and reasons for their selection. This ensures greater transparency in the decision-making process.
- **United States:** The Senate Judiciary Committee holds public hearings for nominees to the Supreme Court, allowing for scrutiny and public input into the process.

Establish Clear and Objective Criteria for Judicial Appointments

- **Germany:** Judicial appointments in Germany are based on objective criteria such as legal expertise, professional experience, and demonstrated ethical integrity, which are reviewed by a selection committee.

- **New Zealand:** The New Zealand Judicial Appointment System follows clear guidelines that prioritize merit, diversity, and public service, ensuring a balanced judiciary.

Incorporate Diversity and Representation in Judicial Appointments

- **South Africa**: The JSC is mandated to ensure that the judiciary reflects the country's racial and gender diversity, promoting inclusivity and greater public trust in the justice system.
- **United States:** Recent trends have focused on improving racial and gender diversity within the federal judiciary, recognizing the importance of representation in the judiciary.

Introduce Fixed Terms for Collegium Members

- **Canada and UK**: Members of the judicial appointments committees serve fixed terms, ensuring periodic renewal of the membership and bringing fresh perspectives into the process.

Strengthen the Consultation Process with the Executive

- **Australia:** The Attorney-General consults with the judiciary and other stakeholders before making judicial appointments, ensuring a balance between the judiciary's needs and executive oversight.
- **United Kingdom:** The executive's role is limited but consultative, ensuring that both branches have a say in judicial appointments without compromising judicial independence.

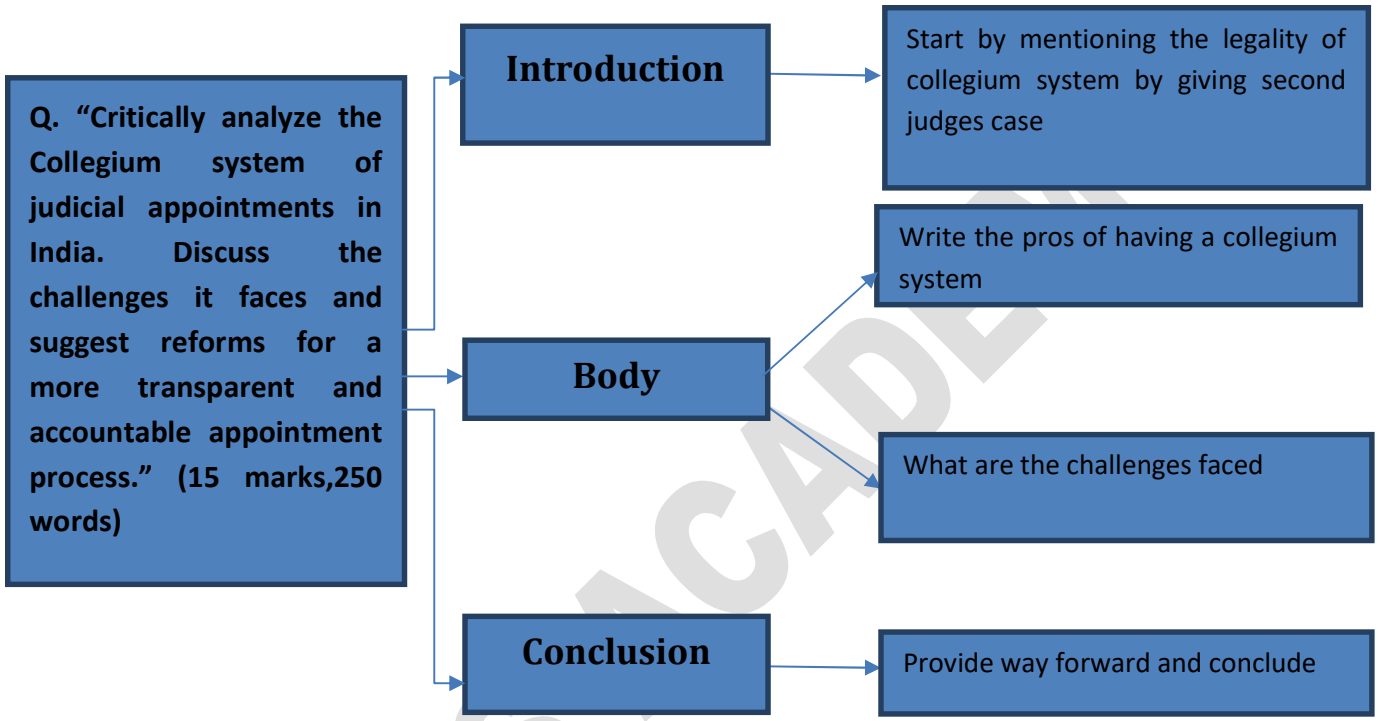
Expedited Appointments to Address Judicial Vacancies

- **United States:** The Senate has strict timelines for confirming judicial nominees, ensuring minimal delay in the appointment process.
- **United Kingdom:** The JAC operates under a fixed timeline to fill judicial vacancies, ensuring that the judiciary functions at full capacity.

PRACTICE QUESTION

Q. "Critically analyze the Collegium system of judicial appointments in India. Discuss the challenges it faces and suggest reforms for a more transparent and accountable appointment process." (15 marks,250 words)

APPROACH



MODEL ANSWER

MODEL ANSWER:

The **Collegium System** in India evolved from the **Second Judges Case (1993)**, giving the judiciary primacy in judicial appointments to the **Supreme Court** and **High Courts**. While it ensures judicial independence, the system has been criticized for a lack of transparency and accountability.

PROS OF COLLEGIUM SYSTEM:

Judicial Independence:The Collegium System ensures that the **executive does not have undue influence** over judicial appointments. This separation is essential for maintaining the autonomy of the judiciary and preventing political interference.

- **Example**: By having senior judges make decisions on appointments, the judiciary protects itself from being swayed by political or executive interests.

Safeguards Against Executive Overreach:Prior to the Collegium System, the executive had significant control over judicial appointments, which could have compromised the independence of judges. The Collegium System prevents the concentration of appointment powers in the executive.

- **Case Reference**: The **Second Judges Case (1993)** established judicial primacy in appointments, safeguarding the judiciary against political influence.

Collective Decision-Making:The system involves multiple senior judges in decision-making, which minimizes the risk of **arbitrary or biased appointments** by a single authority. The collective wisdom of senior judges theoretically leads to more balanced decisions.

- **Example**: The Collegium comprises the Chief Justice of India and the next four seniormost judges, promoting a broad consensus in appointments.

Ensures Meritocracy:The Collegium System is meant to ensure that appointments are made on the basis of **merit and competence** rather than political considerations, fostering judicial excellence.

- **Example**: Judges are appointed after thorough consultations within the judiciary, ensuring the consideration of judicial expertise and performance.

Protection from Political Retribution:Judges appointed through the Collegium System are insulated from potential **political retribution** for their decisions, allowing them to act independently in delivering justice.

- **Example**: Judges can pass rulings without the fear of executive backlash, ensuring the judiciary remains impartial.

CHALLENGES OF THE COLLEGIUM SYSTEM:

1. **Lack of Transparency**:The Collegium's functioning is perceived as opaque, with no formal procedures or public disclosure of the reasons for appointments or rejections
2. **Absence of Accountability**:Decisions are made without external oversight, raising concerns about unchecked judicial power and potential favoritism
3. **Delays in Appointments**:Judicial vacancies persist, with **over 500 positions vacant in High Courts as of 2023**, exacerbating the backlog of cases

4. **Marginalization of the Executive**:The exclusion of the executive from the appointment process has led to tensions and delays, particularly when the executive sits on recommended names

5. **Lack of Diversity**:The Collegium has failed to ensure adequate representation of women and marginalized communities. Women constitute less than **10% of judges** in High Courts

REFORMS AND GLOBAL BEST PRACTICES:

1. **Establish a Judicial Appointments Commission (JAC)**:Drawing from the **UK's Judicial Appointments Commission (JAC)**, India could reintroduce a balanced body comprising judiciary, executive, and civil society members

2. **Transparency in Functioning**:Like **Canada's Judicial Appointments Committee**, India can publish reasons for appointments and rejections, ensuring public confidence

3. **Objective Criteria for Appointments**:**Germany** follows clear guidelines focusing on merit, ethics, and experience. India should implement similar objective criteria

4. **Ensure Diversity**:The **South African Judicial Service Commission** mandates racial and gender diversity, a model India could adopt to enhance inclusivity

5. **Fixed Terms for Collegium Members**:Following **Canada's system**, introducing fixed terms for Collegium members can bring fresh perspectives and reduce concentration of power

Reforming the Collegium System by incorporating transparency, accountability, and diversity, along with structured executive consultation, can ensure a more robust and inclusive judiciary in India while maintaining its independence. Global practices offer valuable insights to achieve this balance.

12. LEGALITY OF FACT CHECK UNIT

iMPACT ANALYSIS

SYLLABUS:

GS 2 > Constitution>> Press Freedom

REFERENCE NEWS:

The Bombay High Court recently struck down as unconstitutional a key provision of the amended Information Technology (IT) Rules, 2021 which empowered the government to identify "fake news" on social media platforms through a Fact Check Unit (FCU).

MORE ON NEWS:

- The amendment to the Information Technology (IT) Rules, 2021, which granted the Central government the **authority to establish the Fact Check Unit (FCU),** was made official in April 2023.
- In **January 2024**, a challenge to these rules led to a **split verdict from a two-judge bench** of the Bombay High Court (HC). The challenges were centred on concerns of potential censorship, impacts on freedom of speech, and the Central Government's regulatory authority over online content.
- **A third judge**, was designated to provide a decisive opinion on this split verdict**.**
- However, on March 11, 2024, the **third judge declined to stay the setting up of the FCU** — and on March 13, the division Bench said by a 2-1 majority that it would not stay the notification of the FCU.
- The March 20,2024 notification designating the PIB's Fact-Checking Unit (FCU) as the fact-check unit of the Central Government — which has now been stayed by the SC — was **issued a day before the Supreme Court was to hear an appeal** against the rejection by the Bombay High Court of a plea for an interim stay on the amended Rules.
- In a 99-page ruling, Justice Atul S Chandurkar sided with the opinion delivered in January this year by Justice Gautam S Patel, leading to what is now essentially a 2-1 verdict. A two-judge Bench of Justices Patel, who has since retired, and Neela Gokhale, had delivered a split verdict in this case. Justice Patel had struck down the amended rules; Justice Gokhale had upheld them.

- The amendment to **Rule 3(1)(b)(v) of the IT Rules, 2021**, significantly **widens the scope of "fake news"** to include content related to government affairs.
- Initially, the rule targeted information that was "patently false or misleading in nature but may reasonably be perceived as a fact." With the 2023 amendment, this was expanded **to cover any government-related content deemed false or misleading** by a designated government fact-check unit, as announced in the Official Gazette.
- This change prompts serious constitutional and legal concerns, touching upon Articles 14, 19(1)(a) and (g), and 21 of the Constitution, and Section 79 of the IT Act. It raises questions about censorship, freedom of expression, press freedom, and the potential for governmental overreach in regulating public discourse.

PIB'S FACT CHECK UNIT:

In November 2019, the Press Information Bureau (PIB) launched a Fact Check Unit (FCU) to counter fake news about the Government of India, its departments, ministries, public sector units, and other central organizations. The FCU's mission is to verify claims about government actions and announcements, using a detailed fact-checking process to correct misinformation and provide the public with accurate information.

- **Organization**:The FCU is led by a senior officer from the Indian Information Service (IIS) and consists of IIS officers managing its daily operations. It operates under the **Principal Director General of PIB**, the Government of India's main spokesperson.
- **Fact-Check Mechanism**:Public inquiries are received via **WhatsApp, email, or a web portal** and categorized based on their relevance to the Government of India. The FCU then thoroughly investigates each relevant query using government sources, technology, and verification from official bodies. Findings are shared on social media if deemed beneficial for public awareness. Fact-checked content falls into three categories:
    - **Fake** - Incorrect information about the Government of India meant to deceive or manipulate, whether spread intentionally or not.
    - **Misleading** - Information that is partially true or distorted to mislead the recipient.
    - **True** - Information verified as factually correct.

Recent government notification(March 20, 2024):

- The notification issued by the Ministry of Electronics and Information Technology recently **formalized the Fact Check Unit (FCU)'s authority**, providing it with legal backing and the power to enforce its findings.

- This legislation also places a **mandatory requirement on online platforms** like Facebook and **Twitter to remove content identified as "fake" by the FCU**. Failing to do so risks **losing their "safe harbour" status**, which shields them from liability for third-party content.

WHY THE CENTRAL GOVERNMENT'S FACT-CHECK UNIT IS CRUCIAL?

- **Combating Misinformation**: At its core, the Fact-Check Unit aims to mitigate the proliferation of misinformation and fake news. This initiative is crucial for protecting public discourse from the harmful impacts of false information, which **can distort public perception and decision-making.**

- **Protection of Democratic Values:** The unit is positioned to protect democratic values by preventing the spread of false information that could **mislead the public, affect public opinion, or disrupt the democratic process.**

- **Strengthening Social Media Accountability**: With the PIB's Fact-Check Unit recognized as the government's **official fact-checking arm**, there's an increased onus on social media platforms to adhere to higher standards of content accuracy. Platforms like Facebook and Twitter are now **more compelled to identify and eliminate misleading content**, enhancing their role in safeguarding information integrity.

- **Bolstering Cyber security Measures**: By identifying and countering misleading content, the Fact-Check Unit also contributes to cyber security efforts. It plays a part in curbing the distribution of harmful digital content, **such as deep fakes**, which can have serious implications for **individual privacy, security, and the democratic process.**

- **Curbing Hate Speech and Potential Violence**: The unit is instrumental in upholding compliance with India's IT Act and national security legislations. This effort is vital in preventing digital platforms from becoming arenas for hate speech and violence, ensuring a **safer online environment** conducive to **respectful and lawful discourse.**

CONCERNS ASSOCIATED WITH FACT-CHECK UNIT BY THE GOVERNMENT:

- **Potential for Censorship and Control over Information:**

- The amendment to Rule 3(1)(b)(v), broadening "fake news" to cover government matters, could lead to **censorship and control of narratives under the guise of fighting misinformation.**
- This threatens speech and expression freedoms under **Article 19(1)(a)** and challenges **Article 14** by potentially allowing **selective enforcement** against dissenting voices, undermining the principle of equality before the law.

- **Impacts on Press Freedom:**
  - The PIB Fact-Check Unit's action against an **Al Jazeera article criticizing the Citizenship (Amendment) Act, 2019, as "fake news"** exemplifies the risks to press freedom. Such instances demonstrate the threat posed by government-controlled entities to the independence of journalism and the critical reporting of government policies, directly impacting the core of **press freedom protected under Article 19(1)(a).**
- **Ambiguity and Subjectivity in Determining "Fake News":**
  - The amendment introduces subjectivity into what can be labeled as "fake news," particularly concerning government affairs, without clear criteria or oversight. This discretion could lead to decisions **that are arbitrary or politically motivated**, complicating adherence to Article 14's principle of non-arbitrariness.
- **Chilling Effect on Freedom of Expression:**
  - The amended rules may cause individuals and entities to **self-censor**, especially when discussing government business, for fear of being **labelled as disseminators of "fake news."** This self-censorship undermines the essence of freedom of expression, a fundamental right under Article 19(1)(a).
- **Impartiality of the Fact-Check Unit:**
  - Given its role as a **government-appointed body**, the Fact-Check Unit's impartiality and **potential for bias** in determining misinformation related to government actions pose a significant concern. This situation challenges the **protection against state overreach**, integral to Article 21's guarantee of personal liberty and dignity.
- **Impact on Social Media Platforms and Online Content:**

- Under the amended rules, social media platforms face **legal liabilities for failing to remove content flagged as misinformation** by the Fact-Check Unit, as per Section 79 of the IT Act. This requirement might lead to over-censorship, affecting these platforms' roles as spaces for free discourse and impacting the rights protected under **Articles 19(1)(a) and (g).**

Section 79 of the Information Technology Act, 2000, establishes a **"safe harbor"** for online intermediaries, protecting them from liability for third-party content, subject to compliance with due diligence and government guidelines.

WAY FORWARD:

- **Enhance Transparency and Accountability:**
  - Create publicly accessible guidelines for content evaluation and decision-making.
  - Implement a transparent appeal process for disputed decisions.
- **Ensure Impartiality and Independence:**
  - Involve an independent oversight body with diverse members.
  - Publish regular reports on Fact-Check Unit activities and decisions.
- **Foster Collaboration with Stakeholders:**
  - Partner with social media, news organizations, and academia for best practices in fact-checking.
  - Develop public education initiatives on misinformation and media literacy.
- **Strengthen Legal and Ethical Frameworks:**
  - Align the legal framework with international freedom of expression and digital rights standards.
  - Incorporate ethical considerations to avoid suppressing legitimate discourse.
- **Support Press Freedom and Freedom of Expression:**
  - Uphold press freedom and freedom of expression as core values.
  - Focus on collaborative truth-seeking, avoiding punitive actions against dissent.
- **Address Misinformation Holistically:**

- Recognize fact-checking as one of many tools against misinformation.
- Invest in education, critical thinking, quality journalism, and technological solutions to limit misinformation's spread.

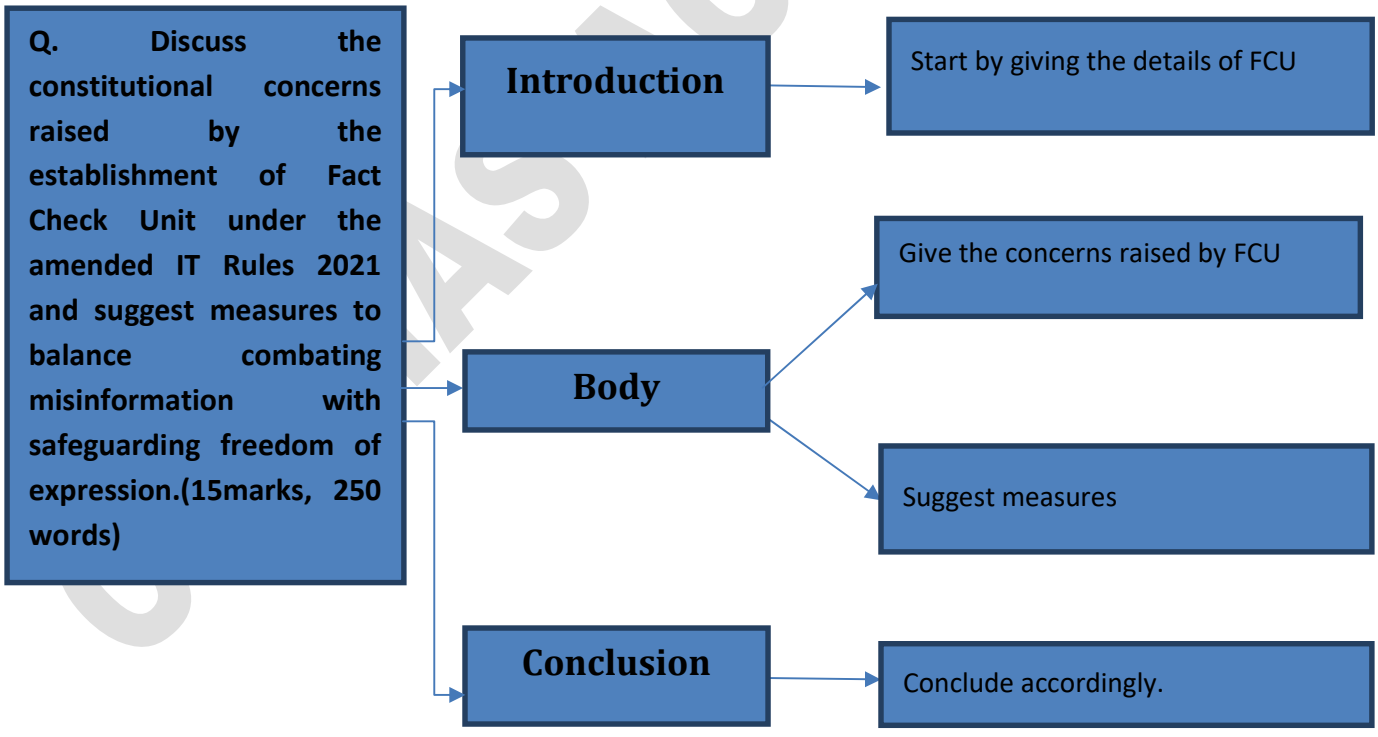
CONCLUSION:

The effectiveness and significance of the Fact-Check Unit also hinge on **public trust in its impartiality and accuracy.** Its ability to establish itself as a credible and unbiased source of fact-checking will be crucial for its long-term impact on **information integrity in India.**

PRACTICE QUESTION

Q. Discuss the constitutional concerns raised by the establishment of Fact Check Unit under the amended IT Rules 2021 and suggest measures to balance combating misinformation with safeguarding freedom of expression.(15marks, 250 words)

APPROACH



MODEL ANSWER

The Bombay High Court recently struck down as unconstitutional a key provision of the amended Information Technology (IT) Rules, 2021 which empowered the government to identify “fake news” on social media platforms through a Fact Check Unit (FCU).

The **Fact Check Unit (FCU)** was established by the government through amendments to the **Information Technology (IT) Rules 2021**, empowering the government to flag "fake news" concerning government affairs. While the unit aims to counter misinformation, its constitutionality has been challenged in the courts, raising significant concerns regarding press freedom and freedom of expression.

CONSTITUTIONAL CONCERNS:

1. **Freedom of Speech and Expression (Article 19(1)(a))**:
    - The FCU's power to identify content as "fake news" related to government matters raises concerns about potential censorship. It may lead to **self-censorship** among individuals and journalists, curbing free expression
2. **Ambiguity in Defining Fake News**:
    - The **broad scope of "fake news"** as defined by the amended rules, without clear criteria or oversight, could result in arbitrary decisions, violating **Article 14** (right to equality) by allowing selective enforcement
3. **Impact on Press Freedom**:
    - Instances like the labeling of an **Al Jazeera article as fake** demonstrate the potential for government control over press narratives. This threatens the independence of journalism, which is critical to maintaining a free press under **Article 19(1)(a)**
4. **Impartiality of the Fact Check Unit**:
    - The FCU, as a government-appointed body, faces questions about its impartiality. This risks **state overreach**, affecting individual liberty and personal dignity, protected under **Article 21**

SUGGESTIONS FOR REFORM:

1. **Transparency and Accountability**:
    - Clear, publicly accessible guidelines should be established for determining fake news, along with a **transparent appeal process** for disputed cases

2. **Impartial Oversight**:
    - An **independent body** should be involved in the fact-checking process to ensure neutrality. Regular reports on FCU decisions should be published
3. **Collaboration with Stakeholders**:
    - Engage social media platforms, news organizations, and fact-checking bodies to create a more inclusive and balanced approach
4. **Strengthening Legal Frameworks**:
    - Align India's fact-checking initiatives with **international standards** for digital rights and free expression, avoiding punitive actions that could suppress legitimate dissent

The FCU's establishment, while crucial for tackling misinformation, must be balanced with safeguarding the **constitutional right to free expression** and press freedom. Ensuring transparency, impartiality, and stakeholder collaboration will enhance its legitimacy and prevent misuse.

13. INDIA-ASEAN RELATIONS

iMPACT ANALYSIS

SYLLABUS:

GS 2 > International relations > India and Global Regions > India & South East Asia

REFERENCE NEWS:

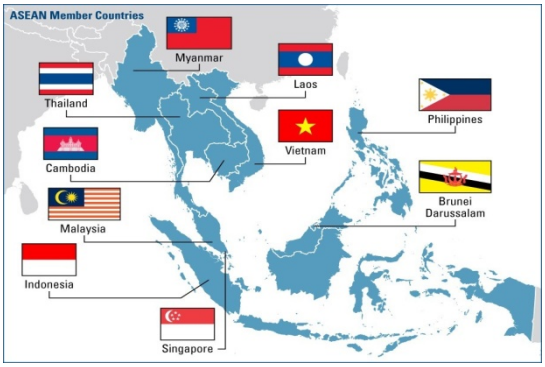
- Prime Minister Narendra Modi's recent visits to ASEAN countries highlight India's focused outreach to its eastern neighbors as part of his new term's foreign policy strategy. With increasing emphasis on trade, strategic partnerships, and economic cooperation, Modi's outreach underscores India's evolving role in the region, despite challenges in connectivity and geopolitical alignment.

RECENT VISITS AND ENGAGEMENTS

- **Visits to Brunei and Singapore**: Modi's visit to Brunei marked the first bilateral visit by an Indian PM to the country. His next stop, Singapore, was focused on solidifying India's strategic and economic partnerships.
    - **Upcoming ASEAN Summit**: Modi is scheduled to visit Laos in October 2024 for the ASEAN-India Summit and the East Asia Summit.
- **High-Level Visits to India**: In recent months, New Delhi has hosted the Prime Ministers of Vietnam (Pham Minh Chinh) and Malaysia (Anwar Ibrahim).
- **President Murmu's Visit to Timor Leste**: As part of India's broader engagement with the region, President Murmu visited Timor Leste while traveling to New Zealand and Fiji.

ASEAN:

- The Association of Southeast Asian Nations (ASEAN) is a **regional intergovernmental organization comprising ten countries in Southeast Asia.**
- It was established in 1967 in Bangkok, Thailand, with the signing of the ASEAN Declaration (**Bangkok Declaration**).



- ASEAN promotes intergovernmental cooperation and facilitates economic, political, security, military, educational, and sociocultural integration among its members and other countries in Asia.
- It is headquartered in **Jakarta (Indonesia).**

BACKGROUND OF INDIA AND ASEAN RELATIONS:

- **1950s and early 1960s:** India aided in the decolonization of South East Asian countries
- **1960s to 1980s:** India kept away from South East Asia due to internal issues like Indo China war. Also, India viewed ASEAN as a product of the Cold war.
- **1990s to 2010s:**
    - Following the end of cold war and 1991 economic reforms, India reached out to the ASEAN countries through "**Look East Policy**".
    - In 1995 it achieved the status of **full dialogue partnership**.
    - In 1996, India became a full member of the **ASEAN Regional Forum (ARF)**

The **ASEAN Regional Forum (ARF)** is an important **platform for security dialogue** in **the Indo-Pacific**. It provides a setting in which members can discuss current security issues and develop cooperative measures to enhance peace and security in the region.

- **2010s to Present:**
    - India and ASEAN have been aggressively strengthening cooperation, through various initiatives like "**Act East Policy**" and Indo-ASEAN Summit.
    - ASEAN-India relations were elevated to a **Strategic Partnership** in 2012.
    - India-ASEAN relationship was elevated recently to **Comprehensive Strategic Partnership** during the **ASEAN-India Summit** held in Cambodia **on November 12, 2022.**

AREAS OF COOPERATION:

- **Trade relations:**
    - **India ASEAN Free Trade Agreement (AIFTA)**, **signed in 2009**, is the cornerstone of economic ties.

- ASEAN is India's **fourth largest trading partner**.
- **Commodity trade between India and ASEAN** region has **reached 98.39 billion** in the period **April 2021- February 2022**.

- **Business & Investment:**
  - ASEAN is a **major FDI source for India**. **Between 2000-2021** cumulative **FDIs from ASEAN to India** was **$117.88 billion**. These were mainly accounted for by **Singaporean investments in India ($115 billion**).
  - **ASEAN India-Business Council (AIBC)** was set up in 2003 to act as a forum to bring key private sector players from India and ASEAN on a single platform for business networking and sharing of ideas.
- **Socio-Cultural Cooperation:**
  - ASEAN nations and India share many cultural traits like **Buddhism and Makar Sankranti festival.** To boost **People-to-People Interaction** with ASEAN, initiatives such as **Students Exchange Programme,** Special **Training Course for ASEAN diplomats**, Exchange of Parliamentarians etc. are organized.
- **Connectivity:**
  - India has made considerable progress in implementing the **India-Myanmar-Thailand Trilateral Highway** and the **Kaladan Multimodal Project**.
  - A possible extension to **India-Myanmar-Thailand Trilateral Highway to Cambodia, Lao PDR and Viet Nam** is also under consideration.
  - India has announced a Line of Credit of USD 1 billion to promote projects that support physical and digital connectivity between India and ASEAN.

Myanmar-Thailand Trilateral Highway: It is a 1360 km long under-construction highway project, connecting Moreh in Manipur with Mae Sot, Thailand via Myanmar. India is undertaking construction of two sections of the Trilateral Highway in Myanmar.

Kaladan Multimodal Project: Kaladan is a multi-modal transport project that involves shipping, Inland Water and road transport. It will connect Kolkata with Mizoram through the Bay of Bengal. The project is being piloted and funded by the Ministry of External Affairs. It is developed as an alternative route to North East India besides the Siliguri corridor.

- **ASEAN-India Projects:**

- India and ASEAN cooperate in the implementation of various projects in the fields of Agriculture, Science & Technology, Space, Environment & Climate Change, Human Resource Development, Capacity Building, New and Renewable Energy, Tourism, People-to-People contacts and Connectivity etc.
- **For example,** ASEAN-India Fellowships for Higher Agricultural Education in India and ASEAN and Exchange of Agriculture Scientists.

- **Funds:**
  - **ASEAN-India Cooperation Fund:** To support implementation of the ASEAN-India Plans of Action, envisaging cooperation in a range of capacity building programmes in the political, economic and socio-cultural spheres.
  - **ASEAN-India S&T Development Fund (AISTDF):** A USD 1 million contribution from India to promote joint collaborative R&D research projects in Science & Technology
  - **ASEAN-India Green Fund:** To support collaboration activities relating to environment and climate change. Some of the areas identified for collaboration are energy efficiency, clean technologies, renewable energy, biodiversity conservation and environmental education.
- **Strategic cooperation:**
  - **ASEAN Post Ministerial Conference (ASEAN PMC) and the ASEAN Defense Ministerial Meeting-Plus (ADMM-Plus)** provide a platform to deliberate on the security issues such as piracy, illegal migration, trafficking of drugs, arms, and human and maritime terrorism.
  - There are also **maritime exercises with the navies of ASEAN countries**, information-sharing initiatives, and defense agreements with individual ASEAN countries. **For example, India-Thailand CORPAT.**
- **Defence cooperation:**
  - India has initiated measures to improve arms sale with ASEAN countries like Vietnam and Philippines. For instance, the first batch of **BrahMos missiles** was delivered to the Philippines in **April 2024**, marking a key milestone in the defense cooperation between India and the Philippines.
- **Technological cooperation:**

- **ISRO** is pursuing a proposal to s**upport ASEAN countries to receive and process data from Indian remote sensing satellites** (RESOURCESAT-2 and OCEANSAT-2) and also to provide training in space science, technology and applications

- **Delhi Dialogue:**
  - India has an annual Track 1.5 event Delhi Dialogue, for discussing politico-security and economic issues between ASEAN and India.

WHY INDIA NEEDS ASEAN:

- **Significant trade & Commercial relations:** ASEAN is a major destination for India's service sectors and a major source for **quality foreign investments**. Also, major Indian companies have made significant investments in ASEAN countries, like **ONGC Videsh's investment in Vietnam**.
- **For development of North East India:** ASEAN provides a **second route for India to access North Eastern India**. This facilitates in development and as well as improving India's strategic concerns in the region. For example, **Kaladan Multimodal Project.**
- **To counter Chinese expansion**: With USA gradually receding from Asia, India needs **strong partners like ASEAN countries to counter china's aggressive growth** in various spheres such as maritime security, global trade and maritime border disputes.
- **Maritime freedom:** Given the **strategic location of ASEAN countries** along critical sea lanes, engagement with them forms an **integral part of India's vision** of **a free, open, inclusive, and peaceful Indo-Pacific built on rules-based order**.
- **To face rising politico-security challenges:** Traditional and non-traditional challenges like **climate change, terrorism, refugee crisis and radicalization** has been on the rise. These are **common security threats** to both the societies.
- **Support Indian initiatives:** Cooperation of ASEAN is key to ensure the success of Indian initiatives like **Act East policy,** smart city, Make in India and Asia-Africa growth corridor. Given its cultural links, ASEAN is also a vital link in India's soft diplomacy strategies.
- **Emerging market:** India is a major destination for agricultural and industrial products from ASEAN. Also, India's favorable demographic dividend will be essential for the ASEAN nations in the near future.

- **For global reforms:** ASEAN is a global powerhouse and an influential organization, and, like India, they have been voicing for **reforms in forums like UN Security Council** and **World Trade Organization.**

- **Diaspora:** Southeast Asia has a strong Indian diaspora. Approximately **8% of Malaysia's population is of Indian descent**, and approximately **9% of Singapore's population is of Indian descent.**

- **Elevate India's status as a global power:** Cooperation with ASEAN enhances India's position as a major geopolitical force. For instance, **membership in the ARF** gave India the chance to share a high table with big powers like the United States, China, and Russia, alongside ASEAN, on security issues in the Indo-Pacific region.

CHALLENGES TO STRONGER COOPERATION:

- **Large Trade deficit:Trade imbalance** between India and ASEAN **remains skewed in ASEAN's favour**. Due to the FTA, the **trade deficit rose from around USD5 billion in FY11 to USD 21.8 billion** in FY19. This trade deficit was one of the reasons that India exited the ASEAN-led **Regional Comprehensive Economic Partnership (RCEP)** trade agreement in 2021.

- **Issues in FTA:** Indian lawmakers have expressed concern that despite trade agreements, India has not received sufficient market access and is facing steep import tariffs in ASEAN.

- **Balancing China:China is the largest trading partner for both India and ASEAN**. In terms of military capabilities too, China is better equipped. This trade dependency on China as well as its military superiority has led to an approach of cautious engagement, largely on ASEAN's part.

- **Delays in connectivity projects:** Long delay in completion of connectivity projects—for instance, the trilateral **India-Myanmar-Thailand (IMT) highway** was **expected to be finished in 2016** but has not due to bureaucratic and procedural issues on the Indian side.

- **Issues within ASEAN**: The members' political systems are mixed with d**emocracies, communist, and authoritarian states** and are divided over major issues of **human rights**, such as **Rohingya issue with Myanmar** and human rights violations in Philippines.

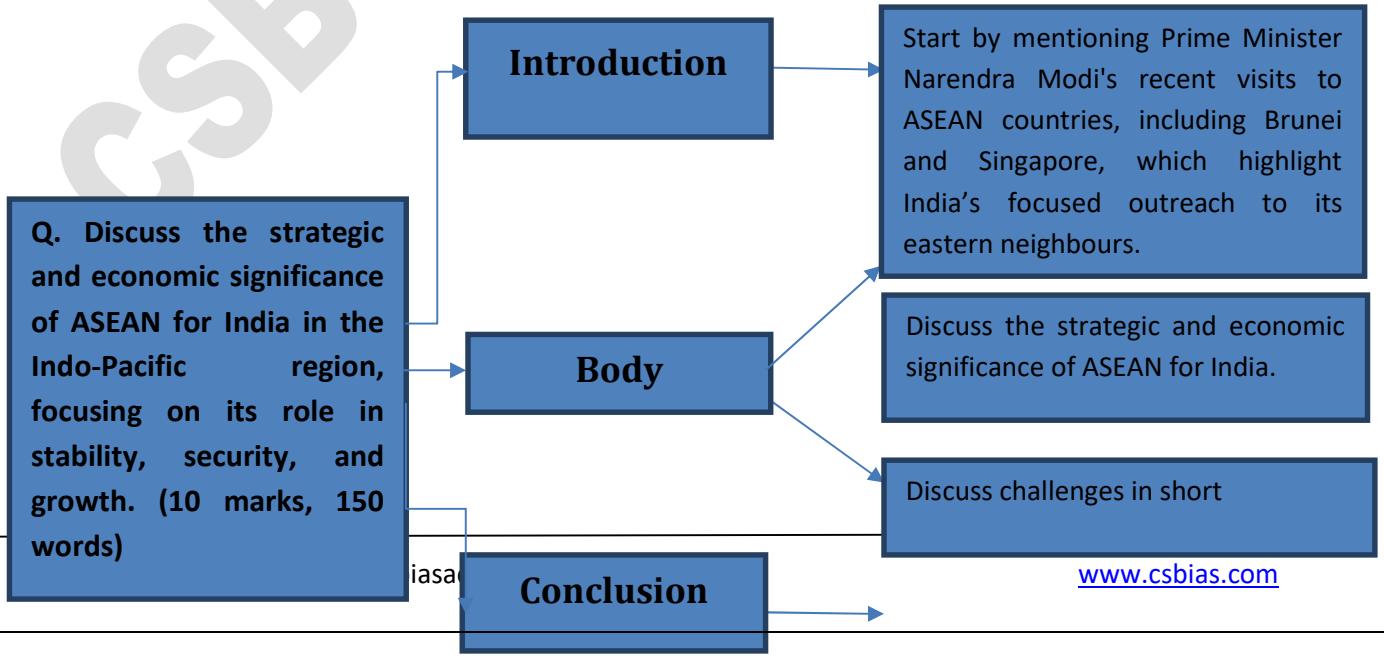
WAY FORWARD:

- **Enhance Economic Integration**: Address trade deficit by improving market access in sectors like IT and pharma. Strengthen India-ASEAN FTA for balanced benefits.
- **Fast-Track Connectivity**: Expedite key projects like the India-Myanmar-Thailand Trilateral Highway. Extend connectivity to Vietnam, Laos, and Cambodia.
- **Strengthen Maritime Security**: Deepen defense cooperation, joint maritime exercises, and information sharing. Focus on combating piracy and ensuring maritime freedom.
- **Improve Strategic Ties**: Strengthen partnerships with ASEAN members like Singapore, Vietnam, and the Philippines.
- **Post-Pandemic Cooperation**: Focus on health security, renewable energy, and disaster management.
- **Build Institutional Mechanisms**: Create dedicated departments for ASEAN cooperation. Expand people-to-people ties through cultural diplomacy.
- **Leverage Multilateral Platforms**: Use forums like the East Asia Summit to push for regional stability.
- **Counter China's Influence**: Provide ASEAN countries alternatives through deeper engagement and Act East Policy integration.

PRACTICE QUESTION

Q. Discuss the strategic and economic significance of ASEAN for India in the Indo-Pacific region, focusing on its role in stability, security, and growth. (10 marks, 150 words)

APPROACH



Provide a way forward and conclude

MODEL ANSWER

Prime Minister Narendra Modi's recent visits to ASEAN countries, such as Brunei and Singapore, and his scheduled participation in the upcoming ASEAN-India Summit in October 2024, underline India's intensified focus on strengthening ties with Southeast Asia. ASEAN is central to India's Indo-Pacific strategy, as it plays a pivotal role in ensuring regional stability, security, and economic growth.

Strategic Significance for Stability and Security:

1. **ASEAN Centrality in the Indo-Pacific**: ASEAN's geographical location along vital sea lanes in the Indo-Pacific is crucial for India's vision of a **free, open, and rules-based maritime order**. These sea routes are essential for global trade and maritime security, especially in a region where India aims to ensure stability and peace.

2. **Countering Chinese Influence**: ASEAN helps India balance China's growing influence, particularly in the South China Sea. India's defense cooperation with ASEAN members like Vietnam and the Philippines, joint naval exercises such as **India-Thailand CORPAT**, and defense sales (e.g., **BrahMos missiles to the Philippines** in 2024) are crucial for strengthening **regional security and maritime freedom**.

3. **ASEAN Regional Forum (ARF)**: India's engagement in the ARF provides a platform for security dialogue, addressing issues such as **piracy, terrorism, and illegal trafficking**. The ARF strengthens India's security framework and enhances its role as a regional security provider in the Indo-Pacific.

Economic Significance for Growth:

1. **Trade and Investment**: ASEAN is India's **fourth-largest trading partner**, and the **India-ASEAN Free Trade Agreement (AIFTA)** has boosted bilateral trade, reaching $98.39 billion in 2021-22. Additionally, ASEAN is a significant source of **Foreign Direct Investment (FDI)**, with Singapore accounting for a major share of $117.88 billion from 2000-2021. This trade relationship supports India's economic integration with Southeast Asia.

2. **Connectivity Projects**: Projects like the **India-Myanmar-Thailand Trilateral Highway** and the **Kaladan Multimodal Project** are vital for linking India's northeastern region with ASEAN markets. This not only enhances **physical connectivity** but also facilitates trade and development in India's northeastern states.

3. **Business and Socio-Cultural Ties**: Platforms like the **ASEAN-India Business Council (AIBC)** foster business cooperation, while cultural and educational exchanges through initiatives such as **student exchange programs** and **people-to-people interaction** strengthen socio-cultural bonds, promoting growth and mutual understanding.

Challenges:

- **Trade Deficit**: India's trade deficit with ASEAN, which rose to $21.8 billion by FY19, highlights an imbalance. Despite trade agreements, India has faced challenges with **market access** and **high import tariffs** in ASEAN countries.
- **Balancing China**: China remains a dominant trading partner and military power in the region, making it difficult for ASEAN to fully engage with India without impacting its relations with China.
- **Connectivity Delays**: Long delays in completing crucial infrastructure projects, like the Trilateral Highway, hinder India's deeper integration with ASEAN.

Way Forward:

- **Enhance Economic Integration**: India should address the **trade deficit** by securing better market access, particularly in sectors like IT and pharmaceuticals. Strengthening the **India-ASEAN FTA** can ensure more balanced economic benefits.
- **Fast-Track Connectivity**: Speed up the completion of key projects like the **Trilateral Highway** and extend them to other ASEAN nations such as Vietnam and Laos, ensuring seamless connectivity.
- **Strengthen Maritime Cooperation**: Deepen defense and **maritime security cooperation** with ASEAN, focusing on joint exercises and combating maritime challenges like piracy.

ASEAN will be central to India's vision for a stable and secure Indo-Pacific. Strengthening economic ties, connectivity, and maritime cooperation will be key for India to enhance its influence and contribute to a peaceful, rules-based region while addressing shared challenges.

14. INDIA-UAE RELATIONS

iMPACT ANALYSIS

SYLLABUS:

GS 2> International relations > India and Global Powers > India & West Asia

REFERENCE NEWS:

- Recently, India and the United Arab Emirates (UAE) signed a significant Memorandum of Understanding (MoU) **for civil nuclear cooperation**. The signing event was held at Hyderabad House in New Delhi, graced by the presence of Sheikh Khalid bin Mohamed bin Zayed Al Nahyan, the Crown Prince of Abu Dhabi, and hosted by Indian Prime Minister Narendra Modi.

MORE ON NEWS:

- The foundation for this cooperation was laid during Prime **Minister Narendra Modi's visit to the UAE in August 2015**, where both nations agreed to collaborate on the peaceful use of nuclear energy, covering safety, health, agriculture, and science and technology sectors.
- The agreement involves the **Nuclear Power Corporation of India Limited (NPCIL) and the ENEC (Emirates Nuclear Energy Company)**, particularly focusing on the operations and maintenance of the ENEC-led Barakah Nuclear Power Plant. This agreement marks a first of its kind in terms of nuclear cooperation between the two countries.
- **Additional Agreements and Cooperation:**
    - **LNG Supply:** Alongside the nuclear MoU, a long-term LNG supply agreement was signed between ADNOC and Indian Oil Corporation Limited.
    - **Strategic Petroleum Reserves:** ADNOC and India Strategic Petroleum Reserve Limited (ISPRL) signed a pact to strengthen India's energy reserves.
    - **Agricultural and Food Parks Development:** An MoU between the Government of Gujarat and Abu Dhabi Developmental Holding Company PJSC (ADQ) aims to develop food parks in Gujarat, aligning with the I2U2 collaboration that includes Israel and the USA.

WHY IS THE UAE IMPORTANT TO INDIA?

- **Remittances:**
    - The **country hosts at least 3.5 million Indians** who work in diverse sectors of the economy of the Emirates and provides it with vital manpower support at all levels.

- The **remittances from the UAE in the first half of 2020 accounted for USD 21 billion.**

- **Strategic considerations:**
  - The UAE, due to its strategic location, has emerged as an important economic center in the world and is also a **major re-export hub for India**.
  - Further good relations with the **UAE are imperative to counter China's influence in the Middle-east region.**
  - For instance, the UAE plays a crucial role in the **India-Middle East-Europe Economic Corridor (IMEC)**, which aims to enhance connectivity and serve as a viable alternative to China's Belt and Road Initiative.
- **Security of the region:**
  - The **Middle-east region is still witnessing a lot of conflicts** in Syria, Iraq etc.
  - Good relations with UAE are imperative to give India a core place in discussion surrounding the Middle-east region.
  - Further UAE can support India in s**trengthening the security of the Indian Ocean region** especially along the western coast of Somalia that is prone to piracy.
  - India-UAE have been collaborating closely to **counter terrorism as well**.
- **Gateway to Africa:**
  - Engagement with the UAE will pave the way for India to **leverage UAE's easy access to the African market** and its various trade partners.
  - This can help India to become a part of the supply chain **especially in handlooms, handicrafts, textiles and pharmaceuticals.**
- **Entry into regional groupings:**
  - UAE commands a significant respect in **regional groupings like OIC** (Organization of Islamic Cooperation) and **GCC.**
- **India's Soft Power:**
  - Good relations with UAE are a sine qua non for **enhancing India's Soft power in the Middle-east region.**
  - A recent progression of it was witnessed in **2021 when both Abu Dhabi and Dubai celebrated Diwali.**

- **Post-pandemic recovery:**
    - It is understood that UAE as part of its post pandemic recovery plans is **planning to revitalise its trade links** with the region from the Mediterranean coast to Turkey on one hand and India and South Asia on the other.
- **Diversification plan of the Emirates:**
    - In recent years, the UAE, through its 'Vision 2021', has sought to diversify its economy and **reduce its dependency on oil.**
    - This provides an opportunity for India to engage with it in **new areas of renewable energy, start-ups, fintech, etc.**

AREAS OF COOPERATION:

- **Economic:**
    - **Bilateral trade:**
        - India-UAE trade, valued at USD 180 million per annum in the 1970s, reached **USD 85 billion in 2022-23** making UAE, **India's third largest trading partner** for the year 2022-23 after China and US.
        - Moreover, **UAE is the second largest export destination** of India (after the US) with an amount of nearly USD 31.61 billion for the year 2022-23.Conversely, India stands as the **UAE's second-largest trading partner** overall and the largest in terms of exports.
        - In February 2022, India became the first country with which the UAE signed a **Comprehensive Economic Partnership Agreement or CEPA.**
        - India and the UAE signed the **Comprehensive Economic Partnership Agreement (CEPA)** aimed at increasing **non-oil trade to USD 100 billion** within five years from USD 45 billion in 2021. The agreement is expected to generate **1 million jobs** in sectors like textiles, gems & jewellery, and automobiles. Since its inception on May 1, 2022, bilateral trade has already seen a 15% increase.

Investment:

The UAE's investment in India totals approximately **USD 20-21 billion**, with USD 15.5 billion as FDI and the rest as portfolio investment from April 2000 to March 2023. In the fiscal year 2022-2023, **the UAE was the fourth-largest FDI investor in India.**Additionally, the UAE has committed to invest **USD 75 billion in India's infrastructure sector** over time.

Energy Cooperation:

UAE has in the last four years emerged as the **3rd major exporter of Crude oil to India.**

The UAE is **the first international partner** to invest by way of crude oil in **India's Strategic Petroleum Reserves Program.**

The countries are also **collaborating in the renewable energy sector** as seen by mutual participation in the **International Solar alliance.**

Western QUAD:

India, Israel, the United Arab Emirates, and the United States have established a new quadrilateral economic forum, informally referred to as the **Western Quad or Middle East Quad.** This forum, also known as **I2U2**, was formed to enhance economic cooperation among the four countries, focusing on areas like water, energy, transportation, space, health, and food security.

The formation of this group reflects a **strategic alignment** among the nations to tackle global challenges through joint investments and initiatives.

Bilateral Agreements:

India and the UAE have signed a number of Agreements and MoUs from time-to-time in different sectors providing an institutional framework for cooperation in those sectors.

For instance, in 2023, India and the United Arab Emirates signed pacts on the **use of local currencies for cross-border transactions** and the setting up of a campus of the prestigious **Indian Institute of Technology in Abu Dhabi**

Institutional Structure for Dialogue:

Annual Foreign Office Consultations are held at the Secretary level.

India-UAE Joint Commission Meeting (JCM) for Economic and Technical Cooperation deals with issues related to trade and commerce.

Pandemic Management:

Both sides had agreed on **an Air Bubble Arrangement in 2020 during the pandemic** which has enabled the movement of people between two countries despite the challenges posed by COVID-19.

The UAE was among the **first countries to receive India's indigenous Covaxin in February 2021.**

Defence Cooperation:

With the signing of MoU on **Defence Cooperation in 2003 and setting up of Joint Defence Cooperation Committee (JDCC)** regular exchange of dialogue is taking place between the two countries.

With the UAE, India has **In-UAE BILAT (bilateral naval exercise**) as well **Desert Eagle-II (bilateral air force exercise).**

Navies of India and the United Arab Emirates have conducted bilateral exercise **'Zayed Talwar' off the coast of Abu Dhabi in August 2021,** aimed at enhancing the maritime cooperation between two naval forces.

Indian Diaspora:

The Indian expatriate community of approximately **3.5 million is the largest ethnic community in UAE** constituting roughly about **35 percent of the country's population.**

The nation has been a **consistent provider of jobs to Indian people**.

Sports:

The collaboration among the two countries in the domain of sports is also rising. This is testified by the **occurrence of IPL 2020 and the last T20 world cup in UAE.**

Cultural Cooperation:

In a significant display of religious tolerance, the UAE authorized the construction of the **BAPS Hindu Mandir in Abu Dhabi, the region's first traditional Hindu temple.** Inaugurated on February 14, 2024, the temple serves as a cultural and spiritual oasis, enhancing India-UAE bilateral ties and underscoring their commitment to a diverse and inclusive society.

AREAS OF CONCERN:

- **Non-Tariff Barriers (NTBs) to trade:**
  - Non-Tariff Measures (NTMs) have mostly been covered by **Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT).**
  - The **UAE has 451 SPS notifications and 534 TBT notifications**. The SPS notifications are mainly related to live poultry, meat, and processed food.
  - In addition, the TBT notifications are mainly related to fish, food additives, meat, rubber, electrical machinery, etc. These measures **hamper India's exports to UAE.**
- **Arab- Iran Conflict:**
  - The differences between Iran and the Arab world hinder India's engagement in the Middle-east region.

- **Balancing the relationship s**ometimes results in **reluctance of some strategic agreements.**

- **Kafala System:**
  - The **inhuman conditions** imposed by the **Kafala system on immigrants** sometimes create differences between the two countries.

- **Pandemic shock**
  - Remittances from UAE marginally affected in 2020 when large number of Indian workers returned home because of pandemic related economic distress.

- **Religious polarization in India's domestic politics:**
  - Experts criticized that the **recent comments on Prophet Muhammad** reflect the religious polarization that exist in India's domestic politics and such incidents may **adversely impact the cordial relation with Gulf countries** including UAE.

WAY FORWARD:

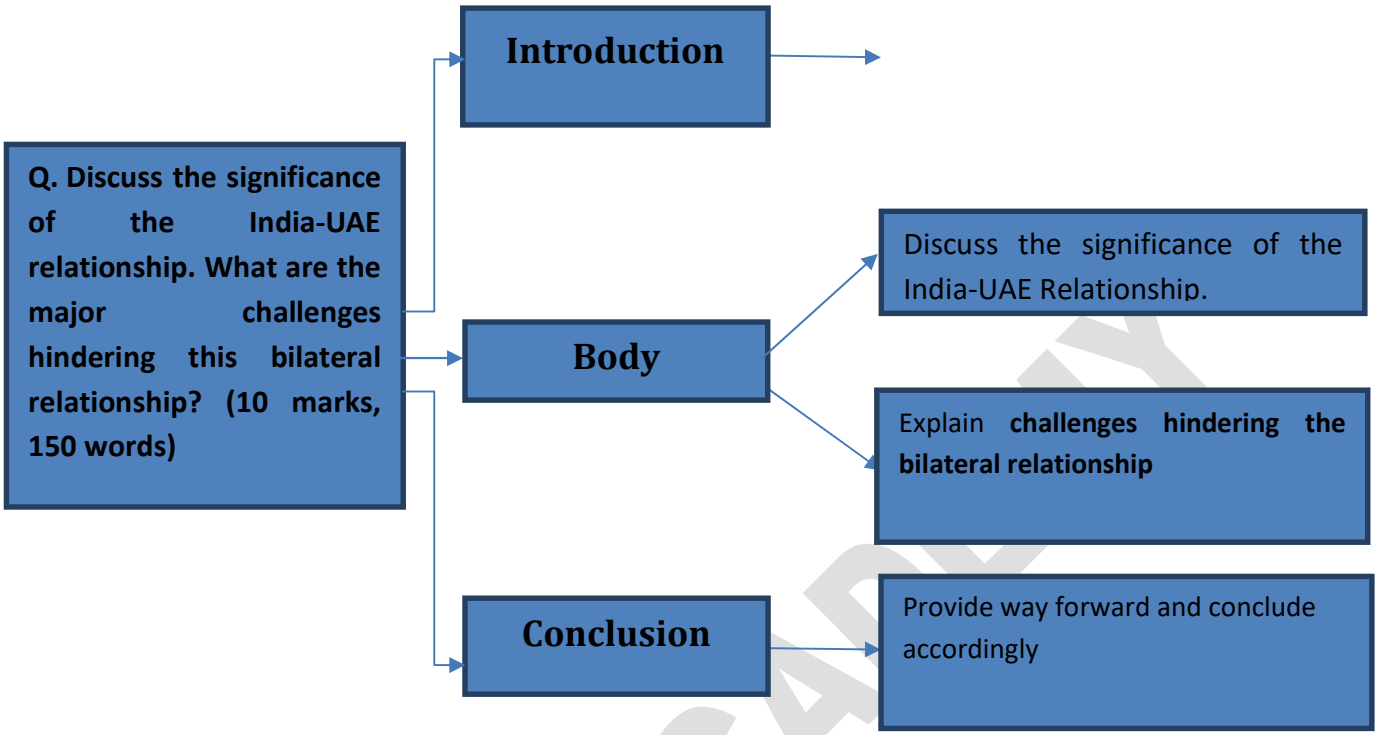
- **Establish more strategic dialogues:** Both countries should establish more strategic dialogues between **them like the 2+2 dialogue.**
- **Reducing non-tariff barriers:** India-UAE must try to bring **more transparency and predictability in the use of NTBs** so that their compliance becomes less cumbersome.
- **Focus on migrant population:** India should actively engage with the UAE to **reform the Kafala system**. A reference of Qatar can be given who has promised to remove the inhuman conditions of the system.India must also make joint efforts with UAE to extend **social security benefits to Indian migrant population.**
- **Strengthen defence cooperation:** Potential areas of bilateral cooperation in the defence field include Production and development of defence equipment, Joint exercises of armed forces, particularly naval exercises etc.

PRACTICE QUESTION

Q. Discuss the significance of the India-UAE relationship. What are the major challenges hindering this bilateral relationship? (10 marks, 150 words)

APPROACH

Start by mentioning the recent Memorandum of Understanding (MoU) for civil nuclear cooperation.



MODEL ANSWER

The strategic partnership between India and the United Arab Emirates (UAE) has grown significantly, marked notably by the **recent Memorandum of Understanding (MoU) for civil nuclear cooperation.** This agreement highlights the multifaceted relationship spanning economic, strategic, and cultural domains.

Significance of the India-UAE Relationship:

1. **Economic Growth**: Bilateral trade between India and the UAE reached USD 85 billion in 2022-23, making the UAE India's third-largest trading partner. The Comprehensive Economic Partnership Agreement (CEPA) aims to elevate non-oil trade, fostering economic growth and job creation.
2. **Strategic Location and Influence**: The UAE serves as a crucial link for India to access Middle Eastern and African markets, enhancing India's strategic position globally. Moreover, good relations with the UAE help counter China's influence in the region, providing a strategic balance in Middle-Eastern affairs.
3. **Energy Security**: As a major supplier of crude oil and the first international partner in India's Strategic Petroleum Reserves, the UAE plays a pivotal role in ensuring India's energy security.

4. **Cultural and People-to-People Ties**: With over 3.5 million Indians making up about 35 percent of the UAE's population, there exists a strong diaspora network that enhances cultural and economic exchanges between the two nations.

5. **Defence and Security Cooperation**: The bilateral defence ties, including joint military exercises like 'Zayed Talwar', bolster mutual security interests and contribute to regional stability.

6. **Western Quad**: The formation of the Western Quad (India, Israel, UAE, and the USA), focusing on cooperation in sectors like water, energy, and health, signifies a strategic alignment to address global challenges collaboratively.

Challenges Hindering the Bilateral Relationship:

1. **Non-Tariff Barriers**: SPS and TBT notifications pose significant trade barriers, affecting a range of Indian exports and complicating the trade relationship.

2. **Labor Rights Concerns**: The Kafala system, governing labor laws in the UAE, has been a point of contention, impacting the rights and welfare of the large Indian workforce in the region.

3. **Regional Geopolitical Tensions**: Navigating the complex political landscape of the Middle East, especially with ongoing tensions involving Iran and other Gulf states, presents a strategic challenge for India.

4. **Economic Diversification**: As the UAE diversifies its economy beyond oil, adapting the bilateral trade strategy to include new sectors such as technology and renewable energy becomes essential.

5. **Social and Religious Dynamics**: Domestic issues in India, such as religious sensitivities, have the potential to affect its international relations, including with Muslim-majority nations like the UAE.

Way Forward:

- **Enhanced Strategic Dialogues**: Regular high-level dialogues, including a structured 2+2 dialogue mechanism, should be prioritized to address both economic and security concerns.

- **Reduction of Trade Barriers**: Collaborative efforts are needed to minimize non-tariff barriers, streamline trade regulations, and facilitate easier market access.

- **Reform in Labor Laws**: Collaborative initiatives to reform the Kafala system could enhance the welfare of Indian expatriates and improve bilateral labor relations.
- **Joint Ventures in Emerging Sectors**: Encouraging joint ventures in emerging technologies and renewable energy can diversify economic interactions and harness mutual strengths.
- **Cultural and Educational Exchange Programs**: Expanding exchange programs would deepen cultural understanding and reinforce people-to-people ties, strengthening the foundational aspects of the bilateral relationship.

The India-UAE relationship, underpinned by robust economic ties, strategic cooperation, and deep cultural links, stands as a beacon of stability and prosperity in the region. By addressing existing challenges and leveraging collaborative strategies, both nations can unlock new dimensions of partnership for future cooperation.

15. EXPANSION OF AYUSHMAN BHARAT PM-JAY FOR SENIOR CITIZENS

iMPACT ANALYSIS

SYLLABUS:

GS 2> Social justice > Health

REFERENCE NEWS:

- Recently, the Indian government has expanded the Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (AB PM-JAY) to provide universal health coverage to all citizens aged 70 and above, irrespective of income.The scheme, already the world's largest public health insurance program, will soon allow registrations for this age group.

KEY FEATURES OF THE EXPANDED AYUSHMAN BHARAT PM-JAY:

- **Current Scheme Coverage**: AB PM-JAY already offers an annual health cover of up to Rs 5 lakh for the economically weakest 40% of the population, covering all age groups. The expansion extends this coverage to all Indians aged 70 and above.
- **Registration Process**: Seniors can register via the Ayushman Bharat portal or government health facilities using Aadhaar, with support for face-authentication for those with unreadable fingerprints.
- **Health Coverage Benefits**: Individuals over 70 will receive Rs 5 lakh coverage annually. This cover is shared within households with multiple eligible seniors, with immediate access post-eKYC and no exclusions for pre-existing conditions.
- **Cost Implications**: The government's initial investment is Rs 3,437 crore for the next 18 months, with states contributing 40%. The scheme aims to cover nearly 6 crore people.
- **Top-Up Cover**: Elderly already under the scheme from economically weaker sections receive an additional Rs 5 lakh cover, requiring re-registration.
- **Integration with Other Health Schemes**: Beneficiaries of schemes like CGHS (Ex-Servicemen Contributory Health Scheme) or ESIC can choose between their existing coverage and AB PM-JAY, with ESIC beneficiaries eligible for both.
- **Private Insurance**: Individuals with private insurance can also avail AB PM-JAY benefits, supplementing their existing cover.

SIGNIFICANCE OF EXPANSION OF THE AB PM-JAY TO ELDERLY:

- **Addressing the Demographic Shift:**
    - India is experiencing a significant demographic transformation, with its elderly population projected to rise dramatically.
    - At the time of the **2011 Census, only 8.6% of India's population** was over the age of 60 years. This figure is expected to rise to **19.5% by 2050**, according to the **Longitudinal Ageing Study in India (LASI).**
    - In numerical terms, the population of Indians over the age of 60 is projected to reach **319 million by2050**, an increase of more than threefold from 103 million in 2011.The AB PM-JAY expansion is a proactive measure to manage the healthcare needs of this growing segment of society effectively.
- **Healthcare Needs of the Elderly:**
    - Elderly individuals are more likely to require hospitalization and longer medical stays.
    - For instance, according to officials, prior to the expansion, the rate of hospital admission for seniors already covered under AB PM-JAY was over **7%, which is double the 3-4%** admission rate of younger beneficiaries covered by the scheme,,
    - Also, an analysis by *The Indian Express* highlighted that almost **12% of all admissions and 14% of the funds reimbursed** under the scheme were for individuals aged 70 and older. These statistics underscore the higher healthcare demands of this age group, which the scheme expansion aims to accommodate.
- **Closing Coverage Gaps:**
    - Despite the evident need, a large proportion of the elderly remain without adequate health insurance.
    - For instance, the **India Ageing Report 2023** reveals that **just over 20% of Indians over the age of 60** are covered by any form of health insurance, whether it be government, employer-provided, or personal. The expansion of AB PM-JAY significantly **widens the safety net**, ensuring that more elderly citizens have access to necessary healthcare services **without the burden of out-of-pocket expenses.**
- **Addressing Gender-Specific Challenges:**
    - The expansion of AB PM-JAY takes on additional significance when considering the gender-specific challenges within the elderly demographic in India.
    - According to a **survey by NITI Aayog**, **women constitute 58% of the elderly population, with 54% of these women being widows**. This demographic trend highlights a substantial challenge, as many of these elderly women may lack sufficient healthcare

support, either due to social isolation or economic vulnerability.The expanded coverage under the scheme is particularly crucial for addressing these challenges.

- **Enhanced Quality of Life and the Right to Health:**
    - The expansion of AB PM-JAY enhances elderly citizens' quality of life by **ensuring the right to health**, recognized under the Directive Principles of State Policy in India's Constitution (**Article 47)**.
    - Although not explicitly stated, the Indian Supreme Court has interpreted the **right to health as part of the right to life under Article 21**, as seen in cases like Bandhua Mukti Morcha v. Union of India. This expansion aligns with these legal interpretations, ensuring that the government fulfills its obligation to provide health services to the elderly.
- **Stimulating Healthcare Investment:**
    - The increased demand for healthcare services due to the expanded coverage could stimulate investment in healthcare infrastructure, particularly in underserved areas. This would not only improve access but also create jobs and promote economic growth in the healthcare sector.
- **Preventive Care Enhancement**:
    - By providing comprehensive health coverage, the scheme encourages the elderly to seek preventive care, facilitating early detection and management of diseases. This approach **reduces chronic disease severity**, aligning with the **UN Decade of Healthy Aging (2021-2030)** goals to enhance elderly life quality globally.

CHALLENGES AND CONCERNS:

- **Outpatient Care Exclusion**:
    - The exclusion of outpatient care, diagnostics, and medicines from the coverage is significant. Chronic diseases, which are prevalent among the elderly and require **continuous management including regular check-ups and medications**, are not covered under the scheme. This gap can lead to substantial out-of-pocket expenses for **routine care which constitutes 40%-80% of healthcare expenses** among the elderly.
- **Inadequate Primary Care Infrastructure**:
    - Since its launch in 2018, the penetration of PM-JAY in **smaller towns and states outside the southern region** has been minimal. The primary and secondary healthcare systems in these areas remain underfunded and poorly equipped, failing to meet the growing healthcare needs of an aging population. This inadequacy **burdens the tertiary care facilities** with cases that could have been managed at lower levels of care.

- **Global Healthcare Comparisons:**
    - India's healthcare strategy is contrasted with those of other nations to evaluate approaches to universal coverage.
    - For example, **Thailand** has successfully broadened access by strengthening **primary healthcare** and redirecting resources to **rural areas**, while the **U.S.** has predominantly relied on **insurance-based models** that have significantly **driven up healthcare costs**. Concerns are growing that India might adopt a similar model, **emphasizing insurance over strengthening public healthcare infrastructure**, potentially leading to higher costs without improving care quality.
- **Challenges with Private Sector Engagement in AB PM-JAY**:
    - Despite the significant funds allocated to private hospitals under the AB PM-JAY—**two-thirds of the total annually, and 53% in the southern states**—there's a notable decline in enthusiasm from the private sector.
    - This is largely due to **low treatment compensation rates and delayed payments.**
    - Additionally, the **reliance on private hospitals** has led to **weakened primary and secondary healthcare systems**, potentially causing an overload at tertiary care facilities. This situation could give private entities an advantageous position to capitalize on the increased demand for tertiary healthcare, which could challenge the overall goals of the scheme
- **Geriatric Care Specialization:**
    - Geriatric care remains **underdeveloped in many regions** of India, with a significant number of healthcare providers **lacking specialized training** to address the unique medical needs of older adults. This gap in expertise can hinder the effective provision of healthcare to this population
- **Financial Sustainability and System Strain:**
    - The addition of approximately 60 million senior citizens to AB PM-JAY poses significant financial and operational challenges for healthcare providers, particularly smaller facilities that may struggle with the increased demand for intensive and long-term care. The financial outlay required for this expansion is substantial, with the central government initiallyallocating ₹3,437 crore to cover upcoming costs.
- **Healthcare Infrastructure:**
    - There is a concern about the readiness of healthcare infrastructure to handle the increased load from the expanded coverage. This includes having enough **healthcare**

providers, facilities, and resources to accommodate the **surge in demand**, especially in **rural or underserved areas.**

- **Misinformation and Overburdened Staff:**
    - There are reports of **misinformation by doctors about benefit delays** under AB PM-JAY, and **government staff** overwhelmed by the additional administrative duties, which could hinder the effective implementation of the scheme.
- **Limited Role of Arogyamitras:**
    - While intended to help navigate the claims process, Arogyamitras have a **restricted role, primarily in registration**, without a significant impact on patient and family counseling, which is crucial for informed healthcare decisions.
- **Implementation Variability**:
    - The effectiveness of PM-JAY varies significantly across different states due to diverse implementation models. For instance, states like Uttar Pradesh, Chhattisgarh, and Tamil Nadu each use **different models to administer the scheme**, which can lead to inconsistencies in how services are delivered and accessed by beneficiaries.

WAY FORWARD:

- **Strengthen Primary Healthcare**: Following the NITI Aayog's recommendations, there should be a significant investment in bolstering primary healthcare facilities. This would help manage chronic diseases more effectively at the community level, reduce the burden on tertiary care institutions, and integrate preventive care into the health system.
- **Expand Coverage**: Include outpatient services, diagnostics, and medicines in the coverage. Expanding the scope of AB PM-JAY to cover these essential services would significantly reduce out-of-pocket expenditures for the elderly and ensure comprehensive healthcare coverage.
- **Enhance Geriatric Training**: Developing specialized training programs in geriatric care for medical personnel at all levels can address the current gaps in service provision for the elderly. Such training should focus on the unique needs and treatments suitable for older populations.
- **Improve Health Infrastructure**: Increase funding to upgrade health infrastructure, especially in underserved and rural areas, to ensure that there is adequate capacity to meet the increased demand from the expanded coverage. This could include building new facilities and upgrading existing ones with modern medical equipment.
- **Streamline Payment Processes**: Address delays in payments to healthcare providers by streamlining processes and ensuring timely reimbursements. This will encourage more hospitals, especially private ones, to participate actively in the scheme.

- **Role Enhancement for Arogyamitras**: Expand the role of Arogyamitras beyond just registration to include patient advocacy and navigation services throughout the treatment process. This can help bridge the information gap for patients and their families and improve their healthcare experience.
- **Public-Private Partnership Models**: Develop robust models for public-private partnerships that ensure private sector engagement is effectively leveraged to enhance service delivery without compromising the quality of care.
- **Regular Monitoring and Evaluation**: Implement a robust monitoring and evaluation framework to assess the impact of the scheme continuously. Feedback from this can be used to make real-time adjustments to policies and implementation strategies.
- **Policy Advocacy and Community Engagement**: Increase advocacy efforts to raise awareness about the scheme among the elderly population and their families. Community engagement initiatives could be crucial in understanding local needs and adapting the scheme accordingly.
- **Technology Integration**: Enhance the use of technology in the management of the scheme, from registration and record-keeping to telemedicine services, which can play a critical role in reaching remote areas.

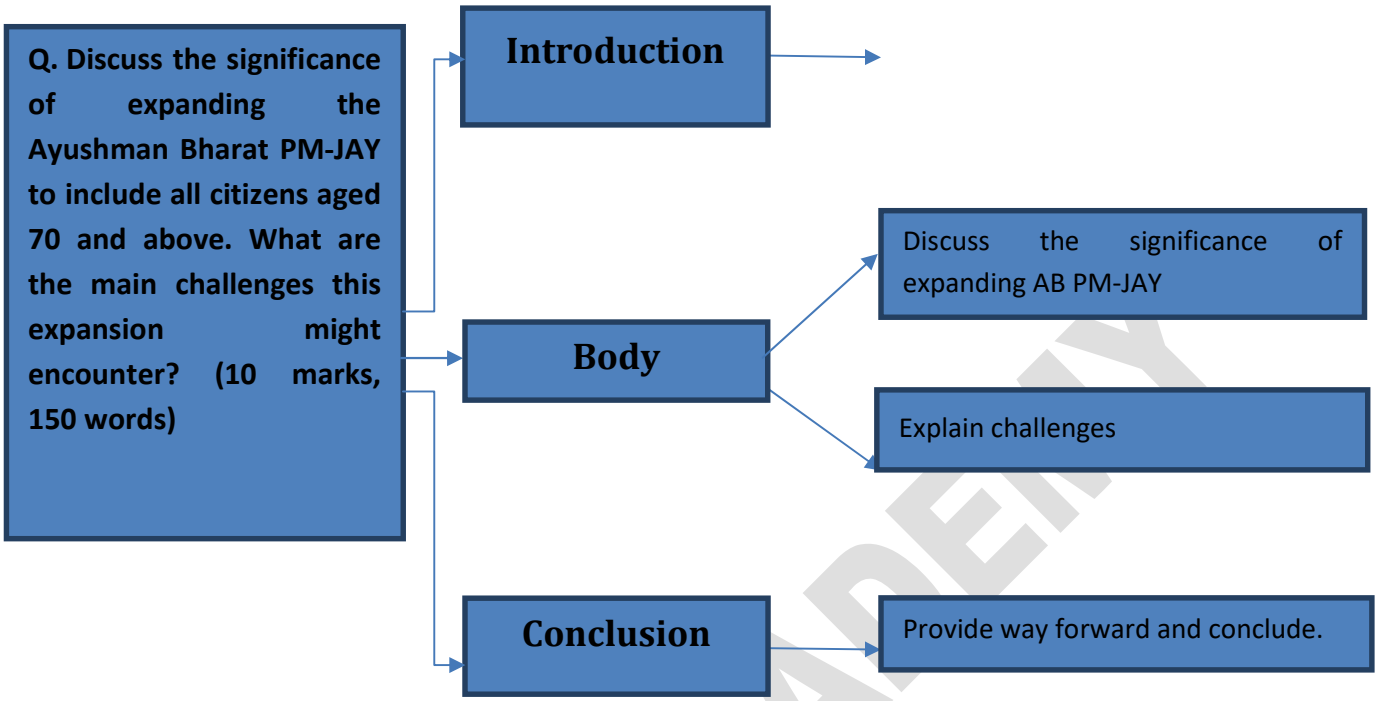
CONCLUSION: The expansion of Ayushman Bharat PM-JAY to cover all seniors over 70 represents a major advancement in equitable healthcare in India. This comprehensive approach not only improves health outcomes for a significant portion of society but also supports broader goals of social equity and economic stability. Addressing service coverage gaps and strengthening primary care are essential to maximize its impact, ensuring the initiative effectively meets the healthcare needs of India's elderly.

PRACTICE QUESTION

Q. Discuss the significance of expanding the Ayushman Bharat PM-JAY to include all citizens aged 70 and above. What are the main challenges this expansion might encounter? (10 marks, 150 words)

APPROACH

Start by mentioning that the expansion marks a transformative step in India's journey toward universal healthcare.



MODEL ANSWER

The expansion of the Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (AB PM-JAY) to include all citizens aged 70 and above marks a transformative step in India's journey toward universal healthcare. With a rapidly aging population and increasing healthcare needs among the elderly, this initiative provides comprehensive coverage to a vulnerable demographic, addressing a critical gap in India's health insurance framework.

Significance of Expanding AB PM-JAY:

1. **Demographic Shift and Growing Elderly Population:** India's elderly population is projected to rise from 8.6% in 2011 to 19.5% by 2050, reaching 319 million (source: **Longitudinal Ageing Study in India (LASI))**. The expansion of AB PM-JAY ensures healthcare coverage for this growing segment, addressing the healthcare demands of an aging population.
2. **Increased Access to Healthcare:** Elderly individuals are more prone to health complications requiring hospitalization. Currently, 12% of all admissions under AB PM-JAY are for individuals aged 70 and above, highlighting the higher healthcare needs of this group. The expanded coverage will reduce out-of-pocket expenses for these individuals.
3. **Closing Insurance Coverage Gaps:** According to the **India Ageing Report 2023**, only 20% of Indians over 60 have any form of health insurance. The expansion of AB PM-JAY widens the safety net, ensuring healthcare coverage for a larger portion of the elderly, irrespective of their income level.

4. **Addressing Gender-Specific Healthcare Needs:** Women constitute 58% of India's elderly population, with 54% of these women being widows, many of whom face economic vulnerability. The expanded scheme will provide crucial healthcare support to this demographic, addressing the gender-specific challenges in accessing healthcare.

5. **Improving Preventive Care:** By offering comprehensive coverage, the expansion encourages elderly individuals to seek preventive care, facilitating early detection and management of chronic diseases. This aligns with global goals under the **UN Decade of Healthy Aging (2021-2030)** to improve the quality of life for older adults.

6. **Stimulating Healthcare Investment:** The increased demand for healthcare services due to expanded coverage is expected to stimulate investments in healthcare infrastructure, particularly in underserved areas. This could improve access to healthcare and create jobs, contributing to economic growth in the healthcare sector.

Challenges in Implementing the Expansion:

1. **Exclusion of Outpatient Care:** The expanded AB PM-JAY does not cover outpatient services, diagnostics, or medicines. These services, which account for 40%-80% of healthcare expenses among the elderly, are crucial for managing chronic conditions and preventing hospitalizations. The lack of coverage for these services may lead to continued out-of-pocket expenses for routine care.

2. **Inadequate Healthcare Infrastructure:** Despite its launch in 2018, the penetration of AB PM-JAY in smaller towns and states outside the southern region remains minimal. Many primary and secondary healthcare facilities are underfunded and ill-equipped to handle the increasing healthcare needs of the elderly, placing a burden on tertiary care institutions.

3. **Financial Sustainability:** The inclusion of nearly 6 crore elderly citizens into the scheme poses a significant financial burden. The government has allocated ₹3,437 crore for the next 18 months, with 40% contributed by the states. Ensuring the long-term financial sustainability of the program is a key challenge.

4. **Challenges with Private Sector Engagement:** Private hospitals, which receive two-thirds of the funds under AB PM-JAY, have shown decreasing interest due to low compensation rates and delayed payments. This could limit the scheme's effectiveness in engaging private healthcare providers, who play a crucial role in delivering services.

5. **Lack of Specialized Geriatric Care:** Geriatric care is underdeveloped in many regions of India, and healthcare providers often lack specialized training to address the unique medical needs of older adults. This gap in expertise could limit the effective provision of healthcare services to the elderly population.

6. **Administrative and Operational Challenges:** Reports of misinformation and overwhelmed government staff could hinder the scheme's successful implementation. Additionally,

Arogyamitras, who play a key role in guiding patients, currently have limited functions, which may impact patient access and understanding of the scheme.

Way Forward:

- **Include Outpatient Care:** Expanding coverage to outpatient services and medicines will reduce out-of-pocket expenses for the elderly.
- **Strengthen Healthcare Infrastructure:** Invest in primary and secondary healthcare facilities, especially in underserved regions, to meet growing demand.
- **Geriatric Care Training:** Train healthcare workers in geriatric care to address the specific needs of the elderly.
- **Improve Private Sector Engagement:** Ensure timely payments and better compensation to keep private hospitals involved.
- **Enhance Arogyamitras' Role:** Expand their role to include patient advocacy, improving access and understanding of the scheme.
- **Ensure Financial Sustainability:** Revise funding models and increase state contributions to secure long-term sustainability.

The expansion of Ayushman Bharat PM-JAY for citizens aged 70 and above is a vital step toward **universal healthcare, promoting social equity and economic stability**. However, addressing outpatient care, infrastructure, and financial sustainability is key to its success.

16. INDUS WATER TREATY

iMPACT ANALYSIS

SYLLABUS:

GS 2 > International Relations > India and Neighbours > Bilateral agreements

REFERENCE NEWS:

- Recently, India issued a notice to Pakistan under **Article XII(3) of the Indus Water Treaty (IWT)**, seeking modifications due to "fundamental and unforeseen" changes in circumstances.
- This is not the first instance of such action. In January 2023, India had sought a review of the IWT, citing Pakistan's persistent refusal to implement the Treaty, especially regarding hydel projects on Indian territory.

Article XII(3) says: The provisions of this Treaty may from time to time be modified by a duly ratified treaty concluded for that purpose between the two Governments.

MORE ON NEWS:

- The long-standing dispute between the two countries revolves around India's construction of two hydroelectric power projects:
  - **Kishanganga Project** (on a tributary of Jhelum River)
  - **Ratle Hydroelectric Project** (on Chenab River)

INDUS RIVER SYSTEM:

- The Indus, also known as the Sindhu, is the **westernmost of the Himalayan rivers** in India.
- It **originates from a glacier near Bokhar Chu** in the Tibetan region in the Kailash Mountain range. In Tibet, it is known as 'SingiKhamban' or Lion's mouth.
- **Tributaries**:

  Left bank **:** Shyok, Zanskar, Jhelum, Chenab, Ravi, Beas and Sutlej

  Right bank **:** Khurram, Tochi, Gomal, Viboa, Sangar, Kabul, Suru

- The **Panjnad** is the name given to the five rivers of Punjab, namely the Satluj, the Beas, the Ravi, the Chenab and the Jhelum.

INDUS WATER TREATY:

- The Indus Waters Treaty (IWT) between India and Pakistan, **brokered by the World Bank,** dictates the terms of using the water available in the Indus River and its tributaries.

HISTORY:

- Partitioning the Indus rivers system was inevitable after the Partition of India in 1947.
- During the first years of partition, the waters were apportioned by the Inter-Dominion Accord of May 4, 1948. This accord required India to release sufficient waters to the Pakistan in return for annual payments from Pakistan.
- In 1951, **David Lilienthal**, former chairman of the Tennessee Valley Authority and of the U.S. Atomic Energy Commission, visited the region and suggested that the World Bank might use its good offices to bring the parties to agreement. This suggestion was accepted by all parties.
- After **9 years of negotiation mediated by the World Bank**, the final treaty was signed in Karachi on 19 September 1960 **by Pandit Jawaharlal Nehru and Ayub Khan.**
- **Pakistan's Objections:** Pakistan has raised objections to the **Kishanganga** and **Ratle Hydroelectric Projects**, and **dispute resolution mechanisms** under the Treaty have been invoked multiple times. However, a full resolution has not been reached.

- **Neutral Expert and Court of Arbitration (2015-2016):**

In **2015**, Pakistan requested that a **Neutral Expert** be appointed to examine its technical objections to the **Kishanganga** and **Ratle Hydroelectric Projects (HEPs)**.

In **2016**, Pakistan retracted this request and instead proposed the establishment of a **Court of Arbitration** to adjudicate its objections.

- **India's Response:**

In **August 2016**, Pakistan approached the **World Bank**, which had brokered the Treaty, seeking the constitution of a **Court of Arbitration** under the relevant dispute redressal provisions.

India countered by moving a separate application, requesting the appointment of a **Neutral Expert**, a lower level of dispute resolution under the Treaty. India argued that **Pakistan's request for a Court of Arbitration violated the graded mechanism** of dispute resolution outlined in the Treaty.

- **In January 2023,** India sought a review of the IWT, citing Pakistan's persistent refusal to implement the treaty, especially regarding the Kishanganga and Ratle Hydroelectric Projects.
- **Recently**, India issued a notice to Pakistan under Article XII(3) of the **Indus Water Treaty (IWT)**, seeking modifications due to "fundamental and unforeseen" changes in circumstances.

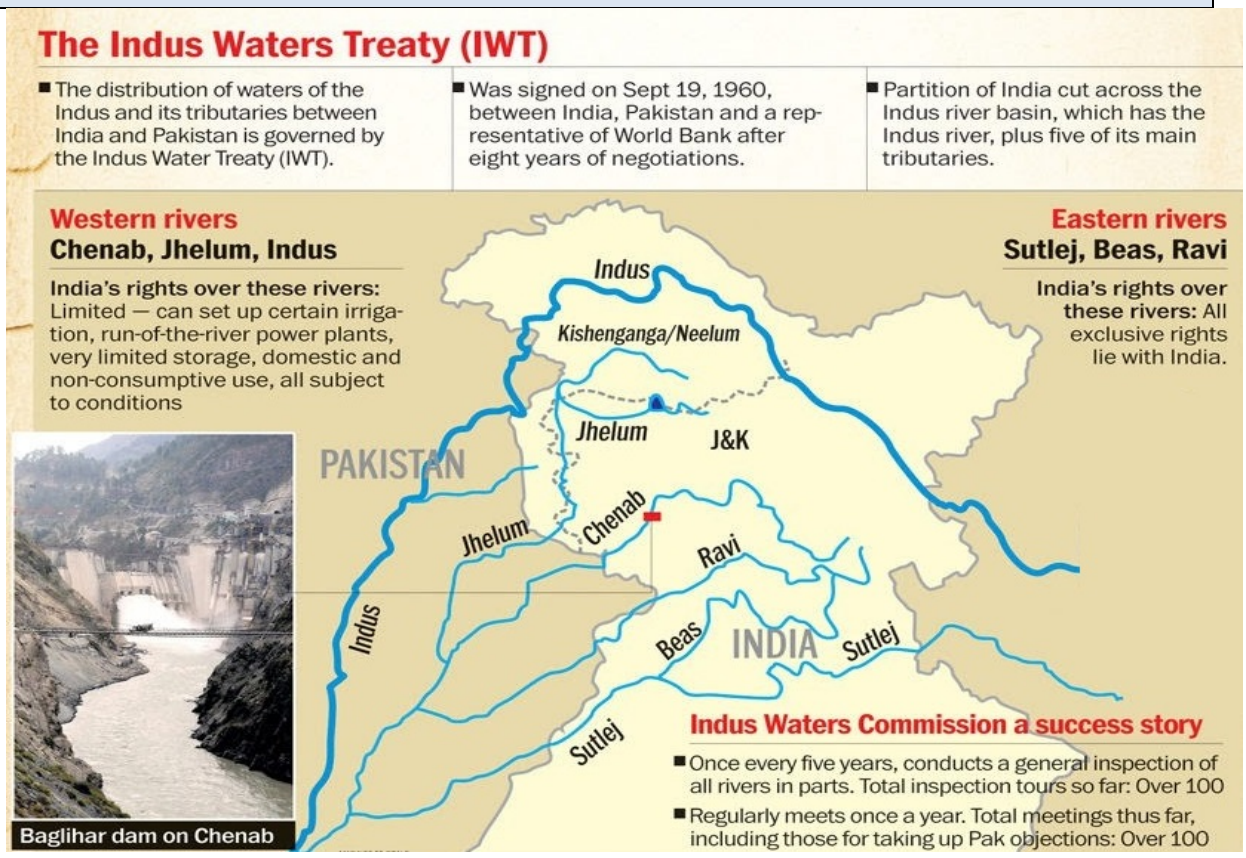
AGREEMENT:

- The Treaty gives control over the waters of the three "eastern rivers" — the Beas, Ravi and Sutlej to India and the three "western rivers" — the Indus, Chenab and Jhelum to Pakistan.
    - Thereby, **India conceded 80.52 per cent of the aggregate water flows** in the Indus system to Pakistan.
        - But India can **use 20% of the water in western rivers in "non-consumptive" needs**, such as for irrigation and electricity production.
- The **Permanent Indus Commission** is a bilateral commission of officials from India and Pakistan, created to implement and manage goals of the Indus Waters Treaty.

- An **Indus Basin Development Fund Agreement**, a treaty between Australia, Canada, West Germany, New Zealand, the United Kingdom, the United States with the World Bank and Pakistan was also signed, which agreed to provide Pakistan a combination of funds and loans for the construction of canals and storage facilities.
- India also gave Rs 83 crore in pounds sterling to Pakistan to help build replacement canals from the western rivers.

For unresolved disputes, the treaty provides a three-tiered mechanism

1. **Permanent Indus Commission –** A platform for direct negotiation
2. **Neutral Expert –** Appointed by the World Bank to address technical disagreements.
3. **Court of Arbitration –** A higher level of resolution for issues that cannot be solved through earlier steps.



SIGNIFICANCE OF THE TREATY FOR INDIA:

- **Peaceful coexistence:**

The treaty has managed to **survive even after three wars** (1965, 1971 and 1999), a number of military stand-offs (1987, 2001-02, 2008, 2016 and 2019) and several other episodes of political friction between the nuclear rivals. Thus, it clearly highlights that India and Pakistan can peacefully coexist in the region.

- **Major projects:**

India has constructed major projects like the **Bhakra Dam on Satluj, Pong and Pandoh Dam on Beas and Thein (Ranjit sagar) on Ravi**. All of them are vital for the prosperity of North west India.

- **Responsible upper riparian**:

The role of India as a responsible upper riparian abiding by the provisions of the treaty has been remarkable. This has **indirectly benefited India in concluding other water sharing agreements**, like 1996 Ganges Treaty with Bangladesh.

- **Strategic advantage**:

Being the upper riparian, India derives significant military advantage out of IWT. It can act as a **strategic pressure point in the events of bilateral disputes**.

- **Military advantage**:

Since Indus is the lifeline of Pakistan, they will be hesitant to initiate any attack in the event of a conflict. Also, Pak attacks on dams or power stations located in Indian part of Indus system will become a violation of the IWT and can lead to its abrogation.

CHALLENGES TO THE TREATY:

- **Under-utilisation**:

Out of the total estimated capacity of 11406 MW electricity that can be harnessed by India in Kashmir, only 3034 MW has been tapped so far. Further, available data suggests that **around 10% of India's share lies unused and is allowed to flow into Pakistan**.

- **Recurring disputes**:

To utilise the full potential of Ravi water, the Centre is currently taking three steps - **resumption of construction of Shahpurkandi project; construction of Ujh multipurpose project; and a second Ravi-Beas link below Ujh**. However, the construction has been frequently interrupted by Pakistan's objections.

- **New realities**:

The **variations in hydrology of rivers, rainfall patterns glacial melting due to climate change** has altered the flow of the rivers. The basins are largely becoming deficit in water and hence conflicts are frequently arising.

- **Water nationalism:**

In recent years, due to widening supply-demand gap and increasing tensions between the two countries, there has been **calls to utilize all the waters** and the abrogation of the treaty.

- **Pak sponsored terror:**

India faces pressure to rethink the IWT due to Pakistan's cross-border terrorism. As PM Modi stated, "blood and water cannot flow together," highlighting the need to reconsider water cooperation amid such tensions.

- **Affects other neighbourhood relations:**

Any unilateral changes to IWT will send alarm bells ringing in India's other lower riparian country, Bangladesh which receives about 91% of its waters from the rivers flowing from India.

- **China-Pak nexus:**

The growing collaboration between Pakistan and China on security, economy and water projects, primarily on the western flowing rivers of IRS, may lead the Chinese to become much more assertive towards India.

- **No exit clause:**

The treaty has no provision for either country unilaterally walking out of the pact. Even the severance of diplomatic and consular relationships between India and Pakistan cannot terminate the IWT.

WAY FORWARD

- **Proactive Utilization of Allocated Water Share**: India should take immediate steps to fully utilize its entitlement to the waters of the Western Rivers under the IWT. As recommended by the **Standing Committee on Water Resources**, the canal systems in Punjab and Rajasthan should be repaired and upgraded to increase their water-carrying capacity.
- **Enhanced Water Data Sharing**: A **legally binding data-sharing framework**, supervised by the World Bank, should be established to monitor changes in water quality and flow.

Such a framework would enhance transparency and improve accuracy regarding the water dependency of both countries.

- **Integration of Ecological Perspectives**: Ecological considerations must be incorporated into water management practices, with a focus on Environmental Flows (EF) to preserve the Indus Valley ecosystems. This approach is consistent with the **Brisbane Declaration and the 2013 Permanent Court of** Arbitration ruling on the Kishanganga project.
- **Recognizing Climate Change Impacts**: India should develop strategies to mitigate the impacts of climate change on the Indus basin. Moreover, India could leverage climate change as a 'change in circumstances' to initiate discussions on renegotiating the IWT.
- **Incorporation of International Legal Standards**: The provisions of the treaty should be updated to align with international legal frameworks, such as the **1997 UN Watercourses Convention and the 2004 Berlin Rules on Water Resources**, ensuring sustainable and equitable water usage.
- **Use of Pressure Tactics in Case of Escalation**: If Pakistan escalates hostilities in the future, India could consider suspending meetings of the Permanent Indus Commission. Since this commission is the first step in the dispute resolution process, its suspension would prevent the activation of the subsequent two steps of the three-tier resolution mechanism.

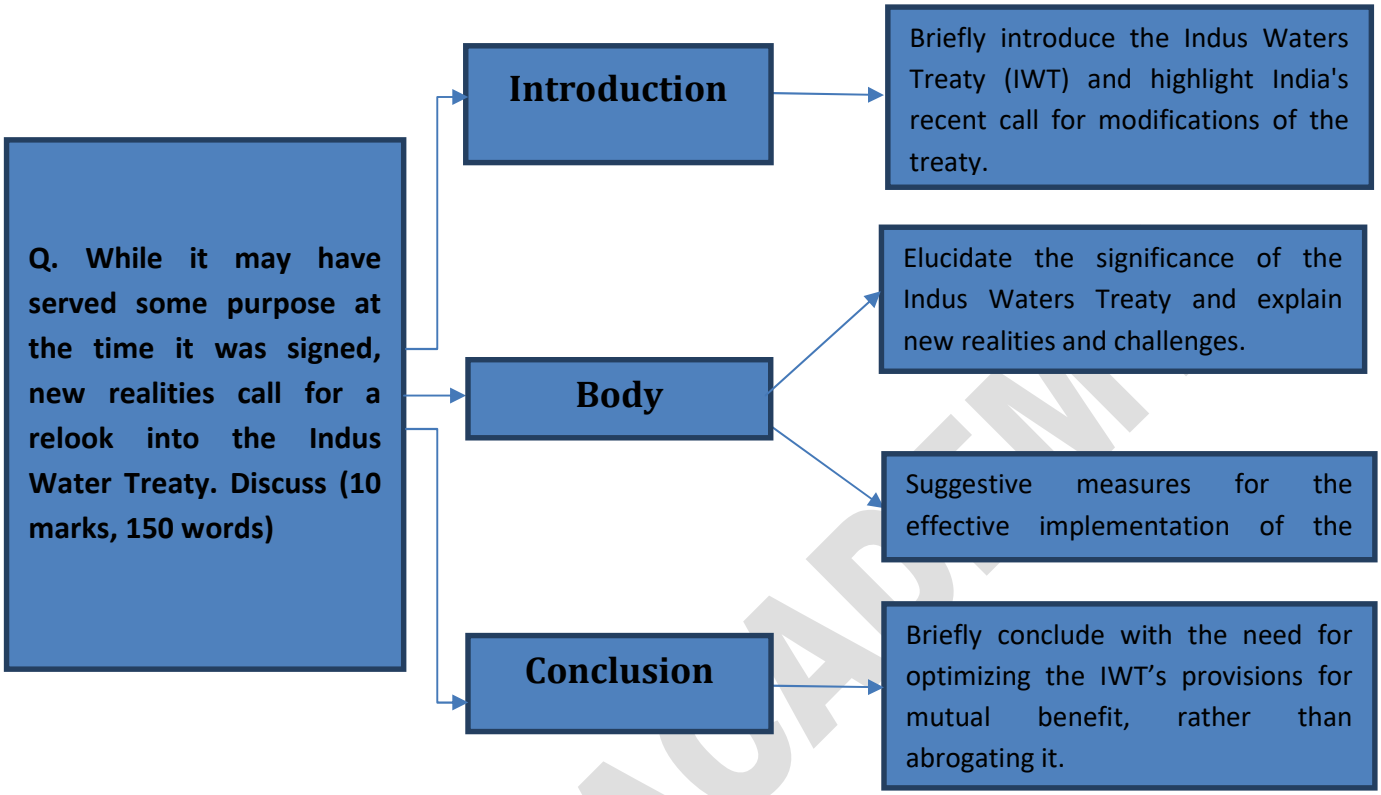
CONCLUSION:

- Despite the treaty lacking an exit clause, provisions of the **1969 Vienna Convention** provide certain rights for lower riparian states. It can also hamper the country's image internationally. Hence, it is **not advisable for India to exit the treaty.**
- Instead of contemplating abrogation or finding faults with the IWT, **India and Pakistan can explore it for mutual benefits**. For example, Article VII of the IWT talks about future cooperation and calls for taking up joint studies and engineering works on the rivers.
- India's best option would be to optimise the provisions of the treaty. For this, India has to **speed up its construction projects** that have been pending for long.

PRACTICE QUESTION

Q. While it may have served some purpose at the time it was signed, new realities call for a relook into the Indus Water Treaty. Discuss (10 marks, 150 words)

APPROACH



MODEL ANSWER

The Indus Waters Treaty (IWT) is a landmark agreement brokered by the World Bank between India and Pakistan, signed in 1960. Recently, India issued a notice to Pakistan under Article XII(3) of the Indus Water Treaty (IWT), seeking modifications due to "fundamental and unforeseen" changes in circumstances.

Significance of the Indus Waters Treaty:

- **Sustained Peace**: The IWT has survived through three wars (1965, 1971, 1999) and multiple military stand-offs between India and Pakistan, highlighting the potential for peaceful coexistence.
- **Only cross border water sharing treaty in Asia:** The Indus water Treaty is the only cross border water sharing treaty between two nations in Asia.
- **Water Allocation**: The treaty allocates the three western rivers—Indus, Chenab, and Jhelum—to Pakistan, while India retains control over the eastern rivers—Beas, Ravi, and Sutlej.
- **India's Entitlement**: India is entitled to use 20% of the water from the western rivers for non-consumptive uses like power generation and irrigation, making projects like Bhakra Dam and Pong Dam vital to India's prosperity.

- **Strategic advantage**: Being the upper riparian, India derives significant military advantage out of IWT. It can act as a **strategic pressure point in the events of bilateral disputes**.

New Realities and Challenges:

- **Climate Change**: Changing rainfall patterns, glacial melting, and hydrological variations due to climate change affect river flows, leading to altered water availability in the region.
- **Underutilization by India**: India has been unable to fully utilize its share under the IWT. For instance, out of the estimated 11,406 MW electricity potential in Jammu and Kashmir, only 3034 MW has been tapped.
- **Geopolitical Pressures**: Pakistan's objections to Indian hydropower projects and growing China-Pakistan cooperation on river projects add new dimensions to the security and political landscape.
- **Water Nationalism**: Increasing water demands on both sides, coupled with terrorism sponsored by Pakistan, has raised calls within India to reconsider or abrogate the treaty.
- **Lack of Exit Clause**: The IWT does not have a unilateral exit clause, limiting India's leverage during crises. However, severing ties with Pakistan doesn't nullify the treaty.

Way Forward:

- **Proactive Utilization**: India must expedite its pending projects on the western rivers to fully utilize its share, as recommended by the **Standing Committee on Water Resources.**
- **Data Sharing**: A **World Bank-supervised framework** for data-sharing on water quality and flow must be established to ensure accurate monitoring of the river systems.
- **Strategic Utilization:** India must optimize its allocated share, especially regarding projects like **the Ujh multipurpose project** and the Ravi-Beas link, to enhance water security.
- **Incorporation of International Laws:** Aligning the treaty with the **1997 UN Watercourses Convention** and the 2004 **Berlin Rules on Water Resources** could ensure equitable and sustainable water use, addressing environmental concerns.
- **Pressure Tactics in Escalation**: In the event of hostilities from Pakistan, India can suspend meetings of **the Permanent Indus Commission**, thereby stalling the dispute resolution mechanism.

While the IWT has endured for over six decades, emerging challenges like climate change and geopolitical shifts require a re-evaluation. Rather than abrogating the treaty, India should focus on optimizing its provisions and fostering cooperation for mutual benefit. A revised IWT aligned with current realities will ensure sustainable and peaceful water sharing between India and Pakistan.

GENERAL STUDIES-III

17. BIOTECHNOLOGY REVOLUTION

iMPACT ANALYSIS

SYLLABUS:

GS 3 >Science and Technology

REFERENCE NEWS:

The Union Cabinet, chaired by the Prime Minister Shri Narendra Modi, approved the proposal **'BioE3 (Biotechnology for Economy, Environment and Employment)** Policy for Fostering High Performance Biomanufacturing' of the Department of Biotechnology.

BioE3 POLICY:

BioE3 policy or the Biotechnology for Economy, Environment and Employment Policy include **innovation-driven** support to R&D and entrepreneurship across thematic sectors.

- This will accelerate technology development and commercialization by establishing **Biomanufacturing & Bio-AI hubs and Biofoundry**.
- Along with prioritizing **regenerative bioeconomy** models of green growth, this policy will facilitate expansion of India's skilled workforce and provide a surge in job creation.
- Overall, this Policy will further strengthen Government's initiatives such as '**Net Zero' carbon economy & 'Lifestyle for Environment'** and will steer India on the path of accelerated '**Green Growth'** by promoting '**Circular Bioeconomy'**.
- The BioE3 Policy will foster and advance future that is more sustainable, innovative, and responsive to global challenges and lays down the **Bio-vision for Viksit Bharat**.

Our present era is an opportune time to invest in the industrialization of biology to promote **sustainable and circular practices** to address some of the critical societal issues-such as climate change mitigation, food security and human health. It is important to build a **resilient biomanufacturing ecosystem** in our nation to accelerate **cutting-edge innovations** for **developing bio-based products.**To address the national priorities, the BioE3 Policy would broadly focus on the following strategic/thematic sectors:

- High value bio-based chemicals, biopolymers & enzymes
- Smart proteins & functional foods
- Precision biotherapeutics
- Climate resilient agriculture
- Carbon capture & its utilization

- Marine and space research.

CURRENT STATUS OF INDIA'S BIOTECHNOLOGY SECTOR:

- The Indian biotechnology sector is valued at approximately **USD 130 billion in 2024**, and it is expected to reach around USD 150 billion by 2025, growing at a Compound Annual Growth Rate (CAGR) of 15-17%.
- India is among **the top 12 biotechnology destinations in the world** and **ranks third in the Asia-Pacific region.**
- It is recognised as a **sunrise sector** crucial in India's ambition to become USD 5trillion economy.
- With about 3% of global biotechnological market share, India is becoming a hub for delivering innovative and affordable healthcare solutions.
- India's biotechnology start-up ecosystem is vibrant, with over 5,000 biotech start-ups as of 2024. These start-ups are involved in innovative research in areas like gene editing, regenerative medicine, diagnostics, and synthetic biology.

The sector is broadly categorized into five segments: **bio-pharmaceuticals, bio-services, bio-agriculture, bio-industrial, and bioinformatics.**

- **Bio-Pharmaceuticals**: Bio-pharmaceuticals is the largest segment, accounting for about **62% of the total biotechnology market in India.** India is a leading global supplier of vaccines, with its companies contributing significantly to global immunization programs. India's strong capabilities in **generic drug manufacturing** are also being extended to biopharmaceuticals.
- **Bio-Services:** India is a hub for clinical research and contract research organizations (CROs), offering services like clinical trials, contract manufacturing, and drug development support. This segment is driven by **cost advantages and skilled manpower**.The increasing demand for outsourcing R&D and clinical trials to India from global pharmaceutical companies has bolstered this segment's growth. The country hosts the highest number of US FDA-approved plants outside the United States.
- **Bio-Agriculture:** India is a major producer of genetically modified (GM) crops, particularly **Bt cotton,** which has been widely adopted and has significantly boosted agricultural productivity.India holds the 5th largest area of organic agricultural land globally.The Bio-Agriculture sector has the potential to nearly double its BioEconomy contribution from **USD 10.5 billion to USD 20 billion by 2025.**There is ongoing research and development in areas like crop protection, bio-fertilizers, and stress-resistant crops.
- **Bio-Industrial: India's** bio-industrial sector includes the production of industrial enzymes, biofuels, and bioplastics. The government is promoting the use of **biofuels** to

reduce reliance on fossil fuels and to address environmental concerns.The sector is also exploring **sustainable industrial processes** using biotechnology, such as **waste management and pollution control.**

- **Bioinformatics: Data-Driven Biology** through Bioinformatics is a rapidly growing area, with applications in genomics, proteomics, and drug discovery. The integration of artificial intelligence (AI) and big data analytics is driving innovation in personalized medicine and precision agriculture.India is home to several bioinformatics companies and research institutions that are collaborating with global firms on cutting-edge

Government Initiatives and Policy Support

National Biotechnology Development Strategy 2021-2025: The government's strategic plan aims to position India as a global hub for biotechnology by providing support for research, innovation, and industry-academia collaboration.

Biotechnology Parks and Incubators: The government has established several biotechnology parks and incubators across the country to support start-ups and research institutions.

Make in India and Startup India: These initiatives have boosted the biotechnology sector by encouraging domestic manufacturing, innovation, and entrepreneurship.

Initiatives like the **Biotechnology Industry Research Assistance Council** (BIRAC) and the **Atal Innovation Mission** (AIM) provide funding, mentorship, and incubation support to biotech start-ups.

100% FDI allowed through automatic route for greenfield pharma and for manufacturing of medical devices.

Department of Biotechnology has funded 51 **Biotech-KISAN hubs** to connect farmers with scientists and institutions to focus on sustainable practices,soil health, irrigation and new agri-tech.

Under the Union Budget 2023-24, the government announced the establishment of 500 new '**waste to wealth' plants** under the GOBARdhan scheme, with a total investment of INR 10,000 crore.

Genome India Project aims to sequence and analyze the genomes of a representative Indian population to understand genetic diversity and its implications for public health.

SIGNIFICANCE OF BIOTECHNOLOGY TO INDIA:

- **Employment Opportunities**: The sector provides employment to millions of people, ranging from high-skilled jobs in research and development (R&D) to roles in manufacturing, quality control, and sales. The thriving start-up ecosystem in biotechnology also fosters entrepreneurship, creating more job opportunities.
    - Companies like Biocon, Serum Institute of India, and Bharat Biotech are not only leaders in the biotech sector but also major employers, driving economic growth through innovation and exports.
- **Vaccines and Biopharmaceuticals**: India is a leading global producer of vaccines, supplying over **60% of the world's vaccines**. The biotechnology sector has been

instrumental in developing vaccines for diseases such as polio, hepatitis, and COVID-19, making healthcare accessible and affordable.

- **Affordable Medicine**: Through the production of **biosimilars and generic drugs**, the biotechnology sector has helped reduce the cost of medicines, making them accessible to a broader population both in India and globally.
    - The Serum Institute of India, the world's largest vaccine manufacturer, played a critical role in the global fight against COVID-19 by producing and distributing vaccines like Covishield at scale and at affordable prices.
- **Biofuels and Bioenergy**: The biotechnology sector is pivotal in developing alternative energy sources like biofuels, which help reduce reliance on fossil fuels and lower greenhouse gas emissions. This is crucial for India's energy security and climate change mitigation efforts.
    - The **National Policy on Biofuels** in India promotes the use of biofuels, such as ethanol blended with petrol, which is produced from biomass and agricultural residues. This initiative supports both energy security and environmental goals.
- **Vaccine Diplomacy**: India's biotechnology sector has been at the forefront of global health initiatives, particularly in providing vaccines and medicines to developing countries at affordable prices. This has enhanced India's reputation as a responsible global leader.
    - During the COVID-19 pandemic, India supplied vaccines to over 90 countries under the "Vaccine Maitri" initiative, strengthening diplomatic ties and demonstrating India's commitment to global health.
- **Fortified Crops and Nutraceuticals**: The biotechnology sector has developed fortified crops and nutraceuticals that address micronutrient deficiencies, thereby improving nutritional security in India.
    - The development of Golden Rice, a genetically modified rice variant rich in Vitamin A, aims to combat vitamin A deficiency

CHALLENGES FACED BY THE SUNRISE SECTOR:

- **Complex and Time-Consuming Approvals**: The approval process for GM crops in India is particularly challenging. Bt brinjal, a genetically modified eggplant, was approved by the Genetic Engineering Appraisal Committee (GEAC) in 2009 but was subsequently put on hold by the government due to public and political opposition. This uncertainty discourages investment in GM research and development.
- **IPR Protection**: The process of securing patents can be lengthy and costly, and there are concerns about the protection of biotech innovations, particularly in the context of biosimilars and new drugs.

- The patent dispute between Novartis and the Indian government over the cancer drug Glivec highlighted the challenges in balancing IPR protection with the need for affordable medicines.

- **Limited Access to Capital**: Biotechnology is **a capital-intensive industry** requiring significant investment in research and development (R&D). Venture capitalists and investors are often hesitant to invest in biotech due to the high risks and long timelines associated with product development.

- **Infrastructure and Skill Gaps**: There is a need for more **world-class research** facilities, better access to advanced technologies, and greater collaboration between academia and industry.

    - The development of indigenous biotech products, such as biosimilars or novel therapeutics, often lags due to inadequate infrastructure and limited access to high-end research tools like CRISPR gene-editing technology.

- **Weak Industrial-academia Linkages**: While India has many prestigious research institutions like the Indian Institutes of Technology (IITs) and the Indian Institutes of Science Education and Research (IISERs), the transfer of technology from these institutions to industry is limited, which hinders the commercialization of innovations.

- **Public Perception and Activism**: Genetically modified organisms (GMOs) face significant public and political resistance in India. Concerns about the safety, environmental impact, and ethical considerations of GM crops have led to stringent regulations and bans

    - The moratorium on Bt brinjal and the long-standing delay in the approval of GM mustard reflect the challenges faced by biotech companies in navigating public sentiment and regulatory hurdles

- **Global Competitiveness**: Indian biotech companies face stiff competition from global players, particularly in markets like the United States and Europe. Gaining market access in these regions requires compliance with international quality standards, which can be costly and challenging for Indian firms.

    - **Indian** biosimilar companies, such as Biocon, have faced challenges in gaining regulatory approval in the U.S. and European markets due to stringent quality requirements and competition from established global giants.

- **Adoption of New Technologies**: While India has made progress in traditional biotech areas, there is inadequate focus on emerging fields such as synthetic biology, personalized medicine, and advanced gene therapies. This limits the sector's ability to innovate and stay at the forefront of global biotech trends.

WAYFORWARD FOR A SUSTAINABLE AND BENEFICIARY REVOLUTION IN BIOTECHNOLOGY:

- **Streamline Regulatory Processes**: Simplifying and expediting the approval processes for biotechnology products, particularly in areas like genetically modified organisms (GMOs), biosimilars, and novel therapeutics, will encourage innovation and reduce delays.
    - The U.S. Food and Drug Administration (FDA) has established streamlined pathways for the approval of biosimilars, which has encouraged innovation and reduced the **time-to-market** for new products.
- **Promote Collaborative Research**: Strengthen the linkages between academic institutions and the biotech industry to facilitate the translation of research into commercial products. This can be achieved through public-private partnerships, joint research initiatives, and technology transfer offices. Establish and support more biotechnology incubation centers and innovation hubs within universities and research institutions to nurture start-ups and facilitate the commercialization of research.
    - The **Fraunhofer Institutes** in Germany are a model of industry-academia collaboration, focusing on applied research and close cooperation with industries
- **Increase Investment in R&D**: Boost funding for emerging fields such as synthetic biology, personalized medicine, and advanced gene therapies. This includes both government funding and incentives for private sector investment.Prioritize investment in cutting-edge technologies such as CRISPR gene editing, regenerative medicine, and bioinformatics to ensure that India remains at the forefront of global biotech innovation.
    - The UK's **Innovate UK** initiative provides grants and support for high-risk, high-reward research in biotechnology, fostering innovation and helping new technologies reach the market.
- **Develop World-Class Research Facilities**: Invest in building world-class research facilities and laboratories equipped with advanced technologies to support biotech research and development. Strengthen digital infrastructure to support bioinformatics and data-driven research, which is critical for genomics, proteomics, and precision medicine.
    - Singapore's **Biopolis** is a state-of-the-art research hub that houses top biotech companies and research institutions, providing a collaborative environment for innovation.
- **Skill Development Programs**: Focus on both technical skills and entrepreneurship to drive innovation.Encourage collaboration with international universities and research institutions to provide Indian students and researchers with exposure to global best practices and cutting-edge research.

- Israel's strong focus on STEM education and continuous skill development in biotechnology has created a highly skilled workforce that drives innovation in the sector.

- **Sustainable Biotech Solutions**: Promote the use of green biotechnology in agriculture to reduce the environmental impact of farming.Establish clear ethical guidelines for research in areas like genetic modification, stem cell research, and synthetic biology.

    - The EU has implemented stringent ethical guidelines and sustainability standards for biotechnology research and development. India can develop similar frameworks to ensure that its biotech sector grows in a socially responsible and sustainable manner.

    - Brazil has implemented community engagement programs in its biotech initiatives, particularly in agriculture, to ensure that local communities are informed and involved in decision-making processes.

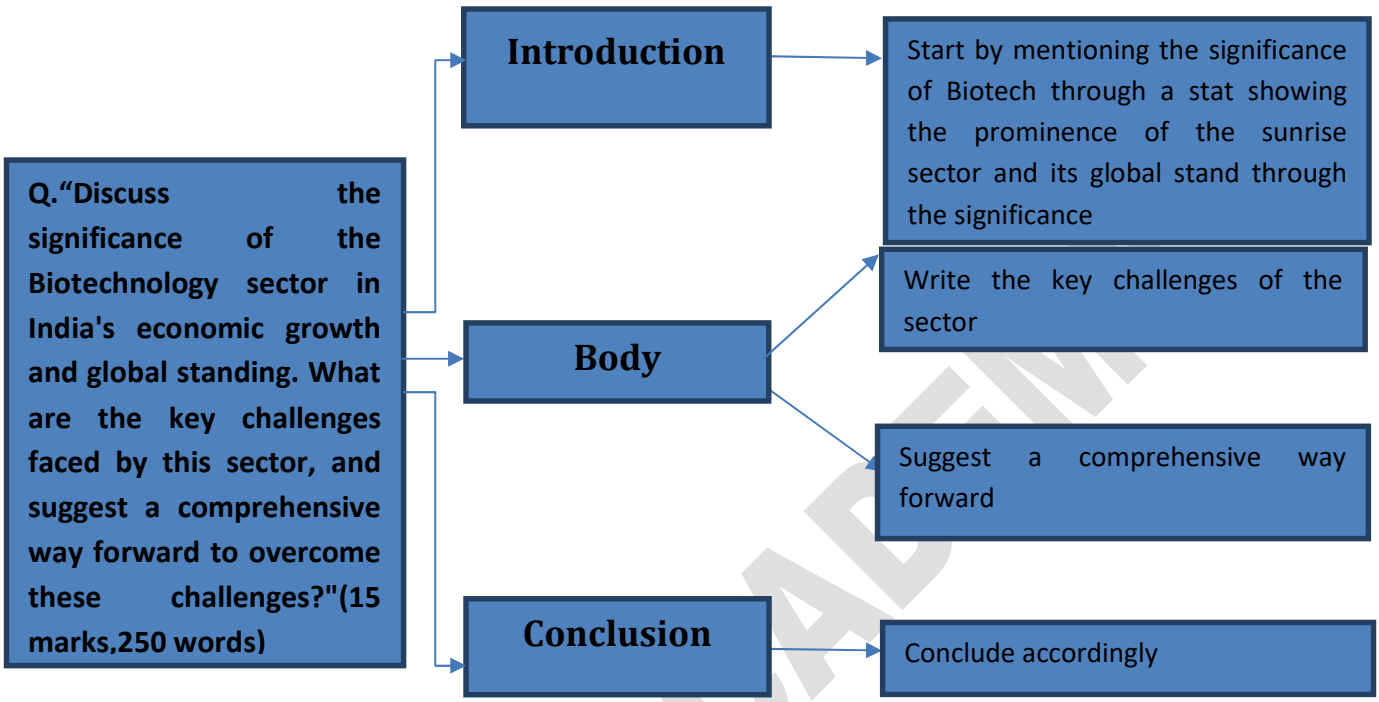
- **Quality Standards and Certifications**: Align Indian biotech products with international quality standards and certifications to enhance their acceptance in global markets. This will require investments in quality control, regulatory compliance, and adherence to Good Manufacturing Practices (GMP).Promote Indian biotech products in global markets through trade agreements, export incentives, and participation in international biotech forums and exhibitions.

    - South Korea has successfully integrated its biotech industry into the global market by focusing on quality standards, innovation, and strategic trade partnerships.

PRACTICE QUESTION

Q. "Discuss the significance of the Biotechnology sector in India's economic growth and global standing. What are the key challenges faced by this sector, and suggest a comprehensive way forward to overcome these challenges?"(15 marks,250 words)

APPROACH



MODEL ANSWER

With a market size expected to reach USD 150 billion by 2025, biotechnology is a "sunrise sector" that plays a pivotal role in India's ambition to become a USD 5 trillion economy. This sector spans across bio-pharmaceuticals, bio-services, bio-agriculture, bio-industrial, and bioinformatics, offering innovative solutions that address public health, food security, environmental sustainability, and economic development.

SIGNIFICANCE OF BIOTECHNOLOGY IN INDIA:

1. **Economic Growth and Employment:**The biotechnology sector significantly contributes to India’s GDP and is a major source of employment, offering high-skilled jobs in R&D, manufacturing, and quality control. Companies like Biocon, Serum Institute of India, and Bharat Biotech are leading employers and drivers of innovation and exports.
2. **Healthcare Advancements:**India is a global leader in vaccine production, supplying over 60% of the world’s vaccines. The biotechnology sector has been instrumental in combating diseases such as polio, hepatitis, and COVID-19, making healthcare more accessible and affordable.

3. **Agricultural Productivity:**Biotechnology has revolutionized Indian agriculture through the development of GM crops like Bt cotton, which has significantly increased agricultural productivity and reduced the use of chemical pesticides. The sector also contributes to the development of bio-fertilizers, bio-pesticides, and stress-resistant crops.

4. **Environmental Sustainability:**The biotechnology sector supports the development of biofuels, bioenergy, and bioplastics, reducing reliance on fossil fuels and lowering greenhouse gas emissions. Initiatives like the National Policy on Biofuels promote the use of sustainable energy sources, contributing to India's energy security and climate change mitigation efforts.

5. **Global Health and Diplomacy:**India's biotechnology sector has played a crucial role in global health initiatives, particularly during the COVID-19 pandemic, where the "Vaccine Maitri" initiative saw India supplying vaccines to over 90 countries, strengthening diplomatic ties and showcasing India's commitment to global health.

KEY CHALLENGES FACED BY THE BIOTECHNOLOGY SECTOR:

1. **Regulatory Hurdles:**The approval process for biotechnology products, particularly GMOs and new drugs, is complex, time-consuming, and often lacks transparency, leading to delays and discouraging investment in innovation.

2. **IPR and Patent Issues:**Securing patents is a lengthy and costly process, with concerns about the protection of biotech innovations, especially in biosimilars and new drugs, posing challenges for companies.

3. **Funding Constraints:**Biotechnology is a capital-intensive sector requiring significant investment in R&D. However, limited access to capital, particularly for start-ups, hinders growth and innovation.

4. **Infrastructure and Skill Gaps:**The sector faces a shortage of world-class research facilities and a skilled workforce proficient in cutting-edge technologies like CRISPR and regenerative medicine. This limits the development of indigenous biotech products.

5. **Public Perception and Resistance to GMOs:**Public and political resistance to GMOs, driven by concerns about safety, environmental impact, and ethical considerations, leads to stringent regulations and delays in the approval of biotech products like Bt brinjal and GM mustard.

WAY FORWARD:

1. **Streamline Regulatory Processes:**Simplify and expedite approval processes for biotechnology products, particularly GMOs and novel therapeutics. Adopting a streamlined regulatory framework, similar to the FDA's pathway for biosimilars, can encourage innovation and reduce delays.

2. **Increase Investment in R&D:**Boost funding for emerging fields like synthetic biology, personalized medicine, and gene therapies. Prioritize investment in cutting-edge technologies to ensure that India remains at the forefront of global biotech innovation.

3. **Focus on Skill Development:**Implement specialized training programs to build a skilled workforce capable of handling advanced research and industrial processes. Encourage collaboration with international universities to expose Indian researchers to global best practices.

4. **Promote Sustainable and Ethical Biotech Solutions:**Encourage the development of sustainable biotech solutions that address environmental challenges. Establish clear ethical guidelines for research in areas like genetic modification and stem cell research.

5. **Align with Global Standards and Market Access:**Ensure Indian biotech products meet international quality standards and certifications to enhance global market access. Promote these products through trade agreements and participation in international biotech forums.

India can achieve a sustainable and beneficiary revolution in its biotechnology sector will not only strengthen the domestic economy but also position India as a global leader in biotechnology innovation and application.

18. DIGITAL AGRICULTURE MISSION

iMPACT ANALYSIS

SYLLABUS:

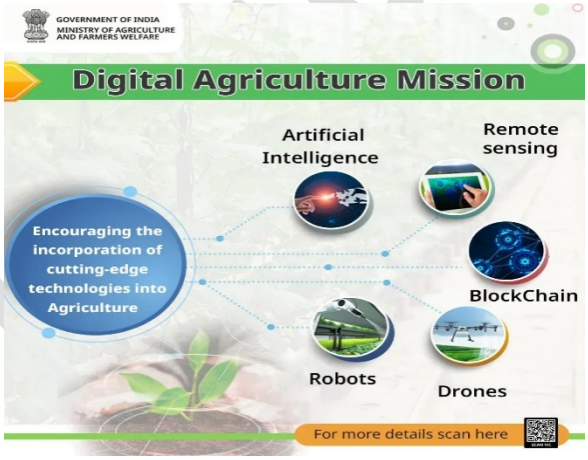
GS 3 > Economic Development >> Technology in Agriculture

REFERENCE NEWS:

The Union Cabinet approved the Rs 2,817-crore **Digital Agriculture Mission** for the creation of Digital Public Infrastructure (DPI) in the farm sector,including the central share of Rs. 1,940 crores.

DIGITAL AGRICULTURE MISSION:

Digital Agriculture Mission for the creation of **digital public infrastructure** in the farm sector by building **AgriStack**, a crop sown registry and geo-referenced village maps, and implementing the **Digital General Crop Estimation Survey (DGCES).**



The mission to create Digital Public Infrastructure in the agriculture sector is **similar to the government's flagship e-governance initiatives in other sectors**, which have over the years resulted in digital solutions such as the Aadhaar unique ID, the DigiLocker document folder, the eSign electronic signature service, the unified payments interface (UPI) instant money transfer protocol, and electronic health records.**Three major pillars** of DPI are envisaged under the Digital Agriculture Mission

- **AgriStack:**The farmer-centric DPI AgriStack consists of three foundational agri-sector registries or databases: **Farmers' Registry, Geo-referenced Village Maps, and Crop Sown Registry**, all of which will be created and maintained by state/ UT governments.
    - **Farmers' Registry**: Farmers will be given a digital identity ('Farmer ID') similar to Aadhaar, which will be linked dynamically to records of land, ownership of livestock, crops sown, demographic details, family details, schemes and benefits availed, etc.Pilot projects for the creation of Farmer IDs have been carried out in six districts in UP, Gujarat, MH, Haryana, Punjab, and TN. The government aims to create digital identities for 11 crore farmers in 2 phases. Once the Registry is created, individual farmers will be able to digitally identify and authenticate themselves to access benefits and services, obviating cumbersome paperwork, and with little or no need to physically visit various offices or service providers.
    - **Crop Sown Registry**: provide details of crops planted by farmers. The information will be recorded through Digital Crop Surveys — mobile-based ground surveys — in each crop season.A pilot Digital Crop Survey was conducted in 11 states in 2023-24 in order to develop the Crop Sown Registry. The government aims to launch the **Digital Crop Survey** across the nation over the next two years, covering 400 districts in the current (2024-25) financial year, and the remaining in FY2025-26.
    - **Geo-Referenced Village Maps**: The maps will link geographic information on land records with their physical locations.
- **Krishi Decision Support System (DSS):** will create a comprehensive geospatial system to unify remote sensing-based information on crops, soil, weather, and water resources, etc.This information will support **crop map generation** for identifying crop sown patterns, droughts/ flood monitoring, and technology-/ model-based yield assessment for settling crop insurance claims by farmers.
- **Soil Profile Maps:** Under the Mission, detailed Soil Profile Maps (on a 1:10,000 scale) of about 142 million hectares of agricultural land are envisaged to be prepared. A detailed soil profile inventory of about 29 million ha has already been completed.

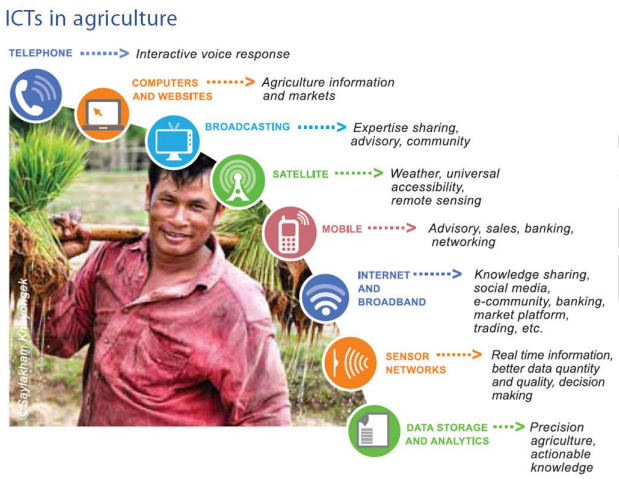
Digital General Crop Estimation Survey:

This will be a major push to improve the existing crop yield estimation system, and to make the data more robust, addressing concerns that are sometimes raised about the accuracy of India's agriculture production estimates.Better data will help government agencies make schemes and services such as paperless MSP-based procurement, crop insurance, and credit card-linked crop loans more efficient and transparent, and develop systems for the balanced use of fertilizers, the sources said.

The digitally captured data on crop-sown area, along with the DGCES-based yield and remote-sensing data, will help improve the accuracy of crop production estimates. The data will also help facilitate crop diversification and evaluate irrigation needs according to the crop and season. The DGCES will provide yield estimates based on scientifically designed crop-cutting experiments, which will be useful in making accurate estimates of agricultural production.

SIGNIFICANCE OF DIGITAL TECHNOLOGY IN AGRICULTURE:

- **Real-Time Weather Forecasts**: For example, the Kisan Suvidha app offers weather updates to help farmers make informed decisions regarding sowing, irrigation and harvesting.



- **Market Price Information**: Digital tools provide real-time market price information, helping to avoid **distress sale**. The e-NAM (National Agriculture Market) platform, for instance, integrates agricultural markets across India.The **Mahalanobis National Crop Forecast Centre (MNCFC)** uses remote sensing technology to monitor crop conditions and estimate yields at the national level. This helps in making informed decisions about food security and managing supply chains.

- **Precision Farming**: Digital technologies like GPS, IoT, and drones enable precision farming, where inputs such as water, fertilizers, and pesticides are applied optimally reducing wastage and improves crop yields. For instance, drones are used to monitor crop health and apply inputs more precisely in states like Punjab and Haryana.

- **Farm Management**: Digital tools help farmers manage their operations more efficiently by providing data on soil health, crop performance, and resource utilization. **The Soil Health Card Scheme** leverages digital technology to provide farmers with information on soil fertility, enabling them to apply the right fertilizers in the right quantities.

- **Remote Sensing and Drones**: Drones are increasingly being used to monitor crop health, assess damage, and apply pesticides and fertilizers precisely. For example, **Garuda Aerospace** and other startups are providing drone services for spraying pesticides and fertilizers, which is particularly useful in large and difficult-to-access fields.

- **Digital Banking and Payments**: The Kisan Credit Card (KCC) scheme, linked to digital banking, allows farmers to access credit quickly and securely, reducing their dependence on informal moneylenders. The **'new trinity' of JAM-UPI-ULI** will be a revolutionary step forward in India's digital infrastructure journey, ensures Direct Benefit Transfer thus **forwarding financial inclusion.**

- **Crop Insurance**: Digital platforms are used to enroll farmers in crop insurance schemes like the Pradhan Mantri Fasal Bima Yojana (PMFBY). Remote sensing and GIS technology are used to assess crop damage, ensuring timely and accurate insurance payouts.

- **E-Marketplaces**: facilitates direct market linkages between farmers and buyers, reducing the role of intermediaries and increasing farmers' income. Platforms like AgriBazaar connect farmers directly with buyers, enabling them to sell their produce at competitive prices.

- **Supply Chain Management**: Digital tools help in tracking and managing agricultural supply chains, ensuring that produce reaches the market in good condition and on time. This reduces post-harvest losses and improves the efficiency of the agricultural supply chain.

- **Risk Management**: AI and machine learning models are used to predict weather patterns, pest outbreaks, and crop yields, helping farmers manage risks more effectively. Startups like SatSure provide predictive analytics to assist farmers in decision-making, reducing the impact of adverse events.

- **Smart Irrigation**: IoT-based smart irrigation systems automate watering based on soil moisture levels and weather forecasts, reducing water usage and promoting **sustainable practices**. Flybird Farm Innovations provides such solutions, which are being adopted by farmers in water-scarce regions like Tamil Nadu.In regions like Maharashtra and Gujarat, farmers are adopting automated greenhouses that control temperature, humidity, and lighting using IoT sensors, thereby improving the yield and quality of high-value crops like flowers and vegetables.

- **Climate Resilience**: Digital platforms provide information on **climate-resilient crops** and practices, helping farmers adapt to changing climatic conditions. This is crucial in regions prone to droughts, floods, and other climate-related challenges mooting a **climate smart agriculture.**

CHALLENGES OF DIGITISING AGRICULTURE IN INDIA:

- **Digital Divide**: A large proportion of Indian farmers, especially small and marginal farmers, have limited access to digital tools due to poor internet connectivity, lack of smartphones, and **low digital literacy**. Rural areas often suffer from inadequate infrastructure.
    - In remote areas of states like Bihar and Odisha, many farmers still rely on traditional methods due to the lack of access to digital platforms and reliable internet connectivity.
- **Cost of Technology**: The initial cost of acquiring digital tools, such as smartphones, drones, and IoT devices, can be prohibitive for small farmers. Additionally, the cost of data services and maintenance can be burdensome.
    - Precision farming tools like GPS-enabled tractors and drones are often too expensive for small farmers in regions like Vidarbha in Maharashtra, where farming incomes are already low.
- **Privacy concerns**: Farmers are often wary of sharing personal and farm data on digital platforms due to concerns over data privacy and misuse. The lack of clear regulations on data protection exacerbates these concerns.
- **Scale of Operations**: The fragmented nature of landholdings in India makes it difficult to implement large-scale digital solutions. Small farms may not benefit as much from technologies that are designed for larger, consolidated farms.
    - In Kerala, where landholdings are typically small and scattered, implementing precision farming technologies is less efficient compared to regions with larger farms like Punjab.
- **Language Accessibility**: Many digital platforms are not available in local languages, making them less accessible to non-English-speaking farmers. Additionally, cultural factors may influence the adoption of technology.
    - Digital platforms like e-NAM have initially been more accessible to English-speaking farmers, limiting their effectiveness in regions where the local language is dominant, such as rural areas of Tamil Nadu or West Bengal.

WAY FORWARD FOR INCLUSIVE AND SUSTAINABLE DIGITAL AGRICULTURE:

Expanding Digital Infrastructure: To bridge the digital divide, the government should prioritize expanding broadband and mobile network coverage to ensure that farmers in remote regions have access to digital tools.

- China's Rural Broadband Program: China has invested heavily in expanding broadband access to rural areas, which improved internet connectivity in remote regions, enabling farmers to access e-commerce platforms and digital advisory services. India can emulate this model by accelerating the implementation of its BharatNet project, which aims to connect all villages with high-speed broadband.

Subsidies and Financial Support: Providing subsidies or financial incentives for purchasing smartphones, tablets, and other digital tools can make technology more accessible to small and marginal farmers. Public-private partnerships can also play a role in reducing the cost of technology.

- In Kenya, the mobile money platform M-Pesa has revolutionized financial inclusion by providing affordable and accessible digital financial services to rural populations. Similarly, India can expand its Kisan Credit Card (KCC) scheme to include digital tools, enabling farmers to purchase devices at subsidized rates.

Digital Literacy Programs: Launching large-scale digital literacy campaigns focused on agriculture can help farmers understand and utilize digital platforms effectively. Extension services can be enhanced with digital literacy modules.

- Rwanda's Digital Ambassador Program: Rwanda's program trains young people to serve as digital ambassadors who teach digital literacy skills to rural populations.

Localization of Digital Platforms: Ensuring that digital platforms and applications are available in local languages is crucial for widespread adoption. User interfaces should be simple and intuitive, catering to the needs of non-English-speaking farmers.

- AgroSmarta digital platform that provides climate data, crop monitoring, and decision support to farmers in Brazil is available in multiple languages, including Portuguese, making it accessible to local farmers.

Climate-Resilient Agriculture: Promote the use of digital technology to encourage sustainable farming practices, such as precision agriculture, smart irrigation, and organic farming.

- The Netherlands is a global leader in precision agriculture, using digital tools to optimize resource use and increase sustainability. India can adopt precision agriculture practices, particularly in water-scarce regions like Rajasthan and Gujarat.

Customized Advisory Services: Develop and expand digital advisory services that provide personalized advice on crop selection, pest management, weather forecasting, and market prices. These services should be easily accessible through mobile apps and SMS.

- Ethiopia's Agricultural Transformation Agency (ATA): ATA's 8028 Farmer Hotline is a mobile-based advisory service that provides farmers with real-time information on best practices, weather updates, and market prices. India can scale up similar services, like the Kisan Call Center (KCC), to offer more personalized and localized advice.

Encouraging Collaboration: Foster collaboration between the government, private sector, and research institutions to develop and scale innovative digital solutions for agriculture. PPPs can drive innovation and bring cutting-edge technology to Indian farmers.

- Israel's Agritech Sector: Israel's success in digital agriculture is largely due to strong collaboration between the government, private sector, and research institutions. Initiatives like the Volcani Institute have developed innovative solutions for agriculture, which are then commercialized through startups.

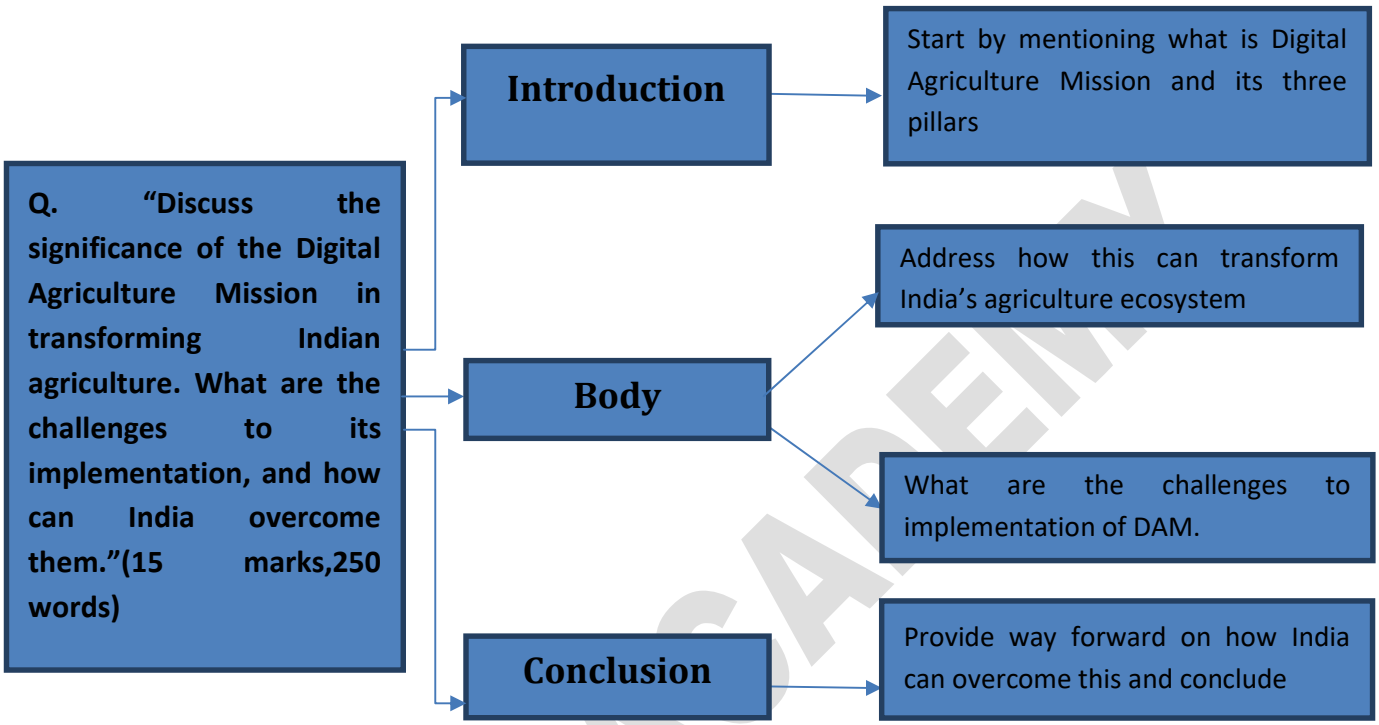
Innovation Hubs and Startups: Create innovation hubs and incubators specifically for agritech startups, providing them with funding, mentorship, and access to markets.

- The agritech ecosystem in Silicon Valley, supported by venture capital and a culture of innovation, has produced numerous startups focused on digital agriculture. India's Atal Innovation Mission (AIM) and Agriculture Infrastructure Fund can be leveraged to support agritech startups, fostering a similar ecosystem in India.

PRACTICE QUESTION

Q. "Discuss the significance of the Digital Agriculture Mission in transforming Indian agriculture. What are the challenges to its implementation, and how can India overcome them."(15 marks,250 words)

APPROACH



MODEL ANSWER:

The Digital Agriculture Mission, launched by the Indian government, aims to transform the agricultural sector through the creation of digital public infrastructure. This mission includes the development of AgriStack, a crop sown registry, geo-referenced village maps, and the Digital General Crop Estimation Survey (DGCES).

SIGNIFICANCE OF THE DIGITAL AGRICULTURE MISSION

1. **Enhanced Efficiency and Productivity**:The mission will enable precision farming by providing farmers with accurate data on soil health, crop performance, and weather conditions. Tools like the Soil Health Card and the Krishi Decision Support System (DSS) will help farmers optimize inputs, reduce wastage, and increase crop yields.
2. **Improved Access to Services**:By creating digital identities (Farmer IDs) linked to land records and other databases, the mission will streamline access to government schemes, subsidies, and credit. This will reduce the need for physical visits to government offices and minimize paperwork, making it easier for farmers to access essential services.

3. **Accurate Crop Estimation and Risk Management**:The Digital General Crop Estimation Survey (DGCES) will improve the accuracy of crop production estimates, aiding in better planning and decision-making. Accurate data will also facilitate the efficient disbursement of crop insurance claims and other financial services.

4. **Market Linkages and Financial Inclusion**:The mission will strengthen digital marketplaces like e-NAM, enabling farmers to access better prices for their produce by connecting directly with buyers. It will also enhance financial inclusion by integrating digital banking services with agricultural activities, reducing farmers' dependence on informal credit sources.

CHALLENGES TO IMPLEMENTATION

1. **Digital Divide**:A significant portion of Indian farmers, especially in remote areas, lack access to digital tools due to poor internet connectivity, low digital literacy, and the high cost of technology. This digital divide can hinder the widespread adoption of the mission's initiatives.

2. **Cost of Technology**:The initial cost of acquiring digital tools, such as smartphones, drones, and IoT devices, can be prohibitive for small and marginal farmers. Additionally, the cost of maintaining these tools and accessing data services adds to the financial burden.

3. **Data Privacy Concerns**:Farmers are often wary of sharing personal and farm data on digital platforms due to concerns over data privacy and misuse. The lack of clear regulations on data protection exacerbates these concerns, leading to resistance in adopting digital solutions.

4. **Fragmented Land Holdings**:The fragmented nature of landholdings in India poses a challenge for implementing large-scale digital solutions. Precision farming and other digital technologies are less effective on small, scattered plots of land.

5. **Language and Cultural Barriers**:Many digital platforms are not available in local languages, making them less accessible to non-English-speaking farmers. Cultural factors and traditional farming practices also influence the adoption of new technologies.

WAY FORWARD:

1. **Expanding Digital Infrastructure**:India can emulate China’s approach by accelerating the implementation of the BharatNet project, aiming to connect all villages with high-speed broadband. This will bridge the digital divide and ensure that farmers in remote areas have access to digital tools.

2. **Subsidies and Financial Support**:India can expand the Kisan Credit Card (KCC) scheme to include subsidies for purchasing digital tools like smartphones and IoT devices. Public-private partnerships can also reduce the cost of technology, making it more accessible to small farmers.

3. **Digital Literacy Programs**:**Rwanda's Digital Ambassador Program**: India can launch large-scale digital literacy campaigns focused on agriculture, training farmers to use digital platforms effectively. Extension services can be enhanced with digital literacy modules, ensuring that farmers understand and utilize the tools available to them.

4. **Localization of Digital Platforms**:**Brazil's AgroSmart**: Digital platforms in India should be available in all major Indian languages and designed with user-friendly interfaces. This will ensure that non-English-speaking farmers can access and benefit from the digital services provided under the mission.

5. **Collaboration and Innovation**:**Israel's Agritech Sector**: By fostering collaboration between the government, private sector, and research institutions, India can develop and scale innovative digital solutions for agriculture. Creating innovation hubs and incubators for agritech startups, as seen in Israel, will drive innovation and bring cutting-edge technology to Indian farmers.

The Digital Agriculture Mission has the potential to revolutionize Indian agriculture by leveraging digital technology to enhance productivity, efficiency, and farmer welfare. However, addressing challenges such as the digital divide, cost of technology, and data privacy concerns is crucial for its successful implementation.

19. NUCLEAR TRIAD OF INDIA

iMPACT ANALYSIS

SYLLABUS:

GS 3>Defence Technology

REFERENCE NEWS:

In a notable advancement for India's nuclear deterrence, the Indian Navy welcomed its second nuclear-powered ballistic missile submarine, INS Arighat, into service last week. The induction ceremony, held in Visakhapatnam, Andhra Pradesh, saw the presence of Defence Minister Rajnath Singh, who highlighted that this addition strengthens India's nuclear triad and overall deterrence capabilities. Though more advanced than its predecessor, the INS Arighat is part of the Arihant-class submarines, named after the Sanskrit term that translates to 'Destroyer of the Enemy'.

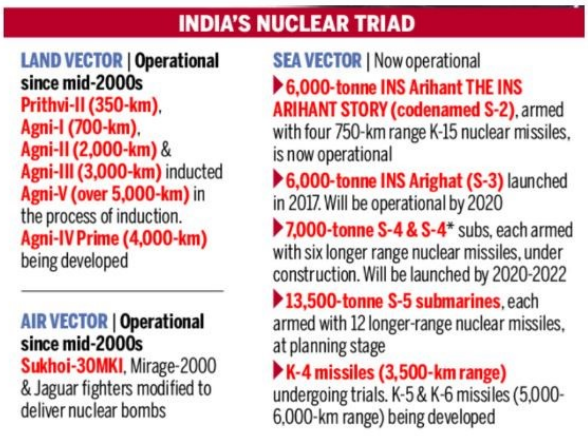
INDIA'S NUCLEAR TRIAD:

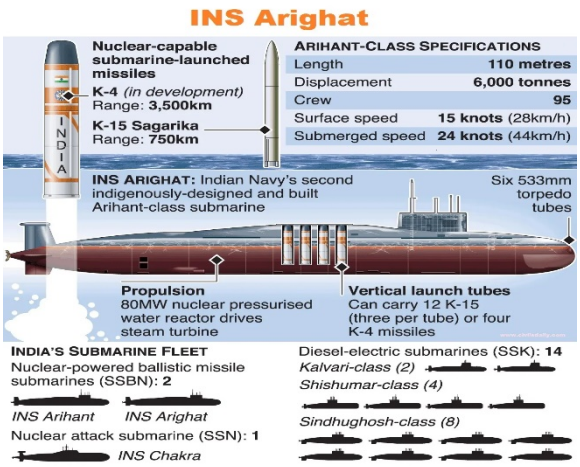
Nuclear Triad means the capability of delivering nuclear weapons by aircraft, land based ballistic missiles and submarine launched missiles.This capability ensures a **second-strike option**, thereby strengthening India's nuclear deterrence.This triad provides India with a**credible minimum deterrence** as part of its **No-First-Use** nuclear policy.

- **Land-based:** It mainly includes missiles that can be launched from land-based platforms such as **ICBMs (Inter-continental Ballistic Missiles),SRBMs (Short Range Ballistic Missiles),** etc. The ICBMs are quite responsive and lethal.ICBMs are deployed in hundreds of silos and can be launched and reach targets within minutes, creating a nearly insurmountable targeting problem for adversaries. Other land-based missiles that can support the triad are Prithvi, Akash, Trishul, etc. The Agni-V missile can go up to a range of 5500 Km with nuclear warheads.
- **Air-based:** It majorly includes the Bombers which are considered as flexible for attacking. The bomber aircraft are flexible and can resolve during a crisis and provide a variety of deployment and yield options when placed on alert. The aircraft that would work as bombers include the Sukhoi Su-30MKI, Mirage 2000H, SEPECAT Jaguar, and most importantly Rafale.
- **Sea-based:** This component majorly includes the Ship Submersible Ballistic Nuclear Submarines (SSBNs). The SSBNs are considered survivable because a portion of the SSBN fleet is always on patrol, making it very difficult for potential adversaries to track all of

them, contributing to their survivability. For example, INS Arihant with K-15 Sagarika missiles (700 Kms range) and K-4 (3500 Kms range) missiles. The SSBNs play a crucial role in the **Second Strike** against any nuclear attack complementing the Nuclear Doctrine as their location is unknown.

The Land and air strike capabilities are controlled by **Strategic Forces Command**, a part of the Nuclear Command Authority.NCA was created in 2003 and is responsible for the management and administration of the country's tactical and strategic nuclear weapons stockpile.NCA is the authority responsible for command, control, and operational decisions regarding India's nuclear weapons programme.





SIGNIFICANCE OF INDIA'S NUCLEAR TRIAD:

Enhanced Deterrence and Credibility:

- **Assured second-strike capability**: The nuclear triad ensures India can launch a retaliatory nuclear strike even if one leg of its delivery platforms (land, air, or sea) is compromised in a first-strike attack. This reinforces India's deterrence posture by guaranteeing **survivability** and **response capability**, making any adversary's first strike futile.

- **Strategic stability**: With a diversified nuclear delivery system, adversaries are less likely to risk launching a nuclear attack due to the certainty of retaliation.

No-First-Use (NFU) Doctrine:

- India's nuclear policy is based on **no-first-use (NFU)**, meaning it will only use nuclear weapons in response to a nuclear attack. A nuclear triad complements this doctrine by

ensuring India can still respond effectively even after absorbing an initial attack, thus maintaining **strategic deterrence**.

Geopolitical Leverage:

- India's nuclear triad bolsters its standing as a **responsible nuclear power**. It enhances its position in **global strategic forums** like the UN Security Council and nuclear non-proliferation talks.India is among the very few countries like US,Russia,China and Pakistan which have achieved nuclear triad.
- The triad's completion makes India a **formidable regional power**, influencing the power dynamics in South Asia and broader Asia, particularly in relation to **China** and **Pakistan**.

Security Against Emerging Threats:

- The **sea-based leg** (submarine-launched nuclear missiles) adds a layer of security against increasingly sophisticated **missile defence systems**. If adversaries develop advanced systems capable of intercepting land or air-based nuclear missiles, the submarine leg provides India with an **undetectable and survivable platform**.

Technological Advancement and Self-reliance:

- The development of the triad, especially the **INS Arihant-class submarines** and **Agni-series missiles**, signifies India's progress in **indigenous defence capabilities** and **technological advancement** in nuclear delivery systems.
- It also fosters India's defence autonomy, reducing dependence on external powers for strategic security.

Strengthening Conventional and Nuclear Deterrence:

- The triad improves both conventional and credible minimum nuclear deterrence. In a situation of escalating conflict, an adversary is less likely to resort to nuclear options, knowing that India can respond through various platforms, thus **reducing the risk of miscalculation**.

LIMITATIONS OF INDIA'S NUCLEAR TRIAD:

Sea-Based Component (SSBN Program) Challenges:

- **Limited operational range of SSBNs**: The K-15 Sagarika missile, currently deployed on the INS Arihant, has a range of only 750 km, which is relatively short for a credible

deterrent. This means the submarine would have to operate close to enemy coastlines (e.g., Pakistan or China) to be effective, increasing its vulnerability.

- In comparison, China's Jin-class SSBNs can carry JL-2 missiles with a range of 7,200 km, providing greater strategic reach.

- **Limited SSBN fleet**: A credible sea-based deterrent requires a fleet of submarines for continuous patrol and survivability. India's ability to maintain a continuous at-sea deterrent (CASD) is limited due to the small size of its SSBN fleet.

    - A nation like the US or Russia, with multiple submarines at sea at any given time, has a more robust sea-based deterrence compared to India.

Air-Based Component Limitations:

- **Aging aircraft**: The aircraft currently used for nuclear delivery, such as the Mirage-2000 and Sukhoi Su-30MKI, were not originally designed for nuclear roles. While capable of carrying nuclear bombs, these aircraft are aging and vulnerable to modern air defence systems, especially in a high-stakes nuclear conflict.

    - India's air-launched nuclear capability is less stealthy and survivable compared to other countries that have dedicated stealth bombers for nuclear delivery, like the B-2 Spirit used by the United States.

- **Limited refueling capacity**: The air force's capacity for long-range nuclear strikes is limited by mid-air refueling capabilities, which constrains India's ability to deliver nuclear strikes over longer distances, particularly targeting regions beyond South Asia.

Land-Based Component Challenges:

- **Slow operational deployment**: Unlike countries like the US and Russia, which have their intercontinental ballistic missiles (ICBMs) on high alert, **India's missiles are maintained in a disassembled state** to **support its no-first-use policy**. The lack of missile silos and permanent basing for India's land-based missiles adds to operational limitations compared to countries with quick-launch ICBMs like the Minuteman-III in the United States.

Technological Gaps in MIRV and Advanced Missiles:

- **MIRV technology (Multiple Independently Targetable Re-entry Vehicle):** Although India is developing MIRV technology (which allows a single missile to carry multiple warheads aimed at different targets), it has not yet fully operationalized it. In contrast,

other nuclear powers like the United States, Russia, and China have deployed MIRV-capable missiles, which are more effective in penetrating missile defence systems.China's DF-41 missile, which can carry up to 10 MIRVs, poses a greater threat compared to India's Agni series, which currently lacks such capacity.

Command and Control Issues:

- **Centralized command**: India's nuclear weapons are tightly controlled by the Nuclear Command Authority (NCA), ensuring that decision-making is centralized and adheres to the no-first-use policy. However, this centralization, while ensuring tight control, may slow down decision-making and response times in a rapidly evolving nuclear scenario.In contrast, the US and Russia have more automated systems, including early-warning systems, that provide quicker response capabilities.
- **Underdeveloped early warning systems:** India's early warning systems for nuclear attacks are still developing, making it vulnerable to a surprise first strike. The absence of a space-based missile defence or advanced surveillance systems could hinder India's ability to detect incoming attacks early, which is crucial for maintaining a second-strike capability.

Financial and Logistical Constraints: Developing, maintaining, and modernizing the nuclear triad is extremely resource-intensive. Given the fiscal constraints and competing defense needs (e.g., conventional military modernization, border security), India's ability to sustain the nuclear triad at optimal levels may be challenged.

- India has to balance investing in its triad with the need to modernize conventional forces, resulting in delays or limited resources for SSBN production or long-range missile systems.

Vulnerabilities in Regional Deterrence:

- **Limited targeting of distant adversaries:** India's current nuclear capabilities are focused on regional deterrence (primarily China and Pakistan). While the Agni-V can target most of China, it cannot yet reach distant adversaries like the US or parts of Europe, limiting India's global deterrence reach compared to powers like the US, Russia, or China.

- The Agni-V has a range of around 5,500-5,800 km, compared to China's DF-31A, which can reach up to 11,200 km.

HOW CAN INDIA STRENGTHEN HER NUCLEAR TRIAD?

- **Expand the Sea-Based Leg of the Triad:** Both the U.S. and Russia maintain a robust fleet of nuclear-powered ballistic missile submarines (SSBNs), ensuring continuous at-sea deterrence through a large number of submarines that can operate globally.
    - The **U.S. Ohio-class** and Russia's **Borei-class** submarines are part of their respective country's robust deterrence strategy, with multiple submarines patrolling at all times.
- **Upgrade missile range**: India's **K-15 Sagarika** and **K-4** missiles have ranges of 750 km and 3,500 km respectively, but to counter distant threats, India should develop and deploy longer-range submarine-launched ballistic missiles (SLBMs), similar to the **Trident II D5** missile used by the U.S. and the **RSM-56 Bulava** used by Russia, both of which have ranges exceeding **11,000 km**.
- **Develop and Deploy MIRV Technology**: Multiple Independently Targetable Re-entry Vehicle (MIRV) technology allows a single missile to carry multiple nuclear warheads, each aimed at different targets. This increases the offensive capability and enhances the ability to overwhelm enemy missile defence systems.
    - The **U.S. Minuteman III ICBMs** and Russia's **RS-24 Yars** ICBMs are MIRV-capable, carrying multiple warheads, each with independent targeting ability.
- **Improve Air-Based Strategic Capabilities:**Dedicated strategic bombers like the **B-2 Spirit** (U.S.) and **Tu-160 Blackjack** (Russia) are designed to penetrate enemy air defenses and deliver nuclear strikes over long distances, adding flexibility to their air-based nuclear delivery systems.
- **Acquire strategic bombers**: India could consider developing or acquiring **dedicated stealth bombers** to serve as long-range nuclear delivery platforms, improving the survivability of its air-based deterrent. Currently, India's **Su-30 MKI** and **Mirage-2000** can deliver nuclear weapons, but they are not optimized for strategic nuclear roles.
    - The U.S. **B-52 Stratofortress** and **B-2 Spirit** serve both conventional and nuclear roles, providing long-range strike capability with stealth features.
- **Develop air-launched cruise missiles**: India can focus on improving and expanding its fleet of air-launched nuclear-capable **cruise missiles** like **BrahMos** and **Nirbhay**, which would enable longer-range strikes and add flexibility to the air-based leg of the triad.
- **Improve Command, Control, and Early Warning Systems:** Both the U.S. and Russia have developed advanced **command and control systems** for nuclear weapons, coupled with

early warning systems like space-based satellites that can detect incoming nuclear missile launches.

- The U.S. operates the **Space-Based Infrared System (SBIRS)**, which provides early detection of missile launches. Russia also has a network of early warning satellites.

- **Strengthen command and control**: India should continue to develop secure, redundant, and resilient **command and control** networks, ensuring they can withstand cyberattacks or EMP strikes. This would maintain communication and control over the nuclear arsenal in a crisis.

    - The U.S. uses a **nuclear command center** and airborne command posts (e.g., **E-4B Nightwatch**) to ensure constant control over its nuclear forces.

- **Consider rail-based systems**: India could explore **rail-based missile launch systems** to further increase the mobility and survivability of its land-based nuclear forces, as Russia did during the Cold War with its rail-mobile ICBMs.

    - Russia's **Barguzin** rail-mobile ICBM system provides additional survivability for its nuclear forces.

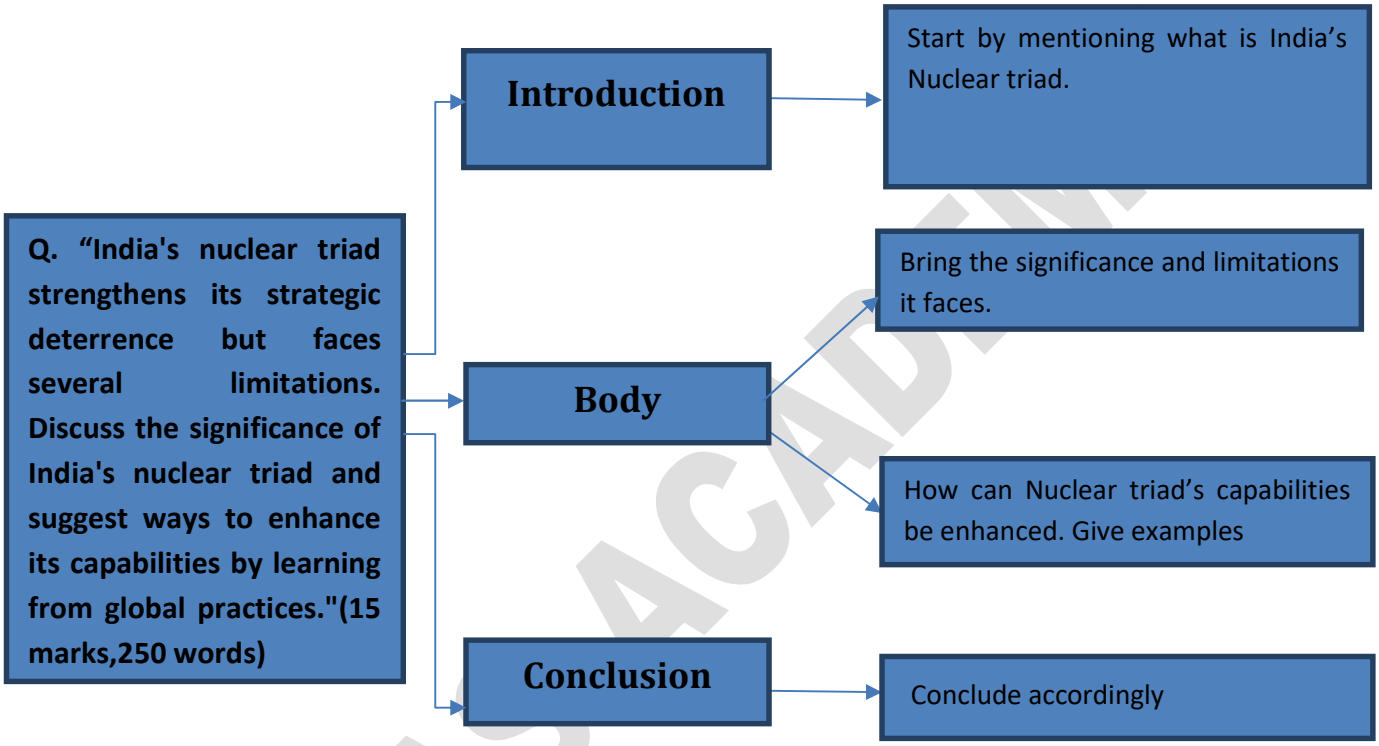
- **Continuous Modernization and Testing:**Continuous modernization is key to ensuring the nuclear arsenal remains effective and credible. The U.S. regularly upgrades its nuclear warheads and delivery systems through a life extension program (LEP), while conducting simulated nuclear tests using supercomputers and advanced simulations.

    - The U.S. **Stockpile Stewardship Program** ensures the safety and reliability of its nuclear arsenal through simulations rather than live tests.

PRACTICE QUESTION

Q. "India's nuclear triad strengthens its strategic deterrence but faces several limitations. Discuss the significance of India's nuclear triad and suggest ways to enhance its capabilities by learning from global practices."(15 marks,250 words)

APPROACH



MODEL ANSWER

India's nuclear triad refers to its capability to deliver nuclear weapons via land, air, and sea-based platforms, ensuring a **credible second-strike capability**. This triad strengthens India's deterrence posture under its **No-First-Use (NFU)** policy and reinforces its strategic security in a nuclear-threatened environment, particularly with neighbouring countries like **China** and **Pakistan**. The recent induction of **INS Arighat** further enhances the sea-based leg of India's triad, showcasing India's progress in **indigenous defence technology**.

SIGNIFICANCE OF INDIA'S NUCLEAR TRIAD:

1. **Enhanced Deterrence**: The triad ensures an assured **second-strike capability**, even if one leg of the delivery system is compromised. This deters adversaries from launching a first strike, as retaliation is guaranteed.

2. **Strengthening the NFU Policy**: By maintaining a second-strike capability, India can uphold its NFU commitment while still deterring nuclear aggression.

3. **Geopolitical Leverage**: India's position in **global strategic forums**, such as nuclear non-proliferation discussions, is strengthened by its status as one of the few countries with a nuclear triad. It reinforces India's role as a responsible nuclear power.

4. **Survivability Against Emerging Threats**: The **sea-based leg** of the triad, particularly nuclear-powered submarines, provides an undetectable platform, which is crucial in the face of evolving missile defense systems.

LIMITATIONS OF INDIA'S NUCLEAR TRIAD:

1. **Sea-Based Component**: India's **SSBN fleet** is still small, with limited patrol capability. Additionally, **K-15 Sagarika missiles** have a range of only **750 km**, necessitating close operations near enemy coastlines, increasing vulnerability.

2. **Air-Based Component**: Aircraft like the **Mirage-2000** and **Sukhoi Su-30MKI** are aging and vulnerable to modern air defense systems. India lacks **dedicated strategic bombers** with stealth capabilities.

3. **Land-Based Component**: India's **ICBMs** are not maintained on high alert. Additionally, India's **MIRV technology** (Multiple Independently Targetable Reentry Vehicle) is underdeveloped, limiting its ability to overwhelm advanced missile defenses.

4. **Command and Control Issues**: India's centralized nuclear command system ensures tight control but may slow down decision-making during a rapidly evolving conflict.

5. **Resource Constraints**: Developing and maintaining the triad is expensive, and competing defense needs like conventional modernization strain India's resources.

WAYS TO ENHANCE INDIA'S NUCLEAR TRIAD:

1. **Expand the SSBN Fleet**: Taking lessons from the **U.S. Ohio-class** and **Russia's Borei-class** SSBNs, India needs to build more **Arihant-class** submarines and extend the range of **SLBMs** to over 10,000 km to ensure credible deterrence.

2. **Develop and Deploy MIRV Technology**: Countries like **Russia** and **China** deploy MIRV-capable missiles. India must fast-track the deployment of MIRV technology in its **Agni series** to enhance strike capabilities.

3. **Acquire Strategic Bombers**: India can consider developing or acquiring **dedicated stealth bombers**, similar to the **B-2 Spirit**, to improve the survivability and range of its air-based deterrent.

4. **Strengthen Command and Early Warning Systems**: India should develop **space-based missile detection systems**, like the **U.S. Space-Based Infrared System (SBIRS)**, to ensure early detection of missile launches.

5. **Invest in Continuous Modernization**: India should establish a **Stockpile Stewardship Program** to maintain the reliability of its nuclear arsenal through advanced simulations and life-extension programs, similar to the U.S.

India's nuclear triad is pivotal for its **national security** and **global strategic standing**. However, to ensure its effectiveness, India must continuously modernize and enhance its capabilities by learning from global nuclear powers. This includes expanding its **SSBN fleet**, advancing **MIRV technology**, and developing **stealth bombers** and **early warning systems**, which will ensure the long-term credibility and survivability of its deterrent.

20. ELECTRICITY ACCESS IN RURAL AREAS

iMPACT ANALYSIS

SYLLABUS:

GS 3 > Economic Development >> Electrification in rural areas

REFERENCE NEWS:

Access to electricity benefited larger, populous villages disproportionately more than hamlets with fewer households, an analysis of the **Rajiv Gandhi Grameen Vidyut Yojana** – a programme launched in 2005 to provide and improve electricity access to roughly 4,00,000 Indian villages.

KEY FINDINGS ON ELECTRICITY ACCESS IN RURAL VILLAGES:

- Smaller villages (<300 people) saw limited economic improvement from electrification.
- Villages with 2,000 people experienced a doubling of per-capita expenditure by ₹1,428 due to electrification.
- Smaller villages showed negligible changes in per-capita expenditure.
- Electrification in smaller villages yielded "zero return" over 20 years.
- Medium-sized villages (1,000 people) saw a modest 13% return, just above cost-effectiveness.
- Larger villages (2,000 people) achieved a 33% return, with a 90% chance of exceeding initial costs.

PREVALENCE OF ELECTRIFICATION IN INDIA:

- **Growth of Household Electrification**: In the early 2000s, many Indian villages lacked access to electricity. By 2017, under Saubhagya, around 30 million households were provided with electricity, marking a significant increase in rural electrification.
- **Regional Disparities**: While most states achieved near-universal electrification, some states like Bihar, Uttar Pradesh, and Rajasthan were lagging in terms of household electrification rates as late as 2015. These states have seen significant improvements due to government schemes but continue to face challenges related to power reliability and affordability.
    - Bihar witnessed a rapid improvement, with household electrification increasing from 55% in 2015 to over 97% by 2020, largely due to Saubhagya and DDUGJY initiatives.

- **Power Supply Quality**: Despite widespread electrification, the quality and reliability of power supply remain a challenge in rural areas. Many villages experience frequent outages or receive electricity for only a few hours a day.
    - A 2021 survey by Prayas (Energy Group) found that in some states, rural households received electricity for 15-20 hours per day, which affects their ability to fully utilize the benefits of electrification.

SIGNIFICANCE OF ELECTRICITY ACCESS IN RURAL VILLAGES:

- **Economic Empowerment:** Electrification allows the use of **modern farming equipment**, irrigation systems, and food processing units. This results in higher agricultural productivity and boosts **rural industries** like handicrafts, cottage industries, and agro-based enterprises.
    - Electrification in states like **Gujarat** and **Madhya Pradesh** has significantly improved agricultural productivity by enabling efficient irrigation, leading to **double-cropping** and **increased yields**.
- **Employment Generation**: Electrification enables the growth of **small and medium enterprises (SMEs)**, providing employment opportunities. Rural areas, with access to reliable power, can support activities like **weaving**, **woodworking**, and **dairy production**.
    - According to the World Bank, electrification in rural areas has led to a **25% increase** in non-agricultural employment, as more businesses set up in previously unconnected areas.
- **Improved Quality of Life:** Electrification allows rural households to access modern amenities such as **lighting**, **television**, and **refrigeration**, enhancing living conditions.
    - **Education**: Schools with electricity can provide better educational tools like **computers**, **projectors**, and extended study hours through lighting, which significantly improves **student performance**.
    - **Healthcare**: Electrified healthcare centers can store **vaccines**, run essential medical equipment, and provide better emergency care. Rural electrification supports critical services like **telemedicine**.
    - The **Saubhagya Scheme** (Pradhan Mantri Sahaj Bijli Har Ghar Yojana) brought electricity to **28.6 million** households, dramatically improving access to education and healthcare.
- **Poverty Alleviation**: Electrification reduces **energy poverty** by giving rural communities access to reliable energy, which lowers the time spent on basic tasks like fetching firewood and increases the time available for productive activities.

- In **Bihar**, the introduction of electricity in rural areas has improved livelihoods by supporting businesses like **brick kilns**, **rice mills**, and **cold storage units** for perishables, directly benefiting small farmers.

- **Sustainable Development**: Rural electrification has increasingly focused on **renewable energy** solutions like **solar power**, helping remote villages get sustainable energy. It reduces dependence on fossil fuels and cuts down **carbon emissions**, supporting environmental sustainability.

    - The **Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY)** integrates **renewable energy projects** in remote areas where grid extension is not feasible. The program has been instrumental in bringing electricity to villages through solar power plants.

CHALLENGES OF ACCESSING ELECTRIFICATION IN RURAL AREAS:

- **Infrastructure Deficits:** Many remote areas suffer from a lack of **physical infrastructure** such as transmission lines, substations, and transformers, making it difficult to provide continuous electricity. Existing infrastructure in rural areas is often outdated, leading to frequent **grid failures**, **power outages**, and **voltage fluctuations**, affecting the quality of supply.

    - States like **Bihar** and **Uttar Pradesh** have struggled with **inadequate transmission and distribution infrastructure**, resulting in unreliable power supply even after connections have been provided.

- **Financial Constraints:** For many poor rural households, the **cost of initial connections** and maintaining the service is prohibitive, despite government subsidies.

- **Revenue Losses for Distribution Companies (DISCOMs)**: Rural electricity distribution is often unprofitable for **DISCOMs**, especially in regions with high agricultural demand. Revenue losses prevent adequate maintenance and expansion of infrastructure.

- **Limited Supply and Reliability:**In many rural areas, power is available only for a few hours a day, especially in agricultural regions where power is prioritized for irrigation purposes.

    - In parts of rural **Madhya Pradesh** and **Rajasthan**, households report getting electricity for only **8-10 hours per day**, which is insufficient for daily needs and productive activities.

- **Geographical and Topographical Challenges:** Many rural areas are located in **hilly**, **forest**, or **desert regions**, making it difficult and expensive to extend the power grid to these areas.
    - Villages in the **Northeast** and **Himalayan states** face difficulties due to **challenging terrain** and dispersed populations.
- **Governmental and Bureaucratic Challenges:**Government schemes for electrification often face delays due to **bureaucratic inefficiencies**, **lack of coordination** between central and state governments, and **inadequate planning**.Political considerations often lead to uneven distribution of electrification efforts, with some regions receiving preferential treatment over others.

CHALLENGES OF NO ELECTRIFICATION IN RURAL INDIA:

- **Impact on Education:** In households without electricity, students have to rely on **kerosene lamps**, which provide insufficient lighting, limiting their ability to study after dark. This directly affects **school performance** and access to **digital learning** resources.Schools without electricity cannot use **modern teaching aids**, such as computers, projectors, or the internet, putting rural students at a significant disadvantage.
    - A report from **ASER** found that rural schools in some states lack **basic lighting and infrastructure**, negatively impacting students' learning environment.
- **Agricultural Challenges**: Without electricity, farmers rely on **manual irrigation techniques** or **diesel-powered pumps**, which are inefficient and costly, reducing agricultural productivity.The absence of electricity also affects **cold storage** facilities, leading to post-harvest losses and reducing income for farmers who cannot store perishable produce.
    - In **Madhya Pradesh**, farmers without access to electricity for **irrigation** systems report lower yields, affecting overall agricultural productivity.
- **Healthcare Deficiencies**: Clinics and hospitals without reliable electricity cannot operate critical medical equipment, store vaccines, or provide emergency services, leading to poorer **health outcomes** in rural areas. Lack of electrified healthcare facilities is linked to higher rates of **maternal and child mortality**, as delivery rooms often lack power for **life-saving medical procedures**.

- In states like **Jharkhand** and **Chhattisgarh**, many **primary healthcare centers** are unable to store vaccines due to unreliable electricity, affecting child immunization programs.

- **Economic Underdevelopment:**Rural areas without electricity struggle to support **small-scale industries** like weaving, food processing, or carpentry. The absence of electricity limits their capacity to produce goods efficiently, reducing income opportunities.In regions without power, the inability to mechanize farming or set up **processing plants** or **mills** limits economic growth and the generation of employment.

    - The **Ministry of Power** noted that the lack of electricity in rural Bihar led to reduced economic activity, limiting the potential for **non-agricultural employment**.

- **Increased Energy Poverty**: Without electricity, rural households depend on **firewood**, **kerosene**, and **cow dung** for cooking and lighting. These traditional fuels are inefficient, contribute to indoor air pollution, and are linked to **respiratory diseases.** Households spend a significant portion of their income on **kerosene** or **diesel**, which are more expensive compared to electricity.
    - According to the **World Health Organization (WHO)**, over **780 million people** in India were affected by indoor air pollution caused by the use of traditional biomass for cooking, which could be reduced through electrification.
- **Social Inequality and Marginalization:**Lack of electrification exacerbates **rural-urban disparities**, reinforcing the **marginalization** of rural communities. Areas without electricity experience slower economic development, which widens the gap between rural and urban populations in terms of **opportunities** and **living standards**.

- **Gender Inequality**: Women, in particular, are disproportionately affected by the lack of electricity, as they spend more time on household chores like fetching water or fuelwood, limiting their opportunities for education and employment.

- **Hindered Digital Connectivity:**In an era where **digital technology** is essential for access to information, employment, and education, the absence of electricity means that rural populations are unable to access digital resources, further deepening the **digital divide**.

    - In states like **Odisha** and **Assam**, the lack of reliable electricity in remote villages has prevented the rollout of digital education and **telemedicine** services, which could have otherwise improved quality of life.

WAY FORWARD FOR INCLUSIVE DEVELOPMENT:

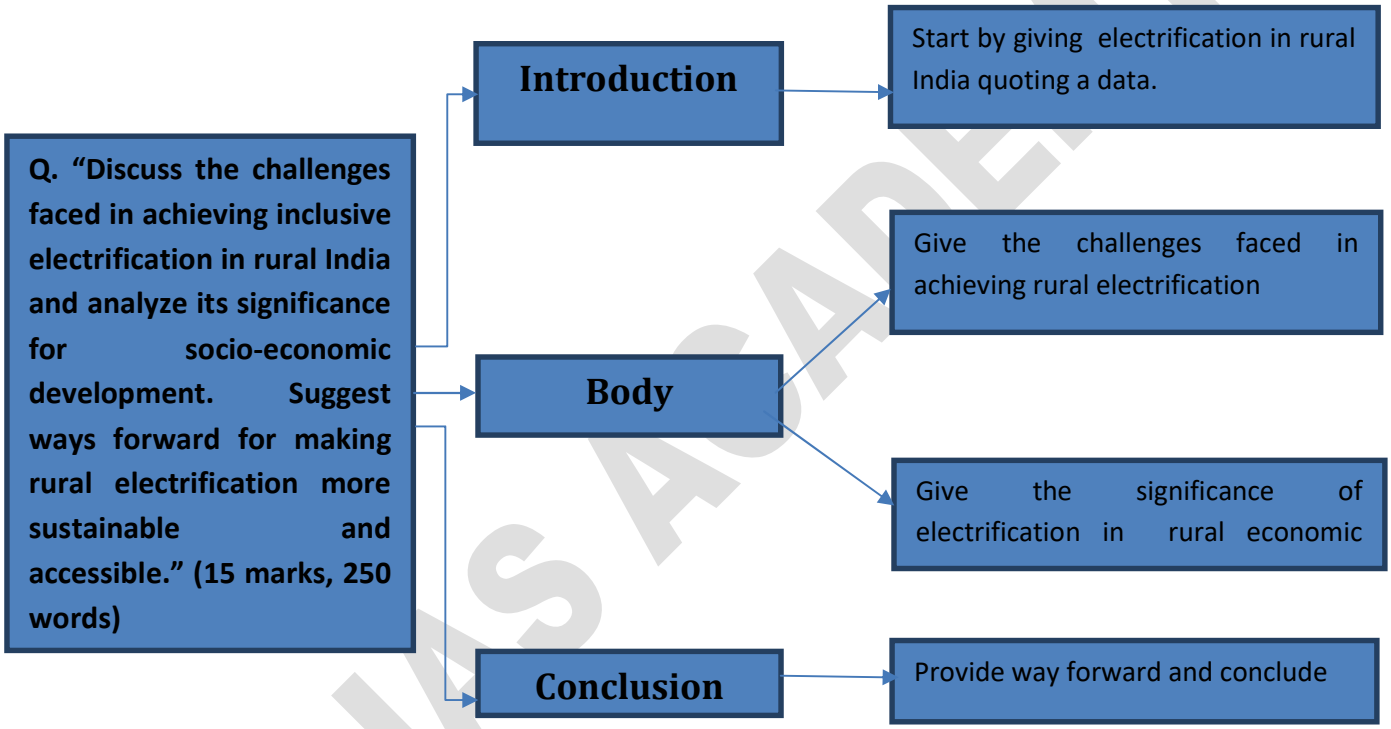
- **China's rural electrification program** used a combination of grid expansion and smart grid technology to bring reliable electricity to remote villages. India can adopt smart metering systems to monitor electricity consumption and improve energy efficiency in rural areas. Initiatives like the Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY) should be strengthened to ensure comprehensive rural grid coverage.

- **Promoting Renewable Energy Solutions**:Bangladesh implemented the Solar Home Systems (SHS) program, which has provided electricity to over 4 million rural households. India should further promote decentralized renewable energy through programs like PM-KUSUM, which supports the adoption of solar energy for agricultural use, and expand solar micro-grids for rural electrification.
- **Affordability and Financial Inclusion**: In Kenya, M-KOPA Solar uses the Pay as You Go model to provide affordable solar energy solutions to low-income rural households. This model allows customers to pay for electricity in small increments through mobile payments.
- **Leveraging Public-Private Partnerships (PPP):** Morocco successfully utilized PPPs in its Noor Solar Project, which involved the private sector in financing and implementing solar power plants, boosting rural electrification and energy sustainability.
- **Inclusive Digital and Technological Access:**Estonia has successfully integrated its e-governance platform with rural electrification, providing access to digital public services like healthcare, education, and business support for rural populations.India should leverage Digital India initiatives to promote digital literacy and expand rural access to broadband connectivity powered by solar micro-grids and rural Wi-Fi programs.
- **Strengthening Local Governance and Community Participation:** Nepal's Community Rural Electrification Program involves local communities in the management of small-scale hydropower projects, ensuring that rural electrification meets the needs of the population and is sustainable over time.
- **Building Local Skills and Capacity**: Rwanda implemented a solar technician training program to empower local youth to maintain and manage solar installations, ensuring long-term sustainability. India should integrate skill development programs under initiatives like Skill India and link them with rural electrification projects, ensuring that local populations are equipped to maintain and sustain energy systems.
- **Promoting Energy Efficiency and Sustainable Practices**:Brazil's Luz Para Todos (Light for All) program promoted energy efficiency by distributing energy-efficient appliances to rural households, reducing energy consumption and extending the benefits of rural electrification.India should promote energy-efficient technologies through schemes like UJALA, which distributes affordable LED bulbs, and expand it to rural areas to improve the effectiveness of electrification efforts.

PRACTICE QUESTION

Q. "Discuss the challenges faced in achieving inclusive electrification in rural India and analyze its significance for socio-economic development. Suggest ways forward for making rural electrification more sustainable and accessible." (15 marks, 250 words)

APPROACH



MODEL ANSWER

Electrification is a crucial enabler of rural development in India, playing a transformative role in **agriculture**, **education**, **healthcare**, and **employment**. Despite substantial progress under schemes like **Saubhagya** and **Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY)**, rural electrification is still not accomplished as small hamlets are far from achieving electricity as per Rajiv Gandhi Gramin Vidyut Yojana.

CHALLENGES:

1. **Infrastructure Deficits**: Many remote areas lack **transmission lines**, **substations**, and **transformers**, leading to frequent **power outages** and unreliable supply

2. **Affordability**: Initial connection costs and maintenance are prohibitive for many **low-income households**, even with subsidies.
3. **Limited Supply**: Power in rural areas is often available for only **8-10 hours a day**, particularly in agricultural regions where irrigation is prioritized
4. **Geographical Barriers**: Villages in **hilly** and **forest** areas face challenges in grid extension, making electricity access costly and difficult
5. **Bureaucratic Delays**: Government schemes face delays due to **inefficiencies**, lack of coordination, and political considerations

SIGNIFICANCE OF RURAL ELECTRIFICATION:

1. **Economic Empowerment**: Electricity boosts agricultural productivity by enabling **modern irrigation** and powering **rural industries** like food processing
2. **Poverty Alleviation**: Electrification reduces energy poverty by enhancing **livelihoods**, providing access to **modern amenities**, and fostering **non-agricultural employment**
3. **Improved Healthcare and Education**: Electrified healthcare centers can operate **critical medical equipment** and store vaccines, while schools with electricity offer extended study hours and access to digital tools

WAY FORWARD:

1. **Renewable Energy Solutions**: India can adopt **Bangladesh's Solar Home Systems (SHS)** model to provide decentralized solar power to remote villages
2. **Public-Private Partnerships (PPPs)**: **Morocco's Noor Solar Project** showcases how PPPs can finance large-scale electrification projects, promoting sustainability
3. **Affordability Models**: **Kenya's Pay-As-You-Go (PAYG)** model for solar energy offers flexibility for rural households to pay in small increments, ensuring affordability
4. **Local Participation**: **Nepal's Community Rural Electrification Program** involves local communities in managing small-scale energy projects, ensuring long-term sustainability

While rural electrification has advanced significantly, its impact is uneven across regions. By adopting **global best practices** such as **renewable energy solutions**, **affordable financing models**, and **community involvement**, India can ensure that electrification leads to **inclusive socio-economic development**, bridging the rural-urban divide.

21. PM SURYA GHAR MUFT BIJLI YOJANA

iMPACT ANALYSIS

SYLLABUS:

GS 3 > Economic Development >> Renewable Energy

REFERENCE NEWS:

Ahead of the RE INVEST 2024 global investors meet and expo on 16th September at Mahatma Mandir in Gandhinagar — where world leaders, industrialists, investors, thought leaders, climate activists, academics, and scholars gathered to promote renewable energy in the fight against climate change – Prime Minister Narendra Modi visited families who had installed solar rooftops under the PM Surya Ghar Muft Bijli Yojana.

This visit embodied his vision of making every household a stakeholder in climate action, by personally engaging with these families, demonstrated his belief that achieving India's climate goals hinges on the active participation of every individual. As the global community grapples with the challenge of climate change, India is fast emerging as a key player in the transition to renewable energy.

PM SURYA GHAR MUFT BIJLI YOJANA:

- It is a central scheme to promote the adoption of solar rooftop systems by providing substantial financial subsidies and ensuring ease of installation.
- It aims to **provide free electricity to one crore households in India**, who opt to install rooftop solar electricity units. The households will be able to get 300 units of electricity free every month.
- The scheme will be executed at two levels:
    - At the national level, it is managed by the National Programme Implementation Agency (NPIA).
    - At the state level, it is managed by State Implementation Agencies (SIAs), which are the Distribution Utilities (DISCOMs) or Power/Energy Departments of the respective states or UTs.
        - As SIAs, DISCOMs are responsible for facilitating various measures to promote rooftop solar adoption, including ensuring the availability of net metres and conducting timely inspections and commissioning of installations.
- It provides subsidies to reduce the cost of installing solar rooftop systems. The subsidy is capped at a maximum of 3kW capacity.

- It develops a "**Model Solar Village**" in each district to serve as a demonstration project and promote rooftop solar adoption in rural areas.
- It provides incentives to Urban Local Bodies and Panchayati Raj Institutions to promote rooftop solar installations in their respective areas.
- It has been issued under the **renewable energy services company (RESCO) model and utility led asset (ULA) model** of the rooftop solar scheme 'PM Surya Ghar—Muft Bijli Yojana'.
- Renewable Energy Services Company (RESCO) Model develops and owns the rooftop solar system installed on the consumer's rooftop for at least five years.
- Under the Utility led Asset (ULA) Model a state discom owns the rooftop solar systems for the project period of at least five years, after which the ownership is transferred to the household.
- A Rs 100 crore corpus will be established to ensure payment security, managed by a national program implementation agency.
- Grid-connected rooftop solar systems on residential properties, including roofs, terraces, balconies, and elevated structures and installations under metering mechanisms such as group net metering and virtual net metering are eligible for Central Financial Assistance (CFA).
- Households with pre-existing rooftop solar systems are excluded under the RESCO and ULA models for the PM Surya Ghar scheme.

SIGNIFICANCE OF A ROOFTOP SOLAR PROGRAMME FOR INDIA:

- **Promotion of Renewable Energy:** India has committed to generating 500 GW of renewable energy by 2030, with solar energy being a significant contributor. The scheme aligns with the government's ambition to shift towards clean energy, reducing the dependence on fossil fuels, and combating climate change.
  - As of 2023, India had an installed solar capacity of around 67 GW, with plans to increase it further. The PM Surya Ghar Muft Bijli Yojana aims to accelerate this by incentivizing households to install solar panels.
- **Cost Savings for Households:** One of the most significant benefits of this scheme is the potential reduction in electricity bills. Households with solar installations can produce electricity for their own consumption, and in some states, surplus electricity can be fed back into the grid, providing further financial benefits.
  - In states like Gujarat and Rajasthan, solar rooftop initiatives under this scheme have reduced household electricity bills by as much as 30-50%. For example, a household using 200 units of electricity per month could save around INR 1,000-1,500 per month depending on local tariffs and the size of their solar installation.

- **Energy Independence and Rural Electrification:** Solar energy through this scheme can provide a decentralized and reliable energy source, especially in remote or rural areas where grid access is either limited or unreliable. This can help bridge the energy gap in rural India and contribute to energy security.
  - As of 2022, about 2.4% of rural households in India still lacked access to electricity. The PM Surya Ghar Muft Bijli Yojana can improve energy access and quality in these areas.
- **Environmental Benefits**: The shift from coal-based energy to solar energy can significantly reduce the carbon footprint of Indian households. Solar energy is a clean, sustainable energy source, with zero greenhouse gas emissions during operation.
  - The installation of a 5 kW solar system can prevent 5.8 tons of CO_2 emissions annually, equivalent to planting around 150 trees each year.
- **Green Job Creation and Economic Growth:** The growth of the solar energy sector, driven by this initiative, creates opportunities in manufacturing, installation, and maintenance of solar panels. It can also spur innovation in energy technologies.
  - According to the Council on Energy, Environment, and Water (CEEW), the renewable energy sector in India could create over 1 million jobs by 2030, with a significant portion in solar energy-related activities.
- **Climate action as a means of economic empowerment**: A key aspect of Prime Minister Modi's vision is linking climate action with economic empowerment. The PM Surya Ghar Yojana ensures that households not only reduce their electricity bills and save on fuel costs by charging their EVs but also generate additional income by selling surplus energy to Discoms, creating a win-win situation. This economic empowerment supports the livelihoods of families while advancing India's clean energy goals.

CHALLENGES OF PM SURYA GHAR MUFT BIJLI YOJANA:

Economic Challenges:

- **High Initial Investment Costs**: Although the scheme promises free or highly subsidized solar energy, the upfront cost of installing solar panels, inverters, and other infrastructure is still relatively high for many households, especially in rural areas. Even with subsidies, the cost of a standard 3 kW system can range between INR 1.5 lakh and INR 2 lakh, which is unaffordable for many low-income households.
  - A household in Bihar, where the average monthly income is significantly lower than urban counterparts, may find it difficult to bear even 20% of the system cost after subsidies.
- **Financial Viability for Discoms**: State electricity distribution companies (DISCOMs) face financial instability, which may affect their ability to implement net metering systems

efficiently. As DISCOMs struggle with high debt levels, the incentives for customers to feed excess solar power back into the grid may not be fully realized.

- According to the Power Finance Corporation (PFC), the total debt of DISCOMs in India was over INR 4.5 lakh crore as of 2022, leading to delayed payments to producers and slowing the implementation of solar initiatives.

Infrastructural Challenges:

- **Grid Integration and Transmission Issues**: India's existing power grid infrastructure in many regions is not equipped to handle decentralized power sources like rooftop solar installations. Problems like voltage fluctuations and load management can occur when integrating solar energy with the conventional grid.
  - In states like Uttar Pradesh, where grid infrastructure is already strained, there have been reports of frequent power cuts, and introducing more decentralized energy sources like solar could exacerbate this issue without necessary upgrades.
- **Maintenance and Quality of Equipment**: Solar panels require periodic cleaning, maintenance, and efficient inverters to function effectively. In remote areas, the lack of availability of trained technicians and service providers can result in decreased system efficiency and lifespan.
  - Studies indicate that the efficiency of solar panels can drop by 20-30% due to dust accumulation in areas like Rajasthan and Gujarat, where dust storms are common.

Regulatory and Policy Challenges:

- **Bureaucratic Delays in Implementation**: The approval process for solar installations, including permissions, inspections, and net metering setups, can be slow and cumbersome in some states. Each state has different policies regarding solar energy, creating inconsistencies in the scheme's rollout.
  - In Maharashtra, residents have reported waiting up to 6 months to receive net metering approvals, limiting the benefits they can reap from selling excess energy back to the grid.
- **Lack of Uniformity in Tariff and Subsidies:** Different states offer varying degrees of subsidies and financial incentives for solar installations, creating disparities in adoption. For example, Gujarat offers a generous subsidy of 40% for rooftop solar, while other states like Jharkhand offer lower subsidies, discouraging potential consumers.
  - Gujarat has the highest number of rooftop solar installations, with over 50,000 systems as of 2022, while states like Bihar and West Bengal lag far behind due to lower subsidies and awareness.

Social Challenges:

- **Low Public Awareness and Technical Know-How**: Many people, particularly in rural areas, are not fully aware of the benefits of solar energy or how the scheme works. Additionally, there is a lack of understanding regarding installation, operation, and maintenance, which reduces enthusiasm for solar adoption.
    - In states like Madhya Pradesh and Bihar, many potential beneficiaries are either unaware of the scheme or unsure of how to go about availing of it, which has led to lower installation rates despite subsidies.
- **Cultural and Behavioral Barriers:** People in some areas may be hesitant to shift from conventional electricity sources to solar due to a preference for familiar technology, or they may view solar energy as unreliable compared to grid electricity.
    - In parts of Rajasthan, where traditional energy sources are still preferred, many homeowners are reluctant to invest in rooftop solar even though the region has high solar potential due to cultural resistance to new technologies.

Environmental and Geographical Challenges:

- **Geographical Constraints:** Not all parts of India receive the same level of solar radiation, making solar energy less effective in some regions. States like the northeastern region experience high rainfall and low solar insolation, limiting the efficiency of solar panels.
    - The average annual solar insolation in Rajasthan is 6-7 kWh/m²/day, while in northeastern states like Assam, it is only 3.5-4.5 kWh/m²/day, making solar less attractive in those regions.
- **Impact of Weather Conditions**: Solar panel efficiency drops significantly in regions with frequent cloud cover, high levels of dust, or pollution. This means that even where panels are installed, their output may not meet expectations, especially during monsoon seasons or in highly polluted urban areas.
    - In Delhi, due to high levels of air pollution and dust, the performance of solar panels can drop by 15-20%, reducing their overall financial viability.

WAY FORWARD FOR A MORE INCLUSIVE AND SUSTAINABLE USE OF SOLAR POWER:

Decentralized Solar Power Deployment

- **Promoting Community-Based Solar Models**: In countries like Germany and Denmark, community-owned renewable energy projects have successfully reduced electricity costs and increased local participation in clean energy generation.
- **Solar Micro-Grids for RuralElectrification**:Bangladesh's Solar Home System program has installed over 5 million systems in off-grid areas, providing electricity to 20 million people, making it a successful model for rural solar deployment.

Improved Financing and Incentive Structures

- **Green Energy Financing Solutions**: Kenya's M-KOPA Solar initiative uses a PAYG model, allowing users to pay in small installments via mobile phones. This model has helped millions of off-grid households access affordable solar power.
- **Enhanced Corporate and Foreign Investments**: China has been highly successful in creating favorable conditions for large-scale foreign and domestic investment in its solar industry, becoming the world's largest producer of solar panels.

Innovative Policy and Regulatory Measures

- **Strengthening Net Metering and Solar Tariffs:** Germany's Feed-in Tariff (FIT) policy has been a major driver in the country's solar power adoption. It guarantees long-term contracts for renewable energy producers to sell power at attractive rates.
- **Solar Rooftop Mandates and Building Codes:**California's Solar Mandate requires all new residential buildings to install solar panels starting from 2020, significantly accelerating solar capacity.

Leveraging Technological Innovations

- **Energy Storage Solutions:**Australia has heavily invested in solar energy storage technologies, particularly in household-level battery solutions like Tesla's Powerwall, which allows users to store excess solar energy for later use.
- **Solar PV Innovations (Bifacial, Flexible, Thin-film Panels):**Japan and South Korea have been exploring the use of innovative solar technologies like floating solar farms and bifacial panels, increasing solar output in urban and congested areas.

Capacity Building and Public Awareness

- **Public Awareness Campaigns:**Mexico implemented solar awareness programs that included training, workshops, and educational outreach to encourage rooftop solar installations.
- **Skill Development for Solar Technicians**:Germany's vocational training programs in the renewable energy sector have been instrumental in creating a skilled workforce capable of supporting the country's solar boom.

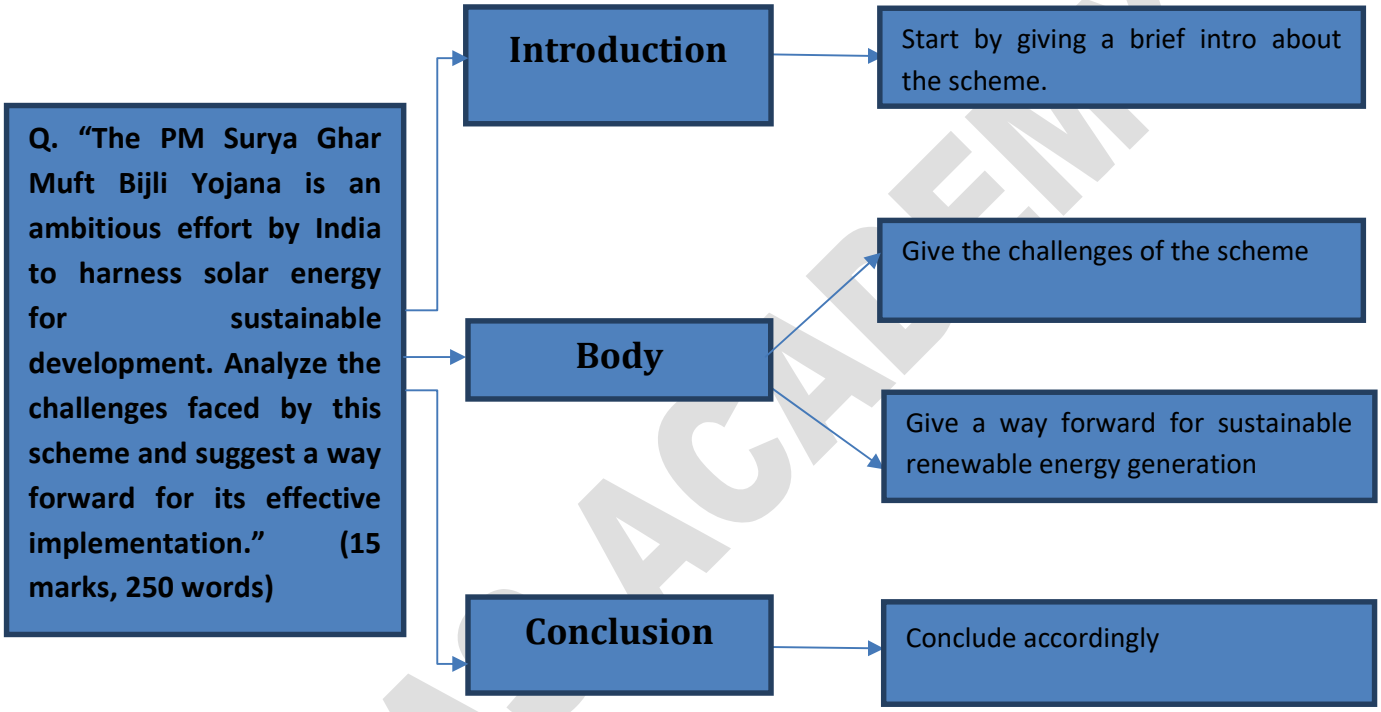
Environmental Considerations

- **Recycling and Disposal of Solar Panels**: The European Union has introduced strict regulations on the recycling of solar PV modules, ensuring that materials are repurposed at the end of their lifecycle.
- **Promoting Agrivoltaics (Dual Land Use):**In France and Germany, agrivoltaics has become a popular practice, where crops are grown underneath solar panels, increasing land productivity and providing farmers with an additional source of income.

PRACTICE QUESTION

Q. "The PM Surya Ghar Muft Bijli Yojana is an ambitious effort by India to harness solar energy for sustainable development. Analyze the challenges faced by this scheme and suggest a way forward for its effective implementation." (15 marks, 250 words)

APPROACH



MODEL ANSWER

The **PM Surya Ghar Muft Bijli Yojana** is a central scheme aimed at promoting rooftop solar systems across India, providing free or subsidized electricity to households. With India's commitment to achieving **500 GW of renewable energy by 2030**, this scheme is a critical step toward achieving energy independence and addressing climate change. However, the scheme faces several challenges that need to be addressed for its success.

CHALLENGES:

1. **Economic Challenges**:

- **High initial investment**: Despite subsidies, the upfront cost of installing solar systems remains a burden for low-income households. Even after subsidies, the installation of a 3 kW system can cost between INR 1.5-2 lakh
- **Financial instability of DISCOMs**: With debt exceeding **INR 4.5 lakh crore**, many state electricity distribution companies (DISCOMs) struggle to implement net metering efficiently

2. **Infrastructural Challenges**:
   - **Grid integration**: India's power grid in many regions is ill-equipped to handle decentralized energy sources like solar power, leading to voltage fluctuations and load management issues
   - **Maintenance**: Solar panels require periodic cleaning and technical maintenance, which is challenging in remote areas where trained technicians are unavailable
3. **Regulatory Challenges**:
   - **Inconsistent policies**: Each state has different policies on subsidies and net metering, leading to discrepancies in adoption
   - **Bureaucratic delays**: Lengthy approval processes for net metering and installations slow the scheme's rollout
4. **Social Challenges**:
   - **Lack of awareness**: Many rural households are unaware of the scheme's benefits and lack the technical know-how for installation and maintenance

WAY FORWARD:

1. **Decentralized Solar Power Models**:Countries like **Germany** and **Denmark** have adopted community-based solar projects, which India could replicate in rural areasIndia can emulate **Bangladesh's Solar Home System** model to bring solar power to off-grid areas
2. **Improved Financing**:Models like Kenya's **M-KOPA Solar** offer flexible, mobile-based payments that can make solar systems more affordable for low-income households
3. **Technological Innovations**: Investing in solar energy storage, as seen in **Australia**, can address solar intermittencyIndia can adopt bifacial and thin-film solar panels, used in **Japan** and **South Korea**, to improve efficiency and adaptability to various climates

4. **Skill Development and Awareness**: Mexico's solar awareness programs can serve as a model for India to educate the public about the benefits of solar power.Germany's vocational training in the renewable energy sector can be replicated to build a skilled workforce in India

To ensure the success of the PM Surya Ghar Muft Bijli Yojana, India must adopt a holistic approach that includes policy reforms, financial innovation, technological advancement, and public engagement. By learning from global best practices, the scheme can overcome existing challenges and pave the way for a sustainable, inclusive solar energy future.

22. WHITE REVOLUTION 2.0

iMPACT ANALYSIS

SYLLABUS:

GS 3 > Economic Development

REFERENCE NEWS:

In a major push to transform India's dairy cooperative sector, Union Minister Amit Shah unveiled **'White Revolution 2.0'**, a comprehensive initiative aimed at empowering women farmers and creating job opportunities.The programme is one of the three initiatives undertaken in the first 100 days of the Modi government's third term.

INDIA'S DAIRY SECTOR:

- India is the world's top milk producer, with production having reached 230.58 million tonnes during 2022-23. In 1951-52, the country produced just 17 million tonnes of milk.
- The national per capita availability of milk is 459 grams/ day, which is higher than the global average of 323 g/ day; this number, however, varies from 329 g in Maharashtra to 1,283 g in Punjab.
- As per the Basic Animal Husbandry Statistics (BAHS) 2023, the top five milk producing states are UP (15.72%), Rajasthan (14.44%), Madhya Pradesh (8.73%), Gujarat (7.49%), and Andhra Pradesh (6.70%), which together contribute 53.08% of the country's total milk production.
- Almost **31.94% of the total milk production comes from indigenous buffaloes**, followed by 29.81% from crossbred cattle. Nondescript buffaloes contribute 12.87%, indigenous cattle 10.73%, and nondescript cattle 9.51%, according to BAHS figures. The share of goat milk is 3.30%, and that of exotic cows, 1.86%.
- The idea of White Revolution 2.0 revolves around cooperative societies, which were also the bedrock of **Operation Flood** five decades ago. Operation Flood, launched in 1970, ushered in the White Revolution and transformed the dairy sector in India.
- **Dairy cooperatives** procured 660 lakh kg of milk per day in 2023-24; the government wants to increase this to 1,007 lakh kg/ day by 2028-29. For this, it has formulated a strategy of expanding coverage and deepening the reach of cooperatives.
- Since it was created in 2021, the Ministry of Cooperation has focused on expanding the network of cooperatives, in particular dairy cooperatives.

- According to officials of the **National Dairy Development Board (NDDB),** the regulator of the dairy industry in India, dairy cooperatives operate in around 70% of the country's districts.
- There are **about 1.7 lakh dairy cooperative societies** (DCSs), which cover around 2 lakh villages (30% of the total number of villages in the country), and 22% of producer households. These cooperative societies procure about 10% of the country's milk production and 16% of the marketable surplus.

WHITE REVOLUTION 2.0:

White Revolution 2.0 will strengthen women's self-reliance and empowerment as well as the fight against malnutrition. The programme focuses on four key areas - **empowering women farmers, enhancing local milk production, strengthening dairy infrastructure, and boosting dairy exports**.

White Revolution 2.0 aims to increase milk procurement by dairy cooperative societies by **50 percent over the next five years.**The dairy cooperatives will procure one thousand lakh litre of milk daily by the end of the fifth year significantly enhancing the livelihoods of rural producers. The plan involves **setting up and strengthening 100,000 new and existing district cooperative societies**, multi-purpose district cooperative societies, and multi-purpose PACS, which will be linked to milk routes with necessary infrastructure.

SIGNIFICANCE OF WHITE REVOLUTION 2.0:

- **Enhancing Milk Productivity and Yield:** One of the core aims of White Revolution 2.0 is to improve milk yields by focusing on **breeding practices, better feed management**, and **animal healthcare**. Enhancing productivity would ensure more milk production without a proportional increase in livestock, improving the overall efficiency of the dairy sector.
- **Strengthening Rural Economy and Farmer Income:** A significant part of White Revolution 2.0 focuses on improving the livelihoods of small and marginal dairy farmers by providing them access to improved veterinary services, modern technology, and organized markets.
    - Dairy farming is the second-largest rural employment sector in India after agriculture.
- **Value Addition and Market Expansion:** emphasizes the production of **value-added dairy products** like cheese, yogurt, and milk powders, which have a growing demand in domestic and international markets.Expanding into value-added products can significantly boost the revenue of India's dairy sector and enhance its global

competitiveness. This will also help the sector diversify, reducing reliance on just raw milk.

- **Focus on Technology and Innovation:** integrates technology into the dairy sector, such as **genetic improvements**, **data-driven decision-making**, and **digital platforms** for dairy supply chains. New tools for milk quality testing, disease prevention, and better breeding techniques are essential components.
- **Promoting Dairy Cooperatives:** Similar to Operation Flood, White Revolution 2.0 aims to empower dairy farmers through the **cooperative model**. These cooperatives help eliminate middlemen, ensure better prices for farmers, and create a stable supply chain from producer to consumer.
    - Cooperatives like **Amul** have become world-renowned models of collective dairy farming. Expansion and strengthening of this model under White Revolution 2.0 would benefit farmers by providing them with market access, technical support, and fair compensation.
- **Addressing Environmental Sustainability:** There is a growing focus on making dairy farming more **sustainable**. White Revolution 2.0 promotes the use of **sustainable fodder practices, biogas plants**, and **efficient water usage** in dairy farming.
- **Improving Milk Quality and Safety Standards:** Enhancing the quality of milk and dairy products is crucial to cater to both domestic and international markets. White Revolution 2.0 places emphasis on ensuring **higher standards of milk quality**, improving storage infrastructure, and better monitoring systems for contamination or adulteration.
- **Empowering Women in the Dairy Sector:** Dairy farming in India involves significant participation from rural women. White Revolution 2.0 aims to provide **training, financial support,** and **leadership roles** to women in dairy cooperatives.
- **Address India's Malnutrition:** Milk and milk based products added to India's dietary basket will aid India's revival strategy against child malnutrition that causes wasting, stunting etc.

CHALLENGES OF DAIRY SECTOR IN INDIA:

- **Low Milk Productivity**: The average milk production per cow in India is around 1,500 liters per lactation, compared to 9,000 liters in the U.S. and 6,000 liters in Europe.
    - India's average milk yield per animal is approximately 3-4 kg/day, compared to 30-40 kg/day in developed countries like the USA

- **Poor Animal Health and Veterinary Services**: India faces a shortage of trained veterinarians, and the availability of animal healthcare services is limited, particularly in rural areas. Many animals are prone to diseases like Foot and Mouth Disease (FMD), which reduce productivity.
    - In 2020, an outbreak of Lumpy Skin Disease in states like Gujarat and Rajasthan affected a large number of cattle, severely impacting milk production.India has approximately 0.36 veterinarians per 1,000 animals, much lower than the recommended 1 veterinarian per 5,000 animals.
- **Inadequate Feeding Practices**: Poor feeding practices, lack of nutritious fodder, and water scarcity affect animal health and milk yield. Many farmers are not aware of or cannot afford balanced diets for their livestock, relying on crop residues and low-nutrient grasses.
    - In states like Uttar Pradesh and Bihar, the majority of dairy farmers feed their cattle suboptimal diets, resulting in lower milk yields.According to a report by NITI Aayog, 60% of dairy farmers cannot afford quality feed, which leads to a significant reduction in milk productivity.
- **Lack of Infrastructure for Milk Collection and Cold Chain**: India suffers from a shortage of infrastructure for milk collection, storage, and cold chains, leading to a high rate of spoilage. Rural areas, in particular, lack proper cold storage facilities, resulting in wastage during transportation.
    - In Madhya Pradesh, nearly 15-20% of milk produced gets spoiled due to inadequate cold chain facilities during peak summers.A NABARD report indicates that 10-12% of milk production in India is lost annually due to poor cold chain infrastructure.
- **Milk Adulteration and Quality Issues**: India faces a significant problem with milk adulteration and substandard milk quality. Adulteration of milk with water, detergent, or chemicals to increase volume is common, which poses serious health risks.
    - The Food Safety and Standards Authority of India (FSSAI) in 2018 found that 68.7% of milk samples tested were not in compliance with food safety standards, primarily due to adulteration.The National Milk Quality Survey (2018) found that nearly 10% of milk sold in India was adulterated with contaminants like urea and detergents.

- **Fragmented Nature of Dairy Farming**: The Indian dairy sector is highly fragmented, with 70-80% of the production coming from small and marginal farmers who own only 1-3 animals. This small-scale production makes it difficult to implement modern dairy practices and achieve economies of scale.
    - In states like West Bengal and Odisha, the average herd size is small, making it difficult for farmers to invest in high-quality feed, veterinary care, or modern technology.Around 70 million rural households in India are engaged in dairy farming, but a vast majority own fewer than 3 animals, limiting their production capacity.
- **Climate Change and Environmental Impact**: Climate change is increasingly affecting the dairy sector. Rising temperatures and changing rainfall patterns reduce the availability of quality fodder and water, negatively impacting milk production. Furthermore, the dairy sector contributes to greenhouse gas emissions, particularly methane from livestock.
    - In Rajasthan, farmers have reported declining milk yields due to severe water shortages and droughts over the past few years. The livestock sector, which includes dairy farming, is responsible for 18% of global greenhouse gas emissions. Methane emissions from dairy cattle in India are also a growing environmental concern.
- **Lack of Financial Inclusion and Credit Access**: Many small dairy farmers lack access to formal credit, preventing them from investing in high-quality cattle, feed, or infrastructure. Limited financial inclusion also affects their ability to avail insurance for their livestock.
    - In Uttar Pradesh, many farmers rely on informal sources of credit at high interest rates, which eats into their earnings.A report by NABARD (2019) indicated that only 25% of dairy farmers had access to formal credit, significantly limiting their capacity to improve their operations.

WAY FORWARD:

- **Improving Milk Productivity through Advanced Breeding and Nutrition**: Brazil's dairy sector improved milk yield by focusing on crossbreeding programs between local cattle and high-yielding foreign breeds.India should strengthen the use of sexed semen technology and artificial insemination to improve genetic traits and boost milk production while preserving indigenous breeds like Gir and Sahiwal.

- **Focus on Balanced Animal Nutrition**: The Netherlands, with its focus on quality cattle feed and balanced diets, has one of the highest milk productivity rates in the world. Introduce fodder development programs and promote the cultivation of high-nutrient grasses and silage, especially in regions facing water scarcity.
- **Strengthening Rural Dairy Infrastructure and Cooperatives**: Amul's cooperative model successfully empowered small farmers in Gujarat by ensuring fair prices, technical support, and access to markets. Expand the cooperative model to underserved states like Bihar and Odisha and ensure that women and smallholder farmers are included in decision-making processes.
- **Building Cold Chain Infrastructure**: New Zealand has a world-class cold chain system for milk and dairy products, ensuring minimal wastage.Develop milk chilling units and village-level bulk coolers in rural areas to prevent milk spoilage. Introduce milk ATMs for direct access to consumers in urban areas, reducing intermediaries.
- **Technological Integration in Dairy Farming:** Kenya's M-Pesa allows farmers to receive payments for milk directly on their mobile phones, ensuring transparency and immediate cash flow.
- **Adoption of Data-Driven Dairy Management**: Israel's dairy farms use sensors to track cattle health and feed quality, resulting in some of the highest milk yields per cow. Deploy affordable wearable sensors for cattle in India to monitor real-time health and productivity, reducing the likelihood of diseases and increasing milk yield.
- **Promoting Sustainability in Dairy Farming:** In Australia, sustainable fodder and water-efficient practices have reduced the environmental impact of dairy farming. In water-scarce regions like Rajasthan and Gujarat, promote the use of water-efficient fodder crops like Berseem and Sorghum, while encouraging farmers to use rainwater harvesting and drip irrigation.
- **Waste-to-Energy Initiatives**: In Denmark, farmers utilize biogas plants to convert dairy waste into energy, reducing greenhouse gas emissions. India can encourage farmers to install biogas digesters, which can generate energy for cooking and reduce the carbon footprint of dairy farming. The government could offer subsidies to set up such biogas plants in dairy clusters.
- **Focus on Value-Added Dairy Products:** France is known for its wide variety of value-added dairy products, generating significant export revenue from cheese, yogurt, and butter. Promote the manufacturing of ethnic dairy products like paneer, ghee, and khoa for export markets, while expanding into high-demand sectors like organic dairy products.
- **Promoting Dairy Exports:** New Zealand, despite its small population, is one of the largest exporters of dairy products globally, due to its focus on quality and global marketing. India should focus on building export-quality infrastructure and meeting

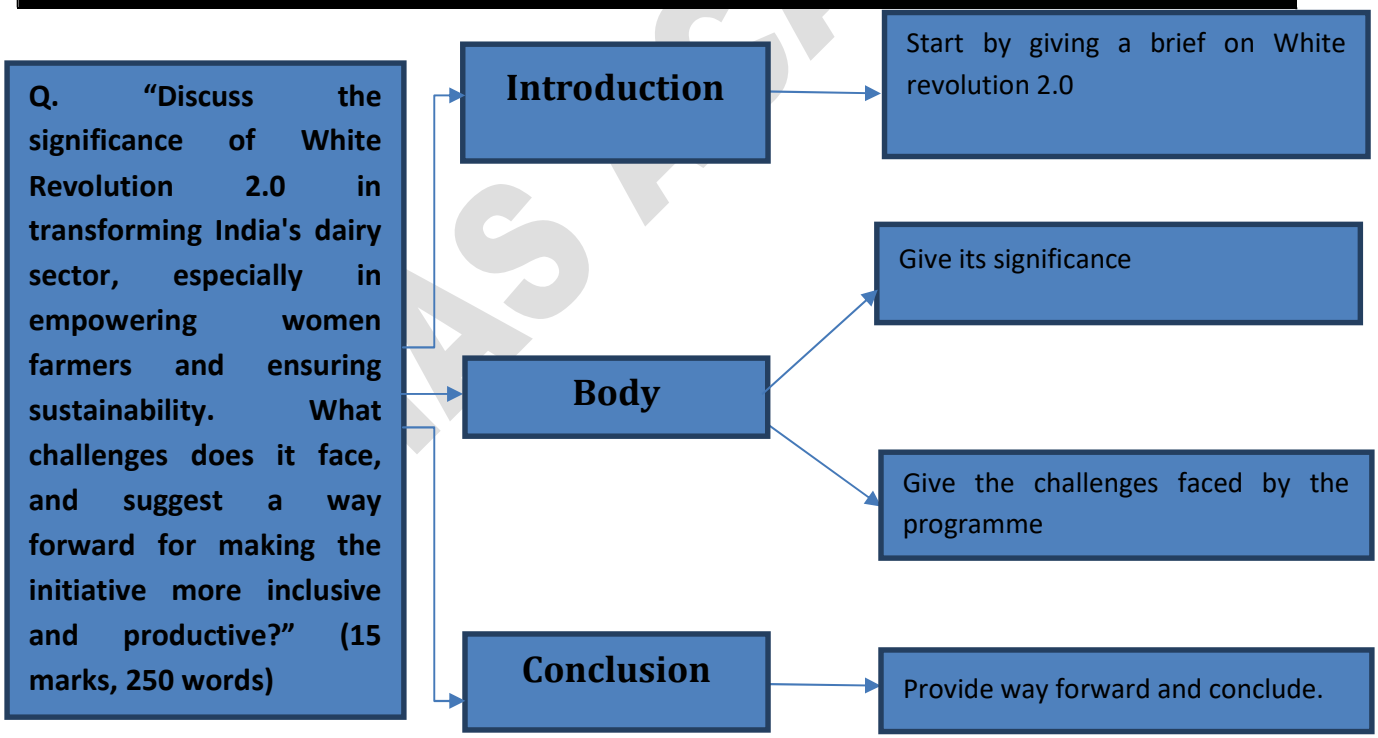
sanitary and phytosanitary standards to boost dairy exports to regions like the Middle East, Africa, and Southeast Asia.

- **Improved Access to Credit and Insurance**: Bangladesh's Grameen Bank has pioneered microfinance initiatives for dairy farmers, allowing them to purchase cattle and expand their operations.
- **Empowering Women in the Dairy Sector**: Kenya's dairy cooperatives have a strong focus on including women in leadership roles, which has boosted milk production and household incomes.

PRACTICE QUESTION

Q. "Discuss the significance of White Revolution 2.0 in transforming India's dairy sector, especially in empowering women farmers and ensuring sustainability. What challenges does it face, and suggest a way forward for making the initiative more inclusive and productive?" (15 marks, 250 words)

APPROACH



MODEL ANSWER

White Revolution 2.0, recently unveiled by the Indian government, seeks to transform the dairy sector by boosting milk production, empowering women farmers, and addressing malnutrition.

This initiative builds upon the success of the first White Revolution (Operation Flood) while addressing contemporary challenges such as climate change, market access, and infrastructure

SIGNIFICANCE:

1. **Empowering Women Farmers**: White Revolution 2.0 focuses on **women's self-reliance**, providing training, leadership roles, and financial support through cooperatives
2. **Sustainability and Climate Resilience**: The program promotes **sustainable dairy practices** like efficient water usage and biogas plants to reduce greenhouse gas emissions
3. **Boosting Rural Income**: By enhancing milk production, promoting value-added products like cheese and yogurt, and improving market access, the initiative aims to **increase rural incomes** and alleviate poverty
4. **Cooperative Strengthening**: It aims to increase milk procurement by cooperatives by **50% over five years**, benefiting millions of rural producers

CHALLENGES:

1. **Low Productivity**: India's average milk yield is **3-4 kg/day**, much lower than developed nations like the U.S. and Europe
2. **Inadequate Infrastructure**: A lack of cold chain infrastructure leads to high spoilage rates of around **10-12% of milk production**, particularly in rural areas
3. **Fragmented Dairy Farming**: With **70-80%** of dairy production coming from small farmers owning 1-3 animals, scaling up remains a challenge
4. **Environmental Impact**: Climate change affects the availability of quality fodder and water, negatively impacting milk production

WAY FORWARD:

1. **Improving Productivity**: Promote **genetic improvement programs** and balanced nutrition through better fodder and veterinary services
2. **Infrastructure Development**: Expand cold chain facilities and milk chilling units, particularly in rural areas, to reduce spoilage
3. **Inclusive Financial Access**: Ensure better access to credit and insurance for small and marginalized farmers

4. **Sustainability Focus**: Encourage the use of biogas plants and **water-efficient fodder crops** like Berseem to address environmental concerns

White Revolution 2.0 is pivotal in addressing contemporary challenges in India's dairy sector by focusing on inclusivity, sustainability, and women's empowerment. However, overcoming infrastructural and productivity bottlenecks is essential to ensure its success in boosting rural livelihoods and making Indian dairy globally competitive.

23. SEMICONDUCTOR MANUFACTURING IN INDIA

iMPACT ANALYSIS

SYLLABUS:

GS 3> Industry and infrastructure > Industrial Policies

REFERENCE NEWS:

- India's semiconductor industry is expanding with several significant projects. The Union Cabinet recently approved a ₹3,300 crore investment for a KaynesSemicon unit in **Sanand, Gujarat**, to produce **60 lakh chips per day**, enhancing the **India Semiconductor Mission (ISM).**

MORE ON NEWS:

- Meanwhile, Maharashtra's cabinet cleared a **USD 10 billion joint venture** between Tower Semiconductor and the Adani Group for a facility in **Taloja, Panvel**, awaiting approval from the India Semiconductor Mission (ISM).
- Additionally, foundation stones are being laid for:

Semiconductor Fabrication Facility by **Tata Electronics in Dholera**, Gujarat (₹91,000 crore).

Outsourced Semiconductor Assembly and Test (OSAT) facility in **Morigaon**, **Assam by Tata Electronics** (₹27,000 crore).

OSAT facility in **Sanand, Gujarat** by **CG Power** (₹7,500 crore).

OSAT refers to Outsourced Semiconductor Assembly and Test, where post-fabrication processes such as assembly, packaging, testing, and marking of chips are carried out, preparing them for integration into electronic device

SEMICONDUCTORS:

- A semiconductor material has an electrical conductivity value falling between that of a conductor, such as metallic copper, and an insulator, such as glass. Common elemental semiconductors are **silicon and germanium**.
- Chipsets are the most commonly used semiconductor component. A chipset is a **group of integrated circuits that control the flow of data** and instructions between the central processing unit (CPU) and external devices.
- Their design and development occur in various stages:

A **wafer** is designed and manufactured in **wafer fabrication (FAB) units, also called foundries**, by companies as per the requirements of chip manufacturers like Samsung and Qualcomm.

The chipmakers then package, test and sell the chips to equipment manufacturers such as Xiaomi and Cisco.

- End-use industries that depend on semiconductors include mobile and telecommunication devices, industrial machinery, automobiles, automation (workplace, healthcare, manufacturing etc.), the Internet of Things (IoT) and other industries that have applications for computing in some form or other.

INDIAN SCENARIO:

- The current production of electronic components in India is valued at **USD 11 billion** and is expected to reach **USD 18 billion by FY 26.(**Source: Invest India)
- The **Indian semiconductor market**, which is valued at approximately **USD 23.2 billion** and is projected to reach **USD 80.3 billion by 2028**, is growing at a compound annual growth rate (CAGR) of 17.10%.(Source: Invest India)
- India has the requisite expertise in software and chip design. Yet**, India lags in the establishment of semiconductor wafer fabrication (FAB) units**.

SIGNIFICANCE OF SEMICONDUCTOR MANUFACTURING

- **Boost Domestic Manufacturing and Supply Chain Resilience:**
    - India aims to become **self-reliant** in semiconductor manufacturing under the **Atmanirbhar Bharat initiative**, with the vision to emerge as a global hub for electronic system design and semiconductor manufacturing.
    - For instance, the **COVID-19 pandemic** highlighted vulnerabilities in global supply chains, especially in the semiconductor industry. By bolstering domestic manufacturing, India can reduce its dependency on international suppliers and enhance **supply chain resilience** against global disruptions.
- **Attract Investment:**
    - India has introduced a **USD10 billion incentive package** under the **Production Linked Incentive (PLI) Scheme for Semiconductors** as part of its broader strategy to establish a robust domestic semiconductor ecosystem. This package, managed by the **India Semiconductor Mission (ISM),** offers up to 50% fiscal support for semiconductor and display manufacturers.

- The goal is to **attract global chip makers** to set up production bases in India, positioning the country as a key player in the global semiconductor market. Major companies such as **Tower Semiconductor, Foxconn, and Vedanta** have already expressed interest.

- **Employment Generation:**
  - With the advent of **Industry 4.0**, the semiconductor industry will create **highly skilled employment opportunities**. For instance, by developing a strong domestic electronics industry, India can harness its **demographic dividend**, generating jobs in advanced technological sectors.

- **Reap Benefits of the Global Chip Shortage:**
  - The global semiconductor shortage has disrupted industries worldwide, presenting India with an opportunity. By attracting fabrication units through favorable policies, India could enhance its self-reliance in semiconductor production, **meeting domestic and global demands**.

- **Strategic Significance:**
  - Manufacturing and supply of semiconductors are concentrated in countries like **Taiwan, South Korea, Japan, the U.S., and China**. Geopolitical tensions in these regions could disrupt supply chains.
  - For instance, **Taiwan, the world's leading chip producer**, faces tensions with mainland China, posing risks to India's imports. Attaining **self-sufficiency** in semiconductor production can protect India from such geopolitical risks.

- **National Security:**
  - Semiconductors are critical components in **defense technologies**. Ensuring a **domestic supply** of these components protects a nation's security apparatus from unreliable foreign sources, thereby enhancing **national security**.

- **R&D Ecosystem Development:**
  - A robust semiconductor manufacturing sector fosters a vibrant **research and development ecosystem**. For instance, **Silicon Valley** demonstrates how a strong semiconductor industry can attract talent and investments in **cutting-edge technologies**.

- **Technological Sovereignty:**
  - Control over **semiconductor technology** is crucial for **technological sovereignty**. For example, it allows countries to set their own standards and regulations, ensuring independence from foreign entities for critical technologies.

- **Economic Diversification:**
    - Investing in **electronics and semiconductor manufacturing** helps diversify a country's economy, **reducing reliance on traditional industries**.
    - For example, **Taiwan's economy** shows how its thriving semiconductor industry has contributed to **economic growth** and diversification.
- **Promote Circular Economy:**
    - A **circular electronics system**, where resources are reused in multiple ways, fosters **sustainability** and enhances **cost-effectiveness**. For instance, building a reliable domestic semiconductor manufacturing base is essential to develop such sustainable systems.

CHALLENGES:

- **Capital intensive industry:**

A semiconductor fabrication facility can cost multiples of a billion dollars to set up even on a relatively small scale. They also have high operating costs and need frequent technology replacement. This makes it a **viable industry for only a few corporate giants**.

- **Power demand:**

Chip fabs require extremely stable power supply. But this is a challenge in India.

For instance, India recorded a power supply **shortage of 1,201 million unitsin October 2021** — the highest in 5.5 years — due to coal shortage in thermal plants. This example highlights **the ongoing challenges in ensuring consistent power supply,** an issue that persists even in 2024, as India continues to face coal-related shortages impacting power generation in several states.

- **Concerns over water use:**

Semiconductor manufacturing requires large volumes of **ultra-pure water** to avoid the contamination of electronic devices. For a **water stressed country** like India, such levels of water usage are unsustainable.

For instance, Taiwan Semiconductor Manufacturing Company uses around **60 liters of water per layer of chip** and the recent severe drought in Taiwan has affected production.

- **Stiff competition:**

India has a weak ecosystem and shortage of resources as compared to more competitive bases **like China and Vietnam**. Hence, it would require immense government support to attract the industries to the country.

- **Challenges and Previous Attempts:**

Previous attempts to establish semiconductor fabrication facilities in India faced challenges. Notably, a **joint venture between Foxconn and Vedanta**, aimed at setting up a **USD 19.5 billion chip plant, was dissolved**.

Additionally, Tower Semiconductor's initial **proposal for a USD 3 billion plant in Karnataka was stalled** due to its then impending merger with Intel, which was **eventually cancelled due to regulatory hurdles.**

- **Environmental concerns:**

India is the **third largest producer of e-waste,** generating about 2.4 kg of e-waste per capita. The arrival of new industries would increase the amount of e waste generated in the country.

https://www.ilearncana.com/details/INDIAS-E-WASTE-PROBLEM/833

GOVERNMENT EFFORTS:

- **India Semiconductor Mission(ISM)**
  - India Semiconductor Mission (ISM) has been setup as an **Independent Business Division within Digital India Corporation.**

Digital India Corporation has been set up by **the Ministry of Electronics & Information Technology**, Government of India, to innovate, develop and deploy ICT and other emerging technologies for the benefit of the common man. It is **a 'not for profit' Company** under Section 8 of the Companies Act 2013. The Company has been **spearheading the Digital India programme** of the Government of India, and is involved in promoting use of technology for eGovernance/ e-Health / Telemedicine, e-agriculture, e-Payments etc

  - ISM has all the **administrative and financial powers** and is tasked with the responsibility of catalysing the India Semiconductor ecosystem in manufacturing, packaging and design.
  - ISM has been working as **nodal agency** for the Schemes approved under **Semicon India Programme.** The **applications were received by ISM and are being appraised by ISM.** ISM has also been engaging with various stakeholders of Semiconductors and Display ecosystem to attract the investments in India.

- **Semicon India Programme:**
  - The government has approved the Semicon India programme with a total outlay of INR 76,000 crore for the development of semiconductor and display manufacturing ecosystems in the country.

- The following four schemes have been introduced under the programme:
    1. **Modified Scheme for setting up of Semiconductor Fabs in India**.
    2. **Modified Scheme for setting up of Display Fabs in India**.
    3. **Modified Scheme for setting up of Compound Semiconductors / Silicon Photonics / Sensors Fab / Discrete Semiconductors Fab and Semiconductor Assembly, Testing, Marking and Packaging (ATMP) / OSAT facilities in India**.
    4. **Semicon India Future Design: Design Linked Incentive (DLI) Scheme.**

- **National Policy on Electronics 2019 (NPE 2019):**
    - The National Policy on Electronics 2019 (NPE 2019) aims to establish **India as a global hub for Electronics System Design and Manufacturing (ESDM).**

- **PLI Scheme for Large Scale Electronics Manufacturing:**
    - Under the scheme, electronic manufacturing companies will get an **incentive of 4 to 6% on incremental sales** (over base year) of goods manufactured in India and covered under target segments, to eligible companies over a period of next 5 years.

- **scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS):**
    - Under the scheme, a financial incentive of 25% of capital expenditure has been approved by the Union Cabinet for the manufacturing of goods that constitute the supply chain of an electronic product.

- **Modified Electronics Manufacturing Clusters (EMC 2.0) Scheme:**
    - The scheme will provide financial assistance up to 50% of the project cost subject to a ceiling of Rs 70 crore per 100 acres of land for setting up of Electronics Manufacturing Cluster projects.

WAY FORWARD:

- **Fast-track Approvals:** Expedite government approvals for semiconductor projects to maintain momentum and interest from global players.
- **Infrastructure Development:** Focus on building requisite infrastructure such as stable power supply, water availability, and logistics to support semiconductor manufacturing.
- **Skill Development:** Invest in specialized training programs to create a skilled workforce capable of meeting the demands of the semiconductor industry.

- **R&D Support:** Increase funding and support for research and development in semiconductor technology to foster innovation and reduce dependence on foreign tech.
- **Partnerships and Alliances:** Encourage joint ventures and partnerships between Indian companies and global semiconductor leaders to transfer knowledge and technology.
- **Sustainability and E-Waste Management:** Implement sustainable practices in manufacturing and waste management to address environmental impacts.
- **Global Supply Chain Integration:** Position India as a key player in the global semiconductor supply chain through strategic partnerships and trade agreements.

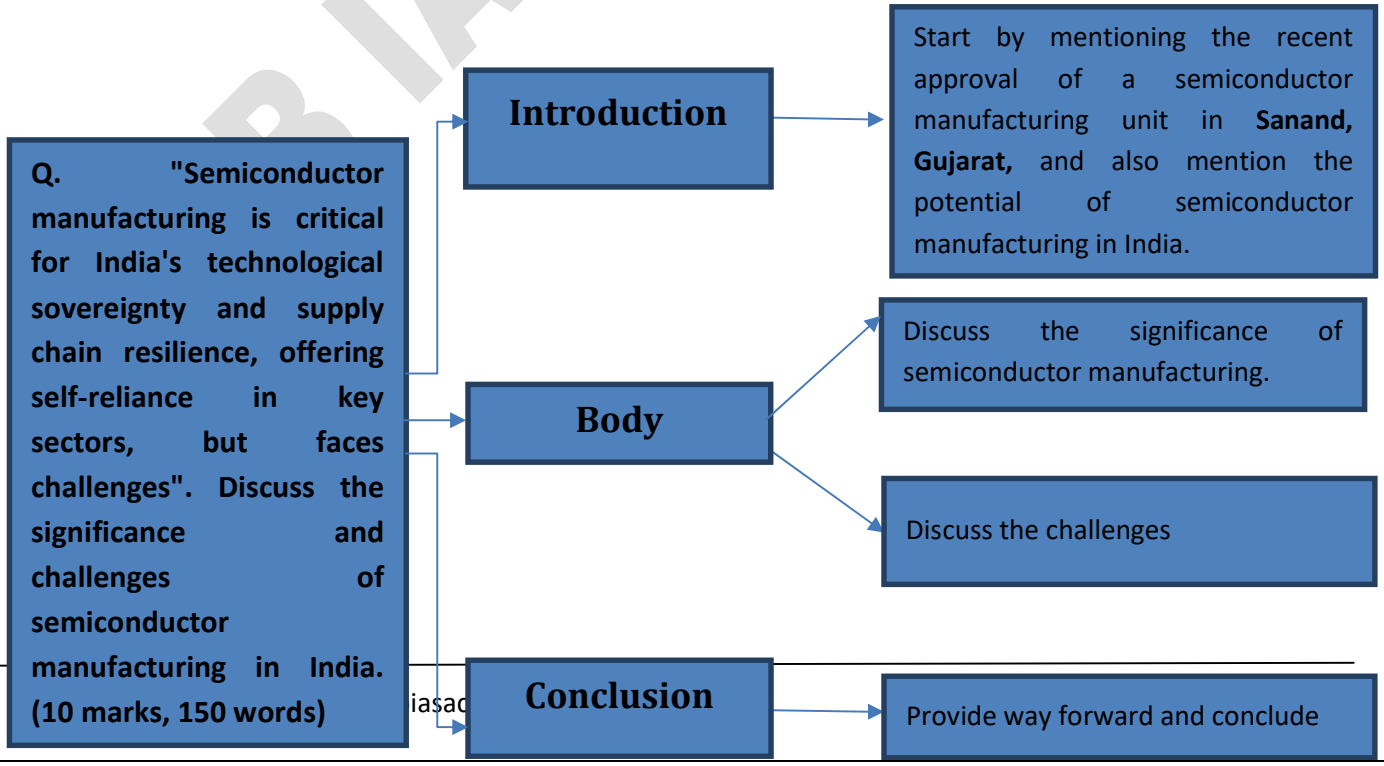
CONCLUSION:

- India's growing semiconductor industry, backed by initiatives like the India Semiconductor Mission, positions the country to become a global leader in advanced tech manufacturing. By focusing on innovation, sustainability, and strategic partnerships, India can shape the future of global supply chains, driving technological independence and economic growth in a rapidly digitizing world.

PRACTICE QUESTION

Q. "Semiconductor manufacturing is critical for India's technological sovereignty and supply chain resilience, offering self-reliance in key sectors, but faces challenges". Discuss the significance and challenges of semiconductor manufacturing in India. (10 marks, 150 words)

APPROACH



MODEL ANSWER

India's semiconductor industry is expanding, highlighted by the Union Cabinet's approval of a Rs.3,300 crore investment for a **KaynesSemicon unit in Sanand**, Gujarat, which will produce **60 lakh chips daily**. With the market valued at USD 23.2 billion and projected to reach **USD 80.3 billion by 2028**, India has the potential to become a global semiconductor hub.

Significance of Semiconductor Manufacturing in India:

- **Boost to Domestic Manufacturing and Supply Chain Resilience:** Semiconductor manufacturing is crucial for India's self-reliance under Atmanirbhar Bharat. The COVID-19 pandemic exposed vulnerabilities in global supply chains, especially in semiconductors. A robust domestic industry will ensure India's resilience against global disruptions.
- **Technological sovereignty and R&D ecosystem:** Control over semiconductor technology is key to both technological sovereignty and a strong R&D ecosystem. For example, Silicon Valley's success shows how investing in semiconductors enables countries to set their own standards, attract talent, and drive innovation, ensuring independence from foreign entities.
- **Attract Investment:** India's USD 10 billion Production Linked Incentive (PLI) Scheme offers up to 50% fiscal support for semiconductor and display manufacturers. This aims to attract major players like Tower Semiconductor, Foxconn, and Vedanta to set up in India.
- **Employment Generation:** The growing semiconductor ecosystem will generate high-skilled jobs. Projects like Tata Electronics' FAB unit in Gujarat (₹91,000 crore) will provide employment in advanced tech sectors.
- **Technological Innovation and Competitiveness:** A strong domestic industry will drive innovation in AI, 5G, and automation, helping India compete globally and enhance its technological edge.
- **Strategic Significance and National Security:** Geopolitical tensions, especially between China and Taiwan (the world's leading chip producer), highlight the need for self-sufficiency. Domestic semiconductor manufacturing will reduce reliance on foreign suppliers, securing India's defense technologies.

Challenges in Semiconductor Manufacturing:

- **Capital Intensive:** The cost of setting up semiconductor fabrication facilities (FABs) is prohibitively high. For instance, Tata Electronics' FAB unit in Gujarat is estimated to cost ₹91,000 crore. The industry requires continuous technology upgrades, making it viable only for large corporations.

- **Power and Water Demand:** Chip manufacturing requires a stable power supply, which remains a challenge in India due to coal-related shortages. Additionally, FAB units need large volumes of ultrapure water. India, being a water-stressed nation, faces sustainability challenges in supporting this resource-intensive industry.
- **Environmental Concerns:** India, the third-largest producer of e-waste, will face further strain on its waste management infrastructure with the expansion of the semiconductor industry. Efforts must be made to mitigate the environmental impact of increased e-waste generation.
- **Lack of Skilled Workforce:** While India has a strong pool of software engineers, the country still lacks the specialized workforce required for semiconductor manufacturing, packaging, and testing. Developing this skill set will require significant investment in education and training programs to support the growth of the sector.
- **Stiff Competition:** India lacks the well-established semiconductor ecosystem that countries like China and Vietnam have. Building a competitive industry will require strong government support, favorable policies, and fast-track approvals for investments.

Way Forward:

- **Fast-Track Approvals:** Expedite approvals for semiconductor projects to maintain momentum and attract foreign investors.
- **Infrastructure Development:** Ensure stable power supply and water availability to support the high operational demands of FAB units.
- **Skill Development:** Invest in specialized training programs to create a skilled workforce capable of meeting industry demands.
- **Sustainability Practices:** Implement stringent e-waste management strategies and promote a circular economy to address environmental concerns.

India's semiconductor sector, supported by initiatives like the ***India Semiconductor Mission (ISM)***, ***Semicon India Programme***, ***Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS)***, **and** ***Modified Electronics Manufacturing Clusters (EMC 2.0) Scheme***, is set to become a global leader in tech manufacturing. By focusing on innovation, sustainability, and partnerships, India can overcome challenges and secure a key role in global semiconductor supply chains, driving growth and technological sovereignty.

24. ROAD SAFETY IN INDIA

iMPACT ANALYSIS

SYLLABUS:

GS 3 > Industry and infrastructure > Roads

REFERENCE NEWS:

- The **"India Status Report on Road Safety 2024,"** by the TRIP Centre at IIT Delhi, critically assesses India's progress toward international road safety goals. It reveals that India is lagging significantly in reducing road traffic fatalities and that an integrated approach to road construction and mobility is crucial. According to the report, road crashes are the leading cause of unintentional injury deaths in India, with the country showing minimal progress in curbing fatalities.

HIGHLIGHTS OF THE REPORT:

- The report reveals significant disparities in traffic death rates across states, emphasizing the **high vulnerability of motorcyclists** and the **frequency of fatal truck crashes.**
- Road safety varies widely, with per capita **death rates more than threefold** between states. **Tamil Nadu, Telangana, and Chhattisgarh** had the highest rates at 21.9, 19.2, and 17.6 per 100,000 people respectively in 2021, while **West Bengal and Bihar** reported the lowest at 5.9 per 100,000.
- The report finds that road traffic injuries continue to be a **major public health challenge** in India, with minimal progress in reducing fatalities despite advancements in other sectors. It also notes that most Indian states are unlikely to achieve the **United Nations Decade of Action for Road Safety goal of halving traffic deaths by 2030.**
- In 2021, road traffic injuries were the 13th leading cause of death in India and the 12th leading cause of health loss, measured in **Disability-Adjusted Life Years (DALYs).** In six states, these injuries are among the **top 10 causes of health loss**, reflecting the severe impact of road safety deficiencies.
- Comparing India's road safety to that of developed countries like **Sweden**, the report notes a **dramatic increase** in the likelihood of road accident fatalities in India—from **40% more likely than Sweden in 1990 to 600% more likely in 2021**. This comparison underscores the urgent need for enhanced road safety measures in India.

REASONS FOR ROAD ACCIDENTS:

- **Demand Vs capacity mismatch:**
    - Increasing urbanisation and economic growth are **not translating to a proportionate increase in the capacity of roads** in India, hence the **congestion of vehicles**, which is prone to accidents.
    - For instance, as of March 2022, the number of registered motor vehicles in India reached approximately **354 million**, a sharp increase from 334 million in 2021. This surge, combined with about a **third of India's population living in urban areas** as of 2023, underscores the severe strain on road infrastructure, especially in cities where space is limited.
- **Infrastructural deficits:**
    - Poor condition of roads and vehicles, **blind spots, low emphasis on structural change** such as raising engineering standards for **roads, signages, signals**.
- **Negligence:**
    - Lack of precautions by road users such as **not wearing helmets, triple-riding, over speeding, drunk driving, distraction while driving like talking over mobile phones.**
    - According to the Ministry of Health's "National Strategy for Prevention of Unintentional Injury," revealed during the "Safety 2024" conference, **over-speeding** is responsible for **75.2% of road crash fatalities**.
- **Poor enforcement of laws:**
    - India amended its law on motor vehicles in 2019, but its **implementation by State governments is not uniform or complete.** The focus of State governments, remains conventional, with an emphasis on user behaviour (drivers and other road users), education and uneven enforcement.
- **Lack of accountability:**
    - The MV Act stipulates only a **fine up to one lakh** for failure to follow norms and stipulations by the designated authority, contractor, consultant or concessionaire, leading to death or disability, and there is little evidence that even this has been enforced after a public inquiry.
- **Vehicle Safety Concerns in India**
    - The Global New Car Assessment Programme **(NCAP)** highlights significant safety concerns for vehicles in India. Popular models like the **Suzuki-Maruti Alto 800 and Tata Nano** have failed the UN's frontal impact crash tests, receiving **zero-star ratings.** This

deficiency in essential safety features, including airbags and structural integrity, contributes to the high occurrence of life-threatening injuries in road accidents.

- **Absence of a national crash-level database:**
    - The absence of a national crash-level database is a significant factor contributing to the increase in road accidents in India, as highlighted in the **"India Status Report on Road Safety 2024."** This deficiency critically **undermines the effectiveness of road safety policies** by limiting the ability to conduct detailed analyses and evaluate policies effectively.
- **Inadequate driver training:**
    - In 2018, **26% of all road accidents** were caused by drivers who did not have a valid license or were driving with a learner's license. Moreover, high number of accidents indicate that the current licensing mechanism in India is unreliable.
- **Weak post-accident measures:**
    - India lacks a technically competent investigation arm that could determine the cause of accidents. This results in accidents repeating at same spots.

SIGNIFICANCE OF ROAD SAFETY:

- **Socio-economic costs:**
    - Road traffic injuries are one of the leading causes of death, disabilities and hospitalization in the country, imposing huge socio-economic costs.
    - As per the World Bank's estimation, India loses **3.14% of its GDP due to road accidents, most of which are preventable.**
- **Working age population is the most vulnerable group:**
    - According to the **'Road Accidents in India: 2022'** report, an age-wise breakdown of road crash data shows that most of those who died were in the **18–45 age bracket (66.5%).**
- **Differential impact:**
    - **A 2021 World Bank study** found that road crashes **disproportionately impact poor** households in India. Over **75% of these households surveyed reported a decline in income** due to such incidents, stemming from loss of income, high medical costs, and limited access to social safety nets.
- **Dominance of Road Transport in India:**

- Recent government data highlights that road transport is the primary mode of transport in India, handling about **64.5% of goods and 90% of passenger traffic.** As population growth and economic development drive increases in vehicle numbers and road network expansion, it's crucial that road safety measures also advance to manage the rising traffic volumes effectively.

- **Challenge against attaining SDGs:**
  - The persistently high annual death toll brings into question the country's ability to meet Sustainable Development Goal (SDG) 3.6, which **aims to halve the fatalities and injuries from road traffic accidents by 2030.**

GOVERNMENT INITIATIVES:

Legislative and Policy Measures:

- The 1989 Motor Vehicles Act, amended in 2019, defines good Samaritans, increases penalties, offers cashless treatment for road accident victims during the golden hour,etc.
- National Road Safety Policy,2010
- Road safety information database
- Bharat New Car Assessment Programme

Infrastructure Development:

- BharatmalaPariyojana
- Dedicated Freight Corridor Project
- National Road Safety Fund
- National Highways Development Project (NHDP)
- Setu Bharatam Scheme

Institutions:

- National Road Safety Board (The Motor Vehicles (Amendment) Act, 2019 provides for the creation of the National Road Safety Board.)
- National Road Safety Council
- Transport Development Council

International Initiatives:

- Development Goal 3.6: By 2030, halve the number of global deaths and injuries from road traffic accidents.
- Brasilia Declaration on Road Safety
- Decade of Action for Road Safety 2021-2030.

WAY FORWARD:

- **Ensure safer road infrastructure:**
  - **Revise safety standards** for both rural and urban roads, **aligning them with international practices** but considering Indian traffic conditions.
- **Use of technology**
  - Continuing application of Intelligent Transport Systems (ITS) under a national framework to establish a safe and efficient transport system should be encouraged.
- **Raise awareness about road safety issues**
  - The Government should increase its efforts to promote awareness about the various **aspects of road safety, the social and economic implications of road accidents** and what needs to be done to curb the rising menace of road accidents.
- **Safer vehicles and drivers:**
  - The Government should ensure vehicles, both motorized and non-motorized, **incorporate safety features from design to maintenance, aligning with international standards.**
  - The Government must **strengthen the system of driver licensing and training** to improve the competence and capability of drivers.
- **Research for road safety:**
  - The Government should encourage **increased activity in programmes of road safety research** by identifying priority areas, funding research in those areas adequately and establishing centers of excellence in research and academic institutions.
- **National road safety plan by Bureau of Police Research and Development suggests the following:**
  - A **dedicated agency** to strictly enforce traffic rules, especially on National Highways.
  - A proposed **Road Safety Police for national and state highways.**
  - **Leveraging AI techniques** for efficient highway management and communication.

- **Emergency medical services for road accidents**
    - The government should ensure that all people involved in road accidents benefit from **speedy and effective trauma care and management.**
- **KS Radhakrishnan panel recommendations:**
    - The KS Radhakrishnan panel on road safety, established by the Supreme Court in 2014, recommended:
        - **Banning alcohol sales on all highways** to curb drunk driving.
        - **Enforcing helmet** laws across states.
        - **Implementing road safety audits** by states for safe road infrastructure.
- The **"India Status Report on Road Safety 2024"** suggests key strategies to enhance road safety:
    - **Establish a National Crash Data Database:** To analyze specific risks and evaluate safety interventions.
    - **Increase Public Access to Road Safety Data:** To improve transparency and accountability.
    - **Implement State-Specific Safety Measures:** Tailored to local challenges.
    - **Enhance Traffic Calming Measures and Signage:** Nationwide improvements to reduce accidents.
    - **Promote Helmet Use:** Especially in rural areas, to decrease fatalities among two-wheeler riders.

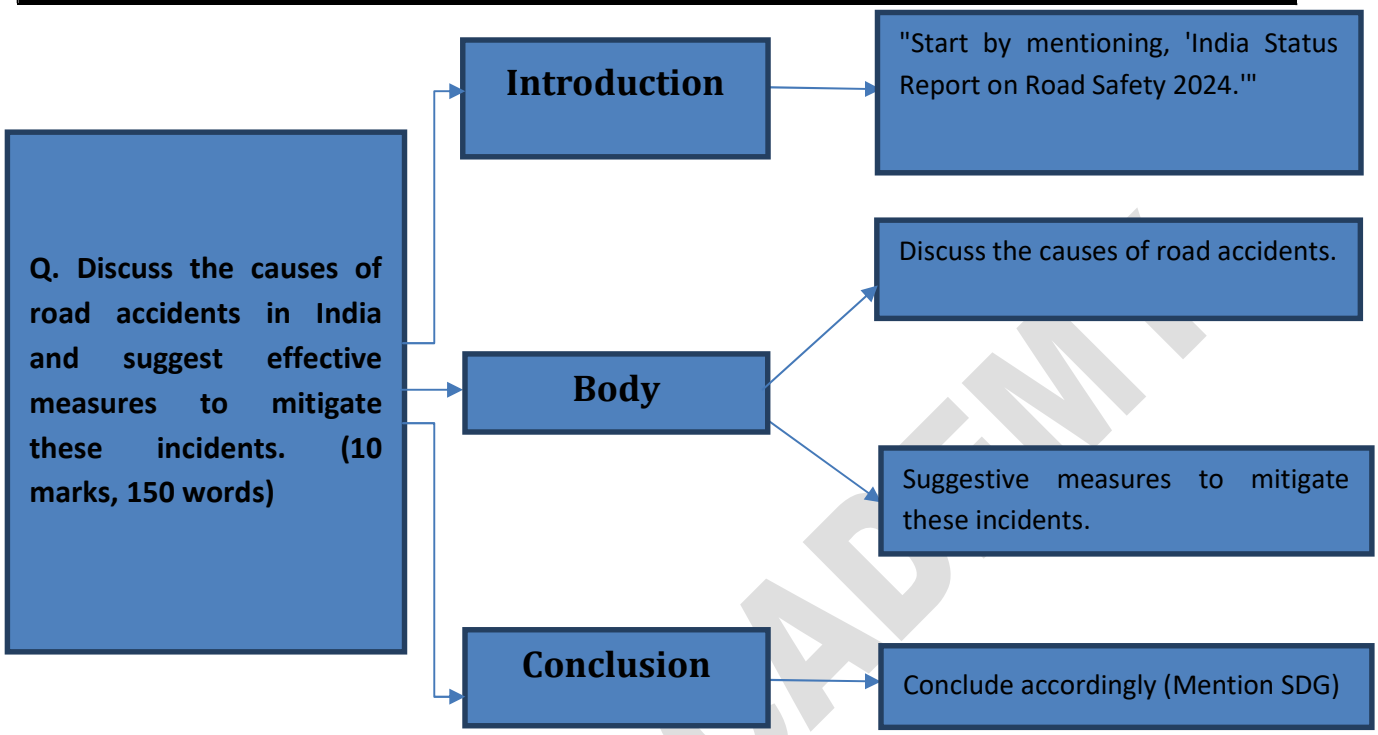
CONCLUSION:

- Addressing road safety in India requires a comprehensive strategy that integrates **legislative reforms, infrastructural improvements, and enhanced public awareness** with rigorous **enforcement of traffic laws**. Strengthening **vehicle safety standardsand driver training** is crucial, as is a commitment at all levels—from individual citizens to policymakers—to foster a culture of safety. Such efforts will not only help India meet its SDG commitments but also significantly reduce the socioeconomic impacts of road-related fatalities and injuries, **safeguarding the nation's most valuable asset: its people.**

PRACTICE QUESTION

Q. Discuss the causes of road accidents in India and suggest effective measures to mitigate these incidents. (10 marks, 150 words)

APPROACH



MODEL ANSWER

The "India Status Report on Road Safety 2024" by the TRIP Centre at IIT Delhi casts a spotlight on the critical issue of road safety in India, revealing the nation's significant lag in achieving the **United Nations' goal to halve traffic deaths by 2030.** The report identifies road crashes as the leading cause of unintentional injury deaths in India, highlighting an urgent need for strategic interventions.

Causes of Road Accidents:

1. **Demand Vs Capacity Mismatch:** Rapid urbanization and economic growth have not kept pace with road infrastructure development, leading to vehicle congestion and higher accident risks. By March 2022, India had approximately 354 million registered vehicles, up from 334 million in 2021, putting significant strain on road capacity, especially in urban areas.

2. **Infrastructural Deficiencies:** Substandard road conditions, inadequate vehicle maintenance, blind spots, and insufficient attention to upgrading engineering standards for roads, signage, and traffic signals are major factors contributing to road safety issues.

3. **Negligence and Enforcement Gaps:**Behavioral issues such as not wearing helmets, over-speeding, and drunk driving remain prevalent, with over-speeding alone responsible for 75.2% of fatalities, according to the Ministry of Health.

4. **Vehicle Safety Concerns:** Many vehicles, including popular models like the Suzuki-Maruti Alto 800, have failed international safety standards, lacking essential features such as airbags and adequate structural integrity. The Global New Car Assessment Programme (NCAP) and the UN's frontal impact crash tests have highlighted these deficiencies.

5. **Lack of Accountability:** Enforcement of road safety laws varies significantly across different states, and there is often a lack of accountability for failures in road design, maintenance, or law enforcement that contribute to accidents. This is compounded by minimal penalties for infrastructural oversights, as highlighted by the inadequacies in the Motor Vehicles Act regarding accountability measures for contractors and officials.

6. **Inadequate Post-Accident Response:** The absence of a competent accident investigation infrastructure results in repeated accidents at the same spots, highlighting a critical gap in addressing root causes post-incident.

Suggested Measures:

1. **Infrastructure Upgrades:** Revise and improve road design and maintenance, ensuring roads are built with safety-focused engineering standards.

2. **Enhanced Law Enforcement:** Implement stricter enforcement of traffic laws using advanced surveillance and monitoring technologies to detect and deter violations.

3. **Educational Campaigns:** Expand public education campaigns to raise awareness about road safety practices, emphasizing the legal and health consequences of negligence.

4. **Vehicle Safety Upgrades:** Enforce stricter safety regulations for all vehicles, ensuring they meet international safety norms, as recommended by the Global NCAP and UN safety standards.

Key Government Initiatives for Road Safety:

- 1989 Motor Vehicles Act (Amended in 2019)
- National Road Safety Policy (2010)
- Bharat New Car Assessment Programme
- BharatmalaPariyojana
- National Road Safety Fund

5. **Committee Recommendations Implementation:** Following the KS Radhakrishnan panel's recommendations, implement road safety audits, enforce helmet laws nationwide, and ban alcohol sales on highways to curb drunk driving.

6. **Development of a National Crash Data Database:** As suggested in the "India Status Report on Road Safety 2024," establish a comprehensive database to analyze and address specific risks, improving policy effectiveness through detailed, data-driven insights.

To significantly enhance road safety in India, it is crucial to integrate legislative reforms, infrastructural improvements, stringent enforcement of traffic laws, and robust public education campaigns. Implementing these measures, guided by expert recommendations and supported by accurate data, will not only help India meet its SDG targets (SDG 3.6: to halve the number of global deaths and injuries from road traffic accidents by 2030) but also substantially reduce the socio-economic costs associated with road traffic accidents.

25. CYBER SECURITY

iMPACT ANALYSIS

SYLLABUS:

GS 3 > Security > Cyber Security

REFERENCE NEWS:

- Union Home Minister Amit Shah, at the first Foundation Day celebration of the Indian Cyber Crime Coordination Centre (I4C) on September 10, 2024, stated that **cyber security is linked to national security**. During the event, he also **unveiled the logo of I4C** and introduced **several key initiatives** aimed at bolstering India's cybersecurity infrastructure.

The "first Foundation Day" of I4C was celebrated in 2024 to mark its expanded role after restructuring. Although **established in 2018**, I4C was officially designated as an **attached office under the Ministry of Home Affairs on July 1, 2024**, providing greater institutional stability and transitioning from a scheme phase to a permanent framework.

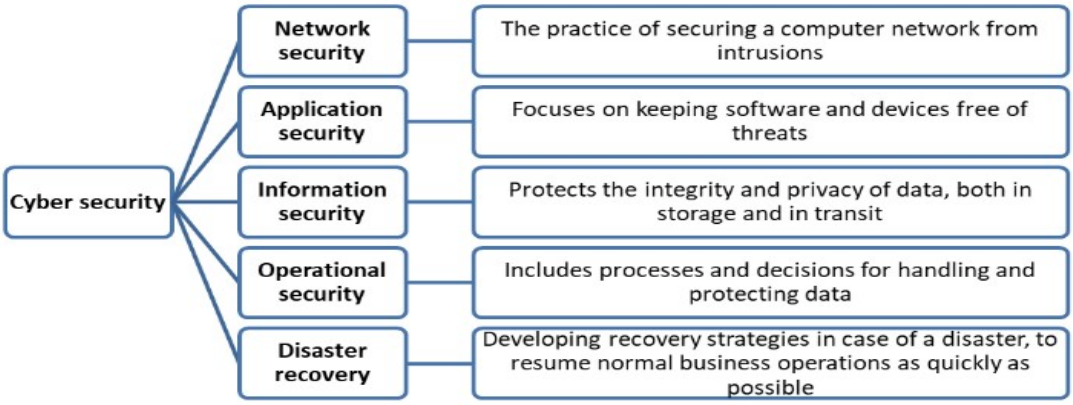
MORE ON NEWS:

- The event marked the launch of new cybersecurity initiatives, including **the Cyber Fraud Mitigation Centre (CFMC)**, the **Samanvay Platform**, the **Cyber Commandos Program**, and **a Suspect Registry**, which were viewed as milestones in strengthening India's cybersecurity infrastructure.
    - **Training of Cybercommandos**: Amit Shah highlighted a major initiative where approximately **5,000 cybercommandos** will be trained over the next five years to enhance cyber security across Indian states. These trained professionals will **support state and central agencies** in securing India's digital spaces.
    - **Cyber Fraud Mitigation Centre (CFMC)**: The CFMC was launched to establish a unified platform that includes banks, financial institutions, telecom companies, Internet Service Providers, and police forces to combat cyber fraud effectively.
    - **Samanvay Platform**: The Samanvay platform, also known as the Joint Cyber Crime Investigation Facility System, was introduced to facilitate **better coordination and information sharing** among various stakeholders in the cybercrime investigation arena.
    - **Cyber Suspect Registry**: A significant announcement was the creation of a national Cyber Suspect Registry. Shah emphasized the necessity of this registry, stating that individual state registries would be ineffective due to the nature of **cybercrime, which knows no state boundaries**. This registry aims to provide a

centralized platform to enhance the effectiveness of combating cybercrime across India.

WHAT IS CYBER SECURITY?

- Cyber security **involves the techniques of protecting computers, networks, programs and data** from unauthorized access or attacks that are aimed for exploitation.
- The concept includes **guidelines, policies, safeguards, technologies, tools and training** to provide the best protection for the cyber environment and its users.



TYPES OF CYBER ATTACKS:

Cyber-attacks compromise the security of individuals, organizations, or nations in cyberspace. They can be categorized into:

- **Cyber Espionage**: Illicit access to confidential information through networks, often targeting governments or organizations (e.g., 2019 Kudankulam nuclear plant attack).
- **Cyber Crime**: Criminal activities using computers or networks, often for financial gain or to spread malware or illegal content.
- **Cyber Terrorism**: Attacks on computers or networks intended to intimidate or coerce governments or people, advancing political or social objectives.
- **Cyber Warfare**: Actions by nation-states to damage or disrupt another nation's networks for espionage or conflict, seen as the fifth domain of warfare.

RECENT EXAMPLES OF MAJOR CYBER-ATTACKS IN INDIA:

- **Telecom Data Breach (2024)**: Data of 750 million Indian telecom users, including Aadhaar details, was compromised and sold online, prompting a DoT security audit.
- **AIIMS, 2023:** The systems at AIIMS and its centers were corrupted by the cyberattack,

which wiped outpatient and research data from its primary and backup servers.

- **Attack on Air India (2021)**: Cyber attackers compromised data of 4.5 million customers, exposing sensitive information like passport and credit card details.
- **Kudankulam Nuclear Power Plant Malware Attack (2019)**: A malware attack targeted the administrative network, compromising its systems.
- **Aadhaar Data Leak (2019)**: Personal information of 6.7 million Aadhaar users was exposed in a massive data breach.
- **WannaCry & Petya Ransomware Attacks (2017)**: These global ransomware attacks locked down thousands of systems in India, affecting government utilities and organizations.
- **Scorpene Submarine Data Leak (2016)**: Confidential details of India's Scorpene-class submarines were leaked, raising serious national security concerns.

STATISTICS:

- According to the **Kaspersky Security Network (KSN) study**, **20% of internet users in India** were affected by cyber threats in the **first quarter of 2024**. The study highlighted that **browser-based attacks** and **social media engineering** were the most common forms of cyber threats during this period, reflecting the increasing vulnerability of online users in the country.
- In a report, US-based network performance service provider Netscout identified **India as the fifth-largest source of cyberattacks**, contributing **6.9 per cent of global incidents in 2023.**
- According to the Ministry of Home Affairs, the **cybercrime helpline portal**, which includes both the **helpline number 1930** and the **National Cyber Crime Reporting Portal**, currently receives around **67,000 calls daily**.
- In the **Global Cybersecurity Index (GCI) 2024** by the **International Telecommunication Union (ITU)**, India achieved **Tier 1 status**, ranking among 46 countries recognized for strong commitments in legal measures, technical advancements, capacity development, and cooperation.

SIGNIFICANCE OF CYBER SECURITY:

- **Increasing Internet Use in India**:
  - As per data from the Union Home Ministry, shared during the First Foundation Day of I4C in 2024, India's internet user base has dramatically increased from **25 crore in 2014 to 95 crore in 2024**.
  - Correspondingly, average data consumption surged from **0.26 GB to 20.27 GB, a 78-fold increase.** This substantial growth in digital activity amplifies the need for enhanced cyber security to safeguard against rising threats in cyberspace.

- **Increasing Digitization in India**:
    - Initiatives like **Digital India**, **Land records digitization**, **Aadhaar**, and the **cashless economy** increase the need for secure cyber architecture.
    - For instance, as per data from the **Union Home Ministry**, shared during the First Foundation Day of I4C in 2024, **46% of the world's digital transaction volume** now takes place in India.
- **Constitutional Obligations**:
    - After the **K.S. Puttaswamy verdict**, the state is obligated to protect citizens' **right to privacy**, making cyber security essential.
- **Economic Value of Data**:
    - The rise of **big data**, **AI**, and **social media marketing** makes data more valuable, heightening vulnerabilities in cyberspace.
- **Rise in Cyber-Crimes**:
    - Cyber-crimes like **WannaCry ransomware**, the **Stuxnet attack**, and the **Scorpene submarine leak** are on the rise.
    - For instance, an **Android device** experienced an average of **three cyberattacks per month** in India in 2023, the India Cyber Security Threat report published by the **Data Security Council of India (DSCI)** revealed.
- **Critical Infrastructure**:
    - Protection of critical infrastructure like **Aadhaar**, **NATGRID**, and **nuclear plants** depends on robust cyber security.
- **Cost of Cyber-Attacks**:
    - The financial impact of cyber-attacks continues to rise globally and in India.
    - According to the **2023 IBM Cost of a Data Breach Report,** the average cost of a data breach in India reached **₹179 million (₹17.9 crore),** an all-time high and a 28% increase since 2020. Globally, the cost of cyber-attacks is projected to reach USD8.44 trillion in 2023, emphasizing the growing complexity and scale of cyber threats worldwide.

MEASURES TAKEN TO IMPROVE CYBER SECURITY:

Institutions:

- National Critical Information Infrastructure Protection Centre (NCIIPC)

- National Cyber Security Coordinator (NCSC)
- Computer Emergency Response Team (CERT-In)
- Defence Cyber Agency (DCA)
- Indian Cyber Crime Coordination Centre (I4C)
- Cyber Swachhta Kendra
- National Technical Research Organization (NTRO)

Policies:

- National Cyber Security Strategy 2020
- National Cyber Security Policy 2013

Surveillance:

- Central Monitoring System (CMS)
- Network Traffic Analysis (NETRA)
- National Intelligence Grid (NATGRID)

Legal Framework:

- Information Technology Act, 2000
- Indian Telegraph Act, 1885
- Personal Data Protection Bill

Global Cooperation:

- Convention on Cybercrime (Budapest Convention)
- Paris Call for Trust and Security in Cyberspace
- Global Centre for Cybersecurity (WEF)

CONCERNS IN CYBER SECURITY:

- **Lack of Awareness**: According to cybersecurity experts, **80% of cybercrime frauds** occur due to a lack of cyber hygiene and awareness.
- **Digital Growth and Vulnerability**: The rapid expansion of the digital space due to the pandemic has exposed vulnerabilities. **During COVID-19**, overuse of social media and online financial activity led to an increase in cybercrimes.

- **Weak Digital Security**: India's outdated infrastructure and weak cybersecurity measures, as seen in the **Aadhaar data leakage** and **Scorpene submarine leak**, highlight the lack of robust protections.
- **Institutional Issues**: With **36 central bodies** handling cyber issues, there is a lack of clear institutional boundaries and accountability, which limits coordination.
- **Private and Public Sector Collaboration**: The private sector has not been sufficiently engaged in cybersecurity initiatives, despite being a major stakeholder.
- **Lack of a Cyber Security Doctrine**: India lacks a comprehensive cyber deterrence strategy, which leaves it vulnerable to low-scale cyber operations by state and non-state actors.
- **Service Hub Vulnerability**: India's large IT and service sectors, along with initiatives like **Digital India**, attract both investment and cybercriminals.
- **Cryptocurrency Risks**: The rise in cryptocurrency use, especially Bitcoin, has fueled the growth of the ransomware industry.
- **Resource Shortage**: India faces a shortage of trained cybersecurity professionals and lacks the hardware and software capabilities for robust cyber defense. In 2020, India had a shortfall of **1.5 million cybersecurity professionals**.
- **Anonymity of Cybercriminals**: The anonymity of cybercriminals and offshore servers hinder law enforcement efforts.
- **Regulatory Shortcomings**: The **IT Act, 2000**, is outdated and struggles to address modern cyber threats. The tussle between the government and tech companies like Twitter on intermediary guidelines also hampers effective cybercrime management.
- **External Attacks**: Examples like **Shadow Network** (China), **Suckfly** (China), **Dtrack** (targeting Indian banks and Kudankulam nuclear plant), and spying concerns with **Huawei** and **ZTE** highlight external threats.
- **Obsolete Systems**: India’s reliance on cheap electronic imports with inadequate security features and rampant use of unlicensed software makes the country vulnerable to attacks.
- **Jurisdictional Uncertainty**: The transnational nature of cybercrimes complicates the application of domestic laws, leading to enforcement challenges.
- **Reliance on Chinese Equipment**: Telecom sectors rely heavily on Chinese equipment, with companies like **Bharti Airtel** and **Vodafone Idea** having significant portions of their networks composed of Chinese components

WAY FORWARD:

- **Cyber-Security Doctrine**: India needs a clear cyber-security doctrine to enhance stability and transparency in cyber defense.
- **National Cyber Security Commission (NCSC)**: Establish an NCSC to coordinate with ministries on critical infrastructure and cyber warfare.
- **Human Resource Development**: Cybersecurity jobs are expected to rise, creating opportunities for **1 million jobs by 2025**. Investment in skill development is key.
- **Digital Education**: Incorporate cybersecurity awareness into school curriculums and expand the **Digital India** campaign to enhance public knowledge.
- **Atmanirbhar in Cyber Systems**: Boost indigenous electronics manufacturing and tighten monitoring of imports to ensure security.
- **Private Sector Collaboration**: Improve coordination between the private sector and government agencies to enhance cyber defense.
- **Zero-Trust Security**: Organizations should adopt a **zero-trust** approach, requiring strict identity verification for all users.
- **Cutting-Edge Technologies**: Encourage research in **AI** to enhance threat detection and response automation.
- **Cyber Deterrence**: Strengthen India's cyber warfare capabilities to confront threats from adversarial nations and non-state actors.
- **Cyber Safety for Children**: Develop child-safe digital spaces to ensure safe online education and digital awareness.
- **Upgrade Cyber Cells**: Establish dark web and social media monitoring cells to improve the capabilities of existing cyber cells.
- **Address Gender Gap**: Promote gender diversity in the cybersecurity workforce to address the projected shortage of **3.5 million professionals** by 2025.

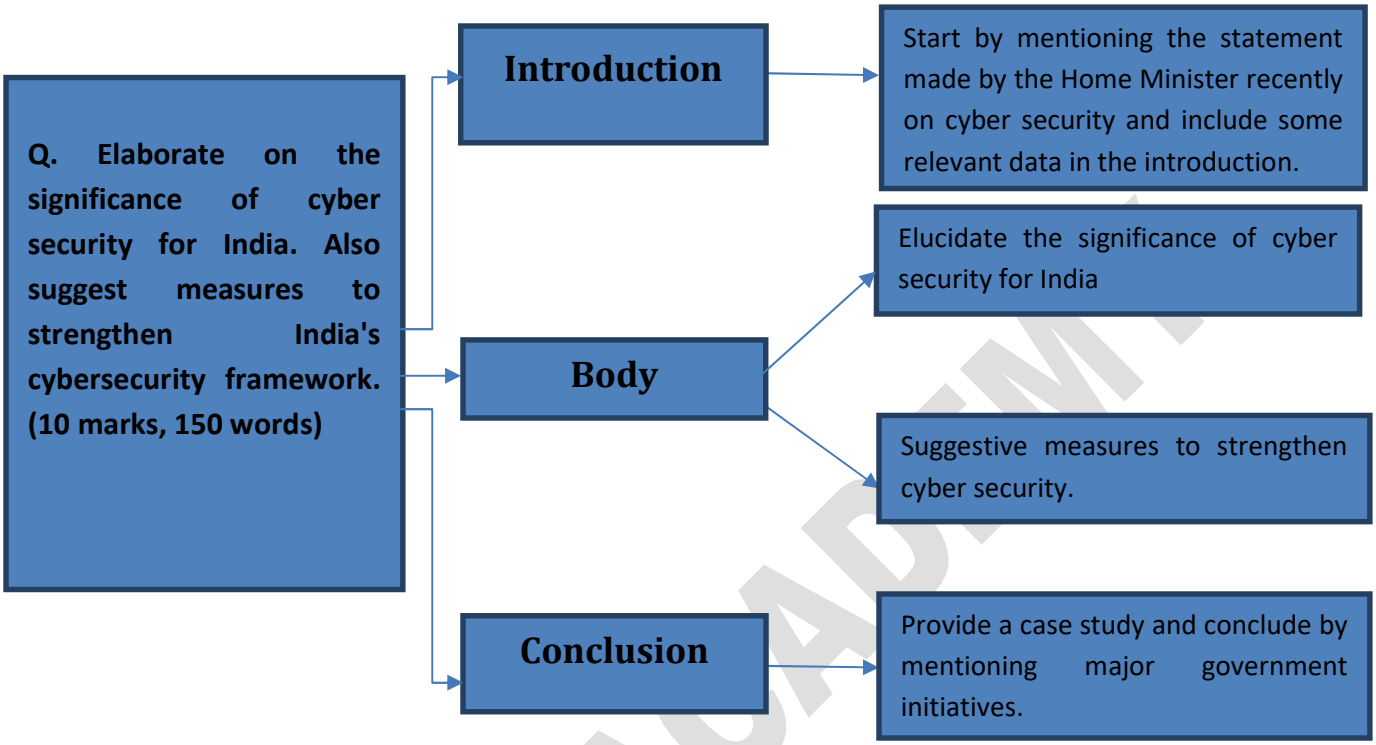
Case Study: Kerala's Cyberdome Project

- Cyberdome is Kerala Police's cybersecurity initiative aimed at preventing cybercrime. It brings together ethical hackers, law enforcers, and volunteers to enhance cyber safety.

PRACTICE QUESTION

Q. Elaborate on the significance of cyber security for India. Also suggest measures to strengthen India's cybersecurity framework. (10 marks, 150 words)

APPROACH



MODEL ANSWER

As highlighted by **Union Home Minister Amit Shah** at the **First Foundation Day of I4C (2024)**, cyber security is now linked to national security. A report by US-based Netscout identified India as the **fifth-largest source of cyberattacks in 2023**, contributing 6.9% of global incidents, emphasizing the need for robust cybersecurity systems.

The Significance of Cyber Security for India:

1. **Protection of National Security**: Cybersecurity is essential to safeguarding India's national security. Major cyber-attacks such as the **Scorpene submarine data leak (2016)** and the **Kudankulam Nuclear Power Plant Malware Attack (2019)** demonstrate the potential risks to critical infrastructure. Securing cyberspace is necessary to prevent data breaches that could compromise the nation's defense capabilities.

2. **Increasing Digital Penetration**: With India's internet user base surging from **25 crore in 2014** to **95 crore in 2024**, and **46% of global digital transactions** being processed in India, the risk of cyber threats grows exponentially. Protecting this vast digital ecosystem is crucial for maintaining trust in online services

3. **Safeguarding Economic Interests**: Cybersecurity is integral to protecting India's growing digital economy. With industries adopting **AI**, **big data**, and **blockchain technologies**, ensuring the

security of sensitive financial data is crucial to prevent fraud, as seen in the **Telecom Data Breach (2024)** that impacted 750 million users(

4. **Critical Infrastructure Protection**: Cyber-attacks targeting critical infrastructures like **AIIMS** (2023) highlight the vulnerabilities in sectors like health, finance, and defense. These attacks compromise not only service delivery but also the country's resilience in times of crisis.

5. **Constitutional and Legal Obligations**: After the **K.S. Puttaswamy verdict**, the state is obligated to protect citizens' right to privacy. Ensuring cybersecurity is an essential part of upholding this fundamental right by protecting individuals from data theft and misuse(

Suggestive Measures to Strengthen Cyber Security:

1. **Develop a National Cyber-Security Doctrine**: India should establish a comprehensive cyber-security doctrine, much like its nuclear policy, that outlines both defensive and offensive measures. This would ensure transparency, boost citizen confidence, and act as a deterrent against potential cyberattacks.

2. **Upgrade Cybersecurity Workforce**: By 2025, the cybersecurity sector is projected to create 1 million jobs in India. Investing in training and skill development will be essential to address the talent shortage and build a robust cyber defense system.

3. **Enhance Public-Private Collaboration**: The government should actively involve the private sector in cybersecurity initiatives, ensuring better coordination and resource sharing to secure critical digital infrastructure and financial systems.

4. **Adopt Zero-Trust Security Models**: Organizations and government institutions should implement a zero-trust approach, where every access point is continuously verified. This will limit unauthorized access and reduce insider threats.

5. **Promote Indigenous Technologies**: India must prioritize the development of indigenous cybersecurity tools and electronics to reduce reliance on foreign technologies, especially in sensitive areas like defense and telecommunications.

Case study: Kerala's **Cyberdome** project, initiated by the Kerala Police, integrates **ethical hackers**, law enforcers, and volunteers to prevent cybercrimes and enhancing cyber-surveillance to protect critical infrastructure.

India's approach to cybersecurity has evolved significantly, with the government launching key initiatives like the **Indian Cyber Crime Coordination Centre (I4C)** and **Cyber Fraud Mitigation Centre (CFMC)**. Furthermore, the **training of 5,000 cybercommandos** highlights the government's commitment to enhancing national cyber defense. These initiatives, coupled with suggestive measures like **upgrading the workforce** and **developing a national doctrine**, are crucial to securing India's expanding digital ecosystem

26. JUTE INDUSTRY

iMPACT ANALYSIS

SYLLABUS:

GS 3 > Economic Development > Indian Economy and issues > Manufacturing sector

REFERENCE NEWS:

- Jute production in India is anticipated to decrease by 20% this financial year due to flood-related damages in major jute-growing regions like West Bengal and Assam. This information was provided by the secretary of the National Jute Board, during an expo in Coimbatore. The decrease in production has occurred despite the jute sector having a significant export potential, estimated at ₹4,500 crore annually.

MORE ON NEWS:

- The National Jute Board is actively tackling industry challenges by pursuing several strategic initiatives to strengthen the jute sector. This includes preparing a **draft for Jute Technology Mission 2.0**, which is being refined in collaboration with stakeholders to ensure the mission's goals align with the needs of the industry.
- In addition, the board is dedicating resources to research aimed at expanding the applications of jute. Notable projects include **extracting ethanol from jute plants**, with lab tests showing that **one tonne of jute can yield 495 liters of ethanol**, and the **development of jute composite materials** for various uses. These initiatives are designed to mitigate the effects of reduced crop yields and enhance value addition in the jute sector, which could lead to increased revenue and more sustainable production methods.

BASIC DETAILS ABOUT JUTE FIBER:

- Jute is a **natural fiber with golden and silky shine** and hence called **The Golden Fiber.**
- Jute fiber is **100% bio-degradable and recyclable and thus environmentally friendly**.
- Jute is the **cheapest vegetable fiber** procured **from the bast or skin of the plant's stem.** It is the **second most important vegetable fiber after cotton**, in terms of usage, global consumption, production, and availability.
- The **best varieties of Jute are Bangla Tosha** – Corchorus olitorius (Golden shine) and **Bangla White** – Corchorus capsularis (Whitish Shine).
- The **best source of Jute in the world is the Bengal Delta Plain**, which is occupied by Bangladesh and India.

- **Conditions of Growth:**
    - Jute is the crop of **hot and humid climate.**
    - It requires **high temperature varying from 24°C to 35°C** and **heavy rainfall of 120 to 150 cm** with 80 to 90 per cent relative humidity during the period of its growth.
    - Small amount of pr**e-monsoon rainfall is very useful** because it helps in the proper growth of the plant till the arrival of the proper monsoon. Incessant and untimely rainfalls as well as prolonged droughts are detrimental to this crop.
    - Large quantity of water is required not only for growing the jute crop but also for processing the fibre after the crop is harvested.
    - **Light sandy or clayey loams** are considered to be **best suited soils for jute.**
    - Since jute rapidly exhausts the fertility of soil, it is **necessary that the soil is replenished annually by the silt-laden flood water** of the rivers.

Applications of Jute Fiber:

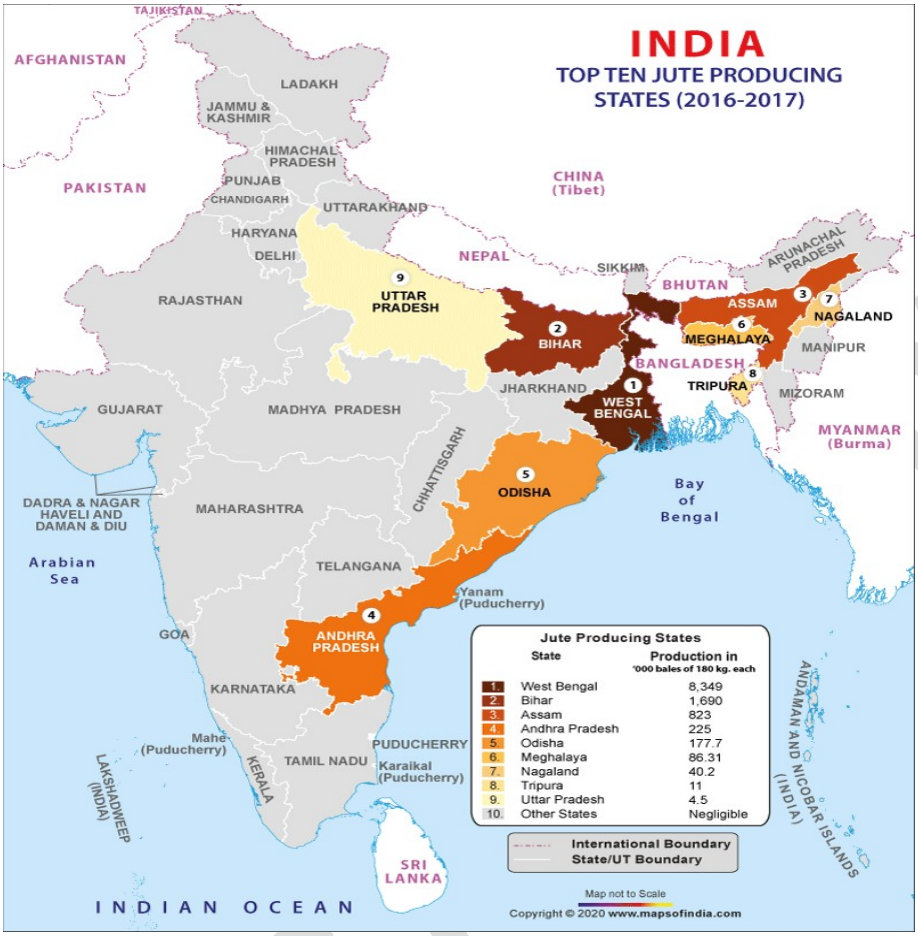
- Jute is widely used in the production of **yarn, twine, ropes**, and various fabrics such as sacking, hessian, and carpet backing cloth. It's also utilized for making shopping **bags, mats, and packing materials**.
- The fiber is traditionally used to make cloths for **wrapping bales of raw cotton and various types of sacks.**
- Jute fibers are incorporated into **home decor items** like curtains, chair coverings, carpets, and area rugs, and used in backing for linoleum due to their biodegradable nature.
- While historically used in traditional textiles, jute has seen innovative uses in non-woven and composite technologies across the **automobile, furniture, and paper industries, producing technical textiles and composites.**
- The versatility of jute extends to products like espadrilles, home textiles, and geotextiles, emphasizing its role as an **eco-friendly material throughout its lifecycle**.

JUTE TEXTILE INDUSTRY IN INDIA:

- **History and evolution:**
    - Jute textile industry is the **second important textile industry of India after cotton textile industry.**
    - This industry **existed in Bengal as handloom industry** but the **large-scale industry started in 1855 at Rishra, near Kolkata.**

- **In 1859, the first powerlooms were started in the same mill** and the spinning as well as weaving was undertaken.
- This industry suffered **a great setback as a result of partition of the country in 1947** because **81 per cent of the jute output went to Bangladesh** (erstwhile East Pakistan) while **102 out of 112 jute mills remained in India.**
- Consequently, acute **shortage of raw jute was felt in India** as the import of raw material from East Pakistan was cut off due to the political differences between the two countries.
- A consistent effort to increase the area under jute cultivation was able to correct the situation later. It is **traditionally in an export-oriented industry and its survival largely depends upon its export performance**. The rise and fall of the industry is closely linked with the demand for goods in the international and national markets.

- **Distribution**
  - Jute textile industry is mainly **concentrated in eastern India** because of the rich alluvial soil of **Ganga-Brahmaputra delta grows about 90 percent of India's jute and provides raw material** to jute mills.
  - As on November 2023, there are **108 composite jute mills** out of which the **state of West Bengal has 79 jute mills** with Andhra Pradesh having 14 mills, Uttar Pradesh 3 mills, Bihar 4 mills, Odisha 3 mills, Assam 2 mills, Chhattisgarh 2 mills and Tripura 1 Jute Mill. ((Source: Standing Committee on Labour, Textiles and Skill Development's Fifty-Third Report on the Development and Promotion of the Jute Industry)
  - **Major jute producing states** include **West Bengal, Bihar, Odisha, Assam, Andhra Pradesh, Meghalaya and Tripura.**



- **Present status of jute industry in India:**
  - According to the **Standing Committee** on Labour, Textiles, and Skill Development's **Fifty-Third Report** on the Development and Promotion of the Jute Industry (2023-2024), India is a leading global producer of jute, **contributing 70% of the world's output.**
  - As per the Food and Agriculture Organisation (FAO), **India is the largest producer of jute followed by Bangladesh and China.**
  - However, in terms **of acreage and trade, Bangladesh takes the lead accounting for three-fourth of the global jute exports** in comparison to India's 7%.
  - **Following are the reasons why India lags behind Bangladesh**
    - India lags behind Bangladesh in producing superior quality jute fibre due to infrastructural constraints related to retting, farm mechanisation, lack of availability of certified seeds and varieties suitable for the country's agro-climate.

- What also does not bode well for India is that jute acreage competes with crops as paddy, maize, groundnut, and sesame.
- The increased availability of synthetic substitutes causes a drop in the demand for jute domestically.

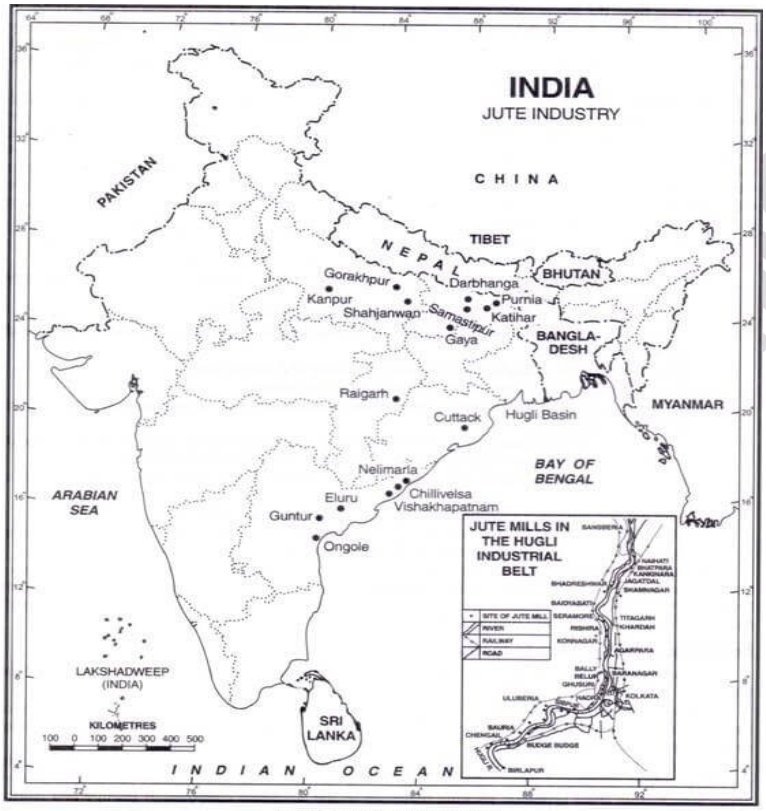


FIG. 27.2. India : Jute Industry

IMPORTANCE OF THE JUTE INDUSTRY IN INDIA:

- **Economic Impact**: Jute is a major cash crop for millions of small farmers in India. The industry contributes significantly to the economy through its vast array of products such as gunny bags, ropes, and other textiles. According to recent **reports by the National Jute Board**, the jute sector had an **export potential of ₹4,500 crore** annually, with last year's exports amounting to **₹3,000 crore** and projections for this year close to **₹3,500 crore** despite a 20% expected drop in production due to floods.
- **Employment Generation**: The jute industry is labor-intensive and provides direct employment to about 370,000 workers in the mills and several million more in the associated agricultural and industrial sectors (Source: Standing Committee on Labour, Textiles and Skill Development's Fifty-Third Report on the Development and Promotion of the Jute Industry). This makes it a vital industry in terms of job creation, particularly in rural areas where alternative employment opportunities may be scarce.

- **Sustainability and Environmental Benefits**: Jute is a **100% biodegradable and eco-friendly fiber** unlike synthetic materials. It plays a crucial role in environmental protection by offering an organic alternative to plastic bags and other products. Moreover, jute cultivation is beneficial for the soil as it requires **less fertilizer and pesticides** compared to other crops, and the leaves and roots of jute plants enrich the soil with micronutrients.

- **Support for Rural Economy**: Jute cultivation is predominantly undertaken by **small farmers**, and the industry **supports the rural economy** not just through agriculture but also via numerous **small and medium enterprises** engaged in the processing and manufacturing of jute products. This has helped in uplifting the economic conditions of some of the poorest regions in India.

- **Export Market**: India is one of the largest producers and exporters of jute goods. With its vast range of biodegradable products, the country caters to a global market looking for eco-friendly solutions. The top export markets for Indian jute goods include the USA, Germany, UK, Australia, and other European countries, demonstrating its global demand.For the fiscal year 2022-23, jute goods production was 1,246,500 metric tons, with exports surging to 177,270 metric tons, which is about 14% of total production. This marked a 56% increase in exports from 2019-20, driven by a rising global demand for eco-friendly products. (Source: Standing Committee on Labour, Textiles and Skill Development's Fifty-Third Report)

- **Government Initiatives and Policy Support**: The Indian government has implemented several policies to support the jute industry, including the mandatory use of jute packaging for food grains and sugar under the Jute Packaging Materials (Compulsory Use in Packing Commodities) Act, 1987. Such policies have bolstered the domestic demand for jute products while ensuring sustained income for farmers and manufacturers.

PROBLEMS OF INDIAN JUTE INDUSTRY:

- **Impacts of Partition:**
    - Most of the **jute-producing areas went to Bangladesh** (erstwhile East Pakistan) resulting in acute shortage of raw jute.
    - Although successful efforts have been made to increase the supply of raw jute since Independence,it still falls short of our current requirements.

Low Yield Per Acre:

India produces very low quantity of jute per unit of land.

In Bangladesh the average yield per hectare is 1.62 tonnes. It is **only 1.3 tonnes per hectare in India.**

Obsolete technology and machinery:

Most of these **jute mills were established some 100 or 150 years back**. Naturally most of these mills are having backdated machinery.

Output of these machines is very low compared to the modern sophisticated machines.

Because of use of these machines for more than a century, **productive capacity has gradually declined.** The labour requirements in these machines are very high and this large labour force is increasing the cost of production.

Competition from synthetic materials

Jute industry has to face a very tough competition from **synthetic packing materials of the advanced countries of Europe and North America.** As such the market for jute goods has shrunk.

The overall demand for jute products is gradually decreasing in the international market.

Competition from Bangladesh:

The **newly established mills and improved machines in Bangladesh** are able to **produce better quality goods** and have an **edge over the Indian jute products in the international markets.**

GOVERNMENT INITIATIVES:

- **Jute Packaging Materials Act, 1987**: Requires mandatory use of jute materials for packing 100% of food grains and 20% of sugar; supported by an annual government contribution of ₹7500 crores.
- **Technical Textiles Inclusion**: DGFT added 15 jute items to the technical textiles list in January 2019.
- **Minimum Support Price (MSP) for Raw Jute and Mesta**: Set annually to encourage higher quality jute production and protect farmers' interests.
- **Incentive Scheme for Acquisition of Select Machinery**: Modernizes jute industry by upgrading to advanced machinery, continuing the momentum from the Jute Technology Mission (2007-2013).
- **Jute - Improved Cultivation and Retting Exercises (ICARE)**: Supports small and marginal growers to produce higher quality jute and introduces them to advanced technologies.
- **Usage of Jute Geo-Textiles (JGT) in NER States**: Applies jute geotextiles to geotechnical problems like soil erosion, with extensive use in rural road construction and flood management.
- **National Jute Board Initiatives**: Includes the Export Market Development Assistance Scheme, Jute Integrated Development Scheme, Jute Raw Material Bank Scheme, and

schemes for retail outlets and design development at NID.

- **Focused Market Initiatives**: Supports marketing of jute products through participation in national and international fairs.
- **Skill Development Program**: Provides training for making jute diversified products to various community and institutional groups.
- **Subsidy Scheme for Certified Seeds**: Offers certified jute seeds to farmers at a subsidized rate to improve crop quality.

WAY FORWARD:

- Government should further **promote the diversification of jute products.**
    - For example, **lifestyle products and accessories, technical textiles, jute geotextiles** etc.
    - Should utilize the **important properties of jute fibre since it has huge diversifying potentiality.**
    - Advantages of jute include **good insulating and antistatic properties**, as well as having **low thermal conductivity and moderate moisture regain**.
    - Along with cotton, **jute should be utilized for apparel manufacturing.**
- Government must make **efforts in R&D** to stre**ngthen the jute industry and implement newer technologies, and improved machiner**y through intensive modernization.
- Jute production is a **labour intensive industry**, so it can be effectively utilized to **reduce unemployment and poverty in India.**

The **Fifty-Third Report by the Standing Committee on Labour, Textiles and Skill Development** on the Development and Promotion of the Jute Industry offers several strategic recommendations to enhance the sector in India:

1. **Modernization and Technological Upgrades**: Urges the modernization of jute mills with new machinery to boost productivity and product quality.
2. **Support for Farmers**: Emphasizes support for jute farmers through fair pricing and the Jute ICARE program to improve fiber quality and yield.
3. **Market Expansion and Diversification**: Advocates for expanding markets and diversifying products to increase domestic and international sales.
4. **Skill Development and Employment**: Recommends training initiatives to enhance worker skills and increase employment opportunities in the industry.

5. **Research and Development**: Encourages partnerships between research institutions and the jute industry to innovate and develop new uses for jute.
6. **Environmental Sustainability**: Highlights the eco-friendly nature of jute and promotes its use as a sustainable alternative to synthetic materials.
7. **Policy and Regulatory Support**: **Policy and Regulatory Support**: Recommends enhancing support for the jute sector and enforcing jute use in packaging as mandated by the Jute Packaging Materials Act, 1987.

CONCLUSION:

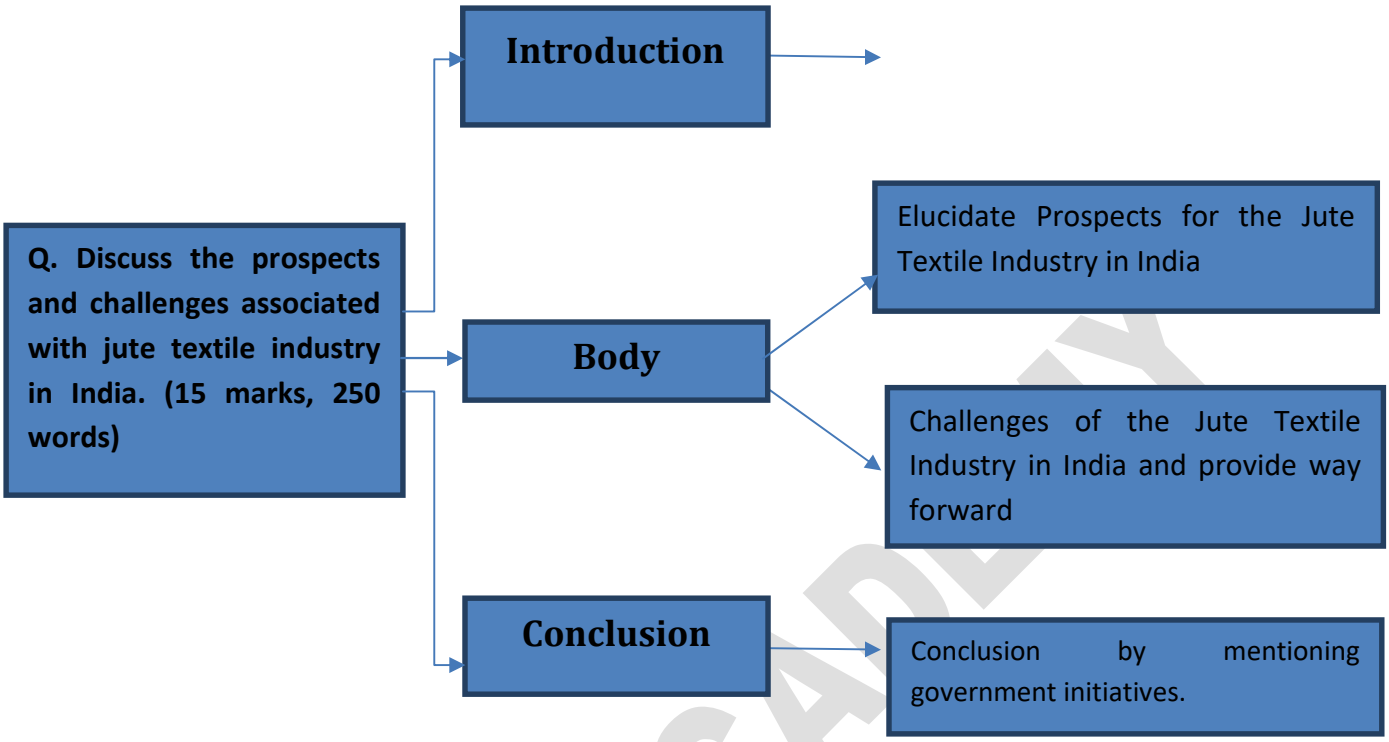
The jute industry is crucial to India's economy, providing significant employment and promoting environmental sustainability. Despite challenges such as competition from synthetic materials and varying raw material availability, the industry's potential is enhanced through governmental support and technological advancements. Continued efforts to modernize, diversify products, and support farmers are essential. By leveraging the eco-friendly properties of jute and expanding its applications, India can strengthen its global leadership in sustainable textile production.

PRACTICE QUESTION

Q. Discuss the prospects and challenges associated with jute textile industry in India. (15 marks, 250 words)

APPROACH

Start by mentioning data, highlighting both prospects and challenges associated with the jute sector in India.



MODEL ANSWER

The jute industry in India, traditionally pivotal in the textile sector, faces challenges yet holds significant potential for revitalization and growth. The **National Jute Board projects an annual export potential of ₹4,500 crore for the industry, despite facing a 20% expected drop in production due to recent flood-related damages** in major jute-growing areas like West Bengal and Assam. This resilience underscores the industry's capacity to recover and expand, given its robust base and innovative prospects.

Prospects for the Jute Textile Industry in India

1. **Government Initiatives and Support**: Various government initiatives, such as the **Jute Packaging Materials Act of 1987** and the inclusion of jute items in the list of **technical textiles**, provide a substantial market within India and help maintain demand for jute products.

2. **Research and Development for Diversification**: The National Jute Board is pushing for innovations like extracting **ethanol from jute** and developing **jute composites**, which can open new markets and applications for jute products, increasing their utility and demand.

3. **Environmental Benefits**: Jute is **100% biodegradable**, making it an attractive option for environmentally conscious consumers and businesses worldwide. This positions jute as a key player in the **global shift towards sustainable materials**.

4. **Export Potential**: With its inherent eco-friendly properties and the global trend towards green products, jute has a renewed potential in international markets. For instance, for the fiscal year 2022-23, **jute exports increased by 56% from 2019-20**, driven by rising demand for eco-friendly products. (Source: Standing Committee on Labour, Textiles and Skill Development's Fifty-Third Report)

5. **Modernization and Technological Upgrades**: Modernizing jute mills and employing new technologies can enhance the efficiency and quality of production. This could lead to better competitiveness and fulfillment of **both domestic and international demand.**

Challenges of the Jute Textile Industry in India

1. **Competition from Synthetic Materials**: The Indian jute industry faces stiff competition from synthetic alternatives that are often **cheaper and more durable**. This competition threatens the domestic and international market share of jute products, as synthetic materials continue to dominate the packaging sector.

2. **Technological Obsolescence**: Many jute mills in India operate with outdated machinery and technology**.** This not only **reduces the efficiency and productivity** of these mills but also **hampers their ability to produce high-quality products** that can compete on a global scale.

3. **Infrastructural Constraints**: Infrastructural issues related to **retting and farm mechanizationcontribute to lower quality jute fiber** production in India **compared to Bangladesh.** These constraints hinder the industry's capacity to produce superior quality fibers that are in demand globally.

4. **Limited Diversification**: Despite the potential for diversification, the jute industry in India has been **slow to innovate beyond traditional products**. This limited diversification affects the industry's ability to tap into new markets and meet changing consumer demands.

5. **Impact of Natural Calamities**: Jute production is projected to decrease by 20% this financial year due to floods in major jute-growing regions like West Bengal and Assam. This reduction directly impacts the raw material supply for the jute industry, disrupting production and affecting economic output.

Way Forward: Recommendations by the Standing Committee on Labour, Textiles and Skill Development

- **Modernization and Technological Upgrades**: Urging the modernization of jute mills with updated machinery to boost productivity and improve product quality, directly impacting the industry's competitiveness both domestically and internationally.

- **Support for Farmers**: Strengthening support for jute farmers through fair pricing and improved agricultural practices, such as the Jute ICARE program, to enhance fiber quality and yield.
- **Market Expansion and Diversification**: Advocating for expanding markets and diversifying jute products to include innovative applications, which could significantly increase market reach and revenue.
- **Skill Development and Employment**: Recommending training initiatives to enhance worker skills, crucial for increasing employment opportunities and improving product quality in the jute industry.
- **Research and Development**: Encouraging partnerships between research institutions and the jute industry to innovate and develop new uses for jute, thereby diversifying its applications and enhancing its value.
- **Policy and Regulatory Support**: Enhancing support for the jute sector through consistent enforcement of existing policies, like the Jute Packaging Materials Act, and potentially introducing new incentives for using eco-friendly materials in broader applications.

The Indian government's concerted efforts, including the **Jute Packaging Materials Act, the Jute Technology Mission, and the Improved Cultivation and Retting Exercises (ICARE)**, are pivotal in revitalizing the jute industry. These initiatives, alongside policies promoting the use of **jute in technical textiles and subsidies for modern machinery**, are enhancing the industry's competitiveness and sustainability, steering it towards a robust future aligned with global environmental and economic trends.

27. AI IN HEALTHCARE

iMPACT ANALYSIS

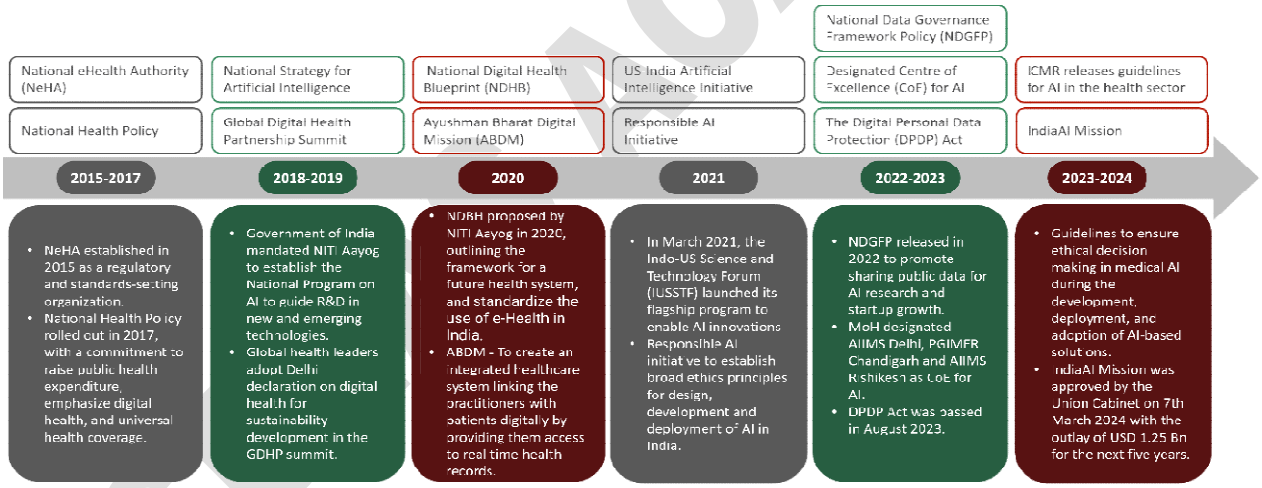
SYLLABUS:

GS 3 > Science and Technology >> Applications of AI

REFERENCE NEWS:

The World Economic Forum is driving digital healthcare transformation by fostering a global, multi-stakeholder approach to accelerate the responsible integration of digital health solutions into healthcare systems worldwide.By collaborating with governments, businesses and civil society, the Forum focuses on improving healthcare access, outcomes and equity through innovative technologies while addressing challenges such as data privacy, cybersecurity and ethical use of AI in healthcare.

HEALTHCARE ECOSYSTEM OF INDIA:



Healthcare Infrastructure

- India has 1.4 hospital beds per 1,000 people, which is lower than the World Health Organization (WHO) recommendation of 5 beds per 1,000 people.
- **Public Healthcare**: India has approximately 25,000 Primary Health Centers (PHCs), over 1,50,000 Sub-Centers, and about 5,000 Community Health Centers (CHCs), largely serving rural populations.

- The doctor-patient ratio in India is 1 doctor for every 1,457 people. While this has improved in recent years, it is still below the WHO-recommended ratio of 1:1,000.
- **Rural-Urban Divide**: There is a significant disparity in the availability of healthcare professionals between urban and rural areas. 70% of doctors are concentrated in urban centers, even though 65% of India's population lives in rural areas.

Health Expenditure

- India's public health expenditure is approximately 1.28% of GDP (2020-21), which is considerably lower than other developing countries. The government aims to increase public health spending to 2.5% of GDP by 2025 under the National Health Policy 2017.
- **Private Health Expenditure**: Approximately 62% of healthcare expenditure is out-of-pocket, which poses financial risks, especially for low-income households.

Major Health Indicators

- Life expectancy in India has increased to 69.7 years (as of 2020), up from 63.5 years in 2000. However, this remains below the global average of 73.4 years.
- The Infant Mortality Rate (IMR) has decreased from 44 deaths per 1,000 live births in 2011 to 28 deaths per 1,000 live births in 2022.
- **State Disparities**: The IMR varies significantly across states, with Kerala having an IMR of 6, while Madhya Pradesh has an IMR of 43.
- The Maternal Mortality Ratio (MMR) has improved significantly, dropping to 97 deaths per 100,000 live births in 2020 from 130 in 2014. However, rural and underdeveloped states continue to report higher MMRs, with states like Assam and Uttar Pradesh reporting figures above 200.
- The under-5 mortality rate in India has decreased from 83 per 1,000 live births in 2000 to 34 per 1,000 live births in 2020, a significant improvement.

Disease Burden

- Non-communicable diseases (NCDs) account for 65% of deaths in India. This includes cardiovascular diseases, cancers, diabetes, and chronic respiratory diseases.India is often referred to as the "Diabetes Capital of the World" with over 77 million people suffering from diabetes as of 2021.

- India accounts for 27% of the global TB cases, with around 2.6 million new TB cases reported annually. Despite progress, TB remains a significant public health issue.India has reduced its malaria burden by 80% from 2000 to 2020, with fewer than 3 lakh cases reported in 2020. The prevalence of HIV in India is approximately 0.22%, with around 2.3 million people living with HIV. While India has made progress in reducing new infections, challenges remain in certain high-risk groups.

SIGNIFICANCE OF AI IN HEALTH ECOSYSTEM OF INDIA:

- **Improving Diagnostics and Early Detection:** AI-powered tools can help improve the accuracy of diagnosis and facilitate early detection of diseases, particularly in cases of cancer, cardiovascular diseases, and diabetes.
    - AI-based platforms like Niramai use thermal imaging and machine learning to detect early signs of breast cancer, offering a non-invasive, low-cost, and scalable solution for rural areas where mammography is unavailable.
- **Bridging the Healthcare Workforce Gap:** India faces a shortage of healthcare professionals, particularly in rural areas. AI can help bridge this gap by automating routine tasks and assisting healthcare workers in decision-making, thus improving healthcare delivery.
    - AI-powered clinical decision support systems (CDSS) can assist doctors and nurses in diagnosing and prescribing treatment, especially in remote areas where specialist doctors are scarce.
- **Enhanced Data-Driven Personalized Healthcare**: AI can analyze vast amounts of patient data, including genomic, demographic, and lifestyle information, to offer personalized healthcare solutions. This data-driven approach enables the creation of customized treatment plans for patients.
    - AarogyaSetu, India's AI-powered health app, helped monitor and manage COVID-19 cases by tracking patient data, providing real-time health updates, and facilitating contact tracing.
- **Telemedicine and Remote Healthcare Access**: AI-driven telemedicine platforms can connect patients in remote and underserved regions with healthcare professionals, enabling access to quality healthcare services without the need for physical visits.
    - The eSanjeevani platform, India's national telemedicine service, utilizes AI to facilitate video consultations between patients and doctors, especially in rural areas where access to healthcare is limited.

- **Reducing Healthcare Costs**: AI can help reduce healthcare costs by streamlining administrative processes, optimizing treatment plans, and reducing the need for invasive tests or unnecessary treatments.
    - AI-based chatbots and virtual assistants are being used to automate patient interactions, schedule appointments, and provide health advice, reducing the burden on healthcare staff and lowering operational costs.
- **Managing Public Health and Pandemics**: AI can play a crucial role in predicting, monitoring, and controlling epidemics and pandemics by analyzing large datasets and identifying patterns in real time.
    - During the COVID-19 pandemic, AI tools helped predict the virus's spread, track infection rates, and identify high-risk areas, enabling better resource allocation and healthcare management.
- **Drug Discovery and Development:** AI can accelerate the drug discovery process by analyzing biological data and predicting which compounds might be effective against specific diseases, reducing the time and cost involved in developing new drugs.
    - AI was used in the development of COVID-19 vaccines and treatments by identifying potential drug candidates in a much shorter time frame than traditional methods.
- **AI-Enhanced Medical Imaging**: AI-powered medical imaging technologies help in analyzing X-rays, MRIs, and CT scans with high precision, often identifying anomalies that human eyes might miss.
    - Qure.ai, an Indian startup, uses AI to interpret chest X-rays and detect lung conditions like tuberculosis, pneumonia, and COVID-19, improving the speed and accuracy of diagnosis.
- **Optimizing Hospital Operations and Workflow Management:** AI can optimize hospital operations by managing patient flow, improving resource allocation, and streamlining administrative tasks like billing and inventory management.
    - AI algorithms can predict patient admission rates, allowing hospitals to allocate resources like ICU beds and ventilators more efficiently, as seen during the COVID-19 pandemic.

- **AI in Health Monitoring and Wearables**: AI-driven wearable devices (e.g., smartwatches, fitness trackers) can continuously monitor vital signs such as heart rate, blood pressure, and glucose levels, offering real-time health insights and alerts.
    - AI-powered wearables like the Apple Watch and Fitbit provide real-time data that can detect early signs of health issues such as heart disease or stroke.

CHALLENGES OF USING AI IN HEALTHCARE IN INDIA:

- **Lack of Digital Infrastructure**: Many Primary Health Centers (PHCs) in rural India still rely on paper-based records, making it difficult to implement AI-powered tools for diagnostics or patient management.
- **Data Privacy and Security Concerns:** AI systems in healthcare rely on large datasets, including sensitive patient information. India currently lacks robust data protection laws that safeguard health-related data, raising concerns over data privacy and security. In the absence of a comprehensive Data Protection Law, there are risks of health data being compromised, especially in AI-powered telemedicine and diagnostic platforms.
- **Inadequate Regulatory Framework**: India currently lacks a comprehensive regulatory framework for AI in healthcare. There is no clear guidance on the approval, monitoring, and ethical use of AI-driven technologies in medical practice. In contrast to countries like the United States, where the FDA has guidelines for AI-based medical devices, India is still in the process of defining regulatory standards for AI in healthcare.
- **Bias in AI Algorithms:** In India, healthcare data is often limited and may not adequately represent the diversity of the population. This can lead to biased algorithms that perform poorly for certain demographic groups. If an AI system is trained primarily on data from urban hospitals, it may not perform well for patients in rural areas, where the disease profile and healthcare infrastructure are different.
- **Lack of Skilled Workforce**: Many healthcare facilities, particularly in rural areas, lack professionals who can integrate AI tools into their medical practices or analyze AI-generated insights for effective decision-making.
- **High Cost of AI Technology**: AI-powered diagnostic tools, such as AI-driven radiology systems, are expensive, making it difficult for smaller hospitals and rural health centers to afford them.
- **Resistance to Change in Healthcare Practices**: Doctors may be hesitant to rely on AI-based diagnostic tools for fear that the technology may lead to misdiagnoses or challenge their professional judgment, which can delay adoption.
- **Lack of Standardization and Interoperability**: Different hospitals and clinics in India may use varying systems to store medical records, making it difficult to compile and analyze patient data across healthcare institutions.

- **Ethical Concerns**: In cases where AI misdiagnoses a patient, it is unclear whether the AI developer, the healthcare institution, or the doctor using the system should be held accountable.
- **Inconsistent Quality of Data**: If an AI tool is trained on inconsistent or outdated medical records, it may not be able to correctly diagnose new cases, reducing its effectiveness.

WAY FORWARD:

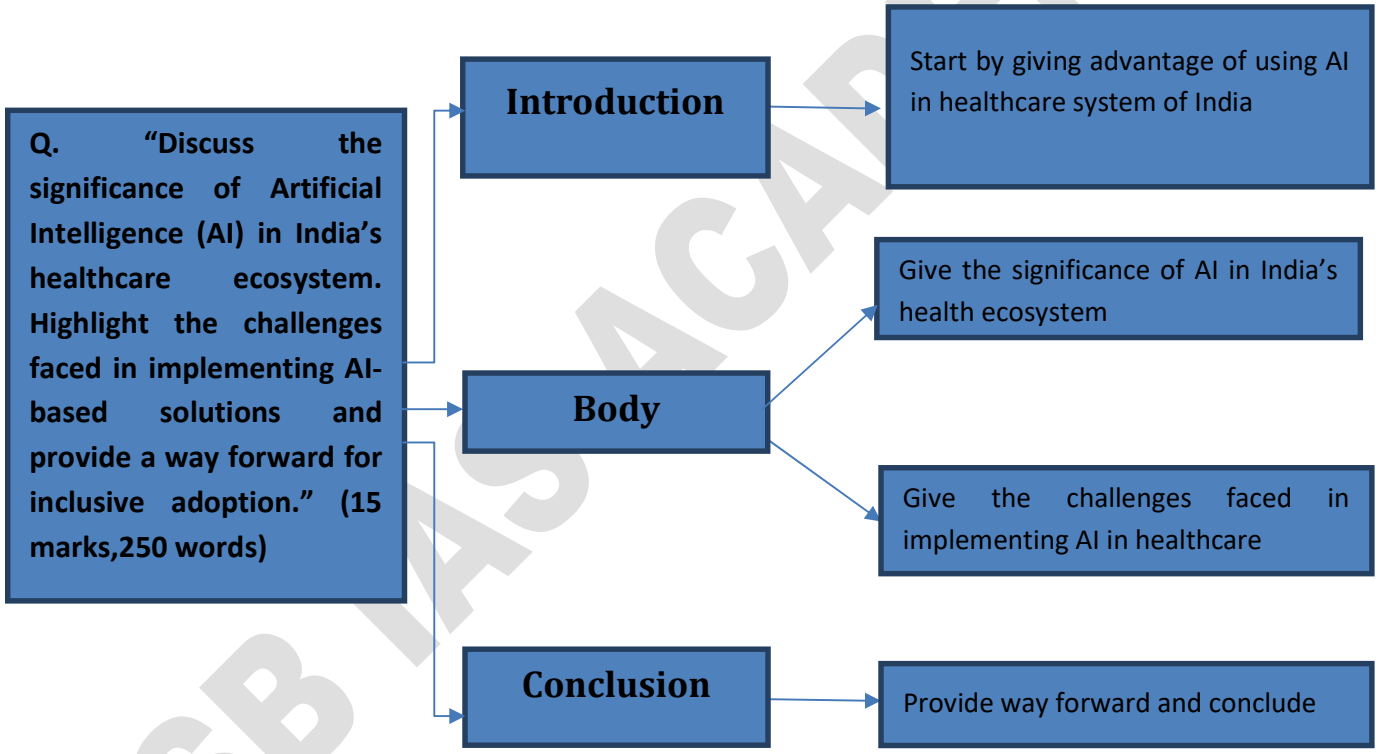
- **Strengthening Digital Health Infrastructure**: **Estonia** has implemented a **nationwide e-Health system**, enabling citizens to access their medical records online. This digital infrastructure provides the foundation for integrating AI-based diagnostics and remote consultations.
- **Data Privacy and Protection Legislation:** The **European Union's GDPR** is a strong framework for data privacy that includes provisions for **personal health data**, ensuring secure and ethical use of AI in healthcare.
- **Building AI Literacy and Training:** In the **United States**, leading medical schools such as **Stanford University** offer courses on **AI in healthcare** to equip future doctors with the knowledge to effectively use AI tools.
- **Affordable AI Solutions for Low-Income and Rural Populations:** In **Rwanda**, the government partnered with **Babyl**, an AI-powered telemedicine service, to provide affordable consultations via mobile phones, reaching underserved populations with limited access to doctors.
- **Ethical and Transparent AI Development:** The **UK's National Health Service (NHS)** has developed an **AI Code of Conduct**, which promotes transparency, safety, and fairness in the use of AI technologies in healthcare.
- **Collaborative AI Ecosystem**: **Canada** launched **Pan-Canadian AI Strategy**, promoting collaboration between AI research institutes, healthcare institutions, and tech companies to integrate AI into public healthcare systems.
- **Focus on Preventive and Public Health**: In **South Korea**, AI was used extensively during the **COVID-19 pandemic** for contact tracing, predicting infection clusters, and allocating healthcare resources efficiently.
- **Reducing Healthcare Costs through AI Efficiency** :**Israel** uses **AI-driven platforms** to reduce healthcare costs by optimizing hospital workflows, improving patient care, and reducing hospital stays, making healthcare more affordable.
- **Improving Interoperability and Data Sharing**: The **Netherlands** has implemented **interoperable health records**, enabling AI systems to access data from different hospitals and healthcare providers, leading to more accurate diagnoses and patient care.

- **Localized and Culturally Sensitive AI Solutions**: **China** has developed **AI health apps** that provide consultations in various dialects and are customized for the country's diverse regions, making healthcare services more inclusive.

PRACTICE QUESTION

Q. "Discuss the significance of Artificial Intelligence (AI) in India's healthcare ecosystem. Highlight the challenges faced in implementing AI-based solutions and provide a way forward for inclusive adoption." (15 marks,250 words)

APPROACH



MODEL ANSWER

Artificial Intelligence (AI) is transforming India's healthcare ecosystem by improving diagnostics, facilitating remote healthcare access, and enhancing patient care. It holds immense potential in addressing India's healthcare challenges, particularly in resource-constrained settings like rural areas.The World Economic Forum is driving digital healthcare transformation by fostering a global, multi-stakeholder approach to accelerate the responsible integration of digital health solutions into healthcare systems worldwide

SIGNIFICANCE OF AI IN HEALTHCARE:

1. **Improved Diagnostics and Early Detection**: AI-powered tools can enhance accuracy in diagnosing diseases such as cancer and diabetes. For example, platforms like **Niramai** use thermal imaging to detect early signs of breast cancer.
2. **Bridging the Healthcare Workforce Gap**: AI-driven **clinical decision support systems (CDSS)** help doctors diagnose and treat patients in remote areas, mitigating the shortage of healthcare professionals.
3. **Cost Reduction**: AI-based automation in administrative tasks and treatment planning can reduce operational costs, making healthcare more affordable.
4. **Telemedicine**: AI-powered platforms like **eSanjeevani** connect rural populations with doctors, reducing the need for physical visits

CHALLENGES IN IMPLEMENTING AI:

1. **Lack of Digital Infrastructure**: Many rural healthcare centers still rely on paper-based records, making it difficult to deploy AI technologies
2. **Data Privacy Concerns**: The absence of robust data protection laws poses significant risks, especially in handling sensitive patient data
3. **Bias in AI Algorithms**: AI models trained on urban data may not work well in rural contexts, leading to inaccurate diagnoses for marginalized populations
4. **High Cost**: AI-driven tools like radiology systems are expensive, limiting their accessibility in smaller hospitals

WAY FORWARD:

1. **Strengthening Digital Infrastructure**: Investment in cloud-based health platformsand expanding internet access in rural areas is crucial.Estonia'snation wide e-health system is an example.
2. **Data Protection Laws**: Implementing a **Data Protection Law** similar to **GDPR** will safeguard patient privacy.
3. **AI Training for Healthcare Workers**: Introducing AI education in medical training and continuing education programs will help integrate AI effectively like USA's Stanford university.

4. **Affordable AI Solutions**: Developing low-cost AI tools tailored to rural areas will bridge the accessibility gap. Rwanda has collaborated with a private group to provide affordable telemedicine services to her people.

While AI holds transformative potential for India's healthcare, its inclusive adoption requires addressing infrastructure, privacy, and cost challenges. A collaborative approach involving the government, private sector, and academia will ensure that AI improves healthcare outcomes for all.

28. PROJECT CHEETAH

iMPACT ANALYSIS

SYLLABUS:

GS 3 > Environment & Ecology > Species extinction & protection

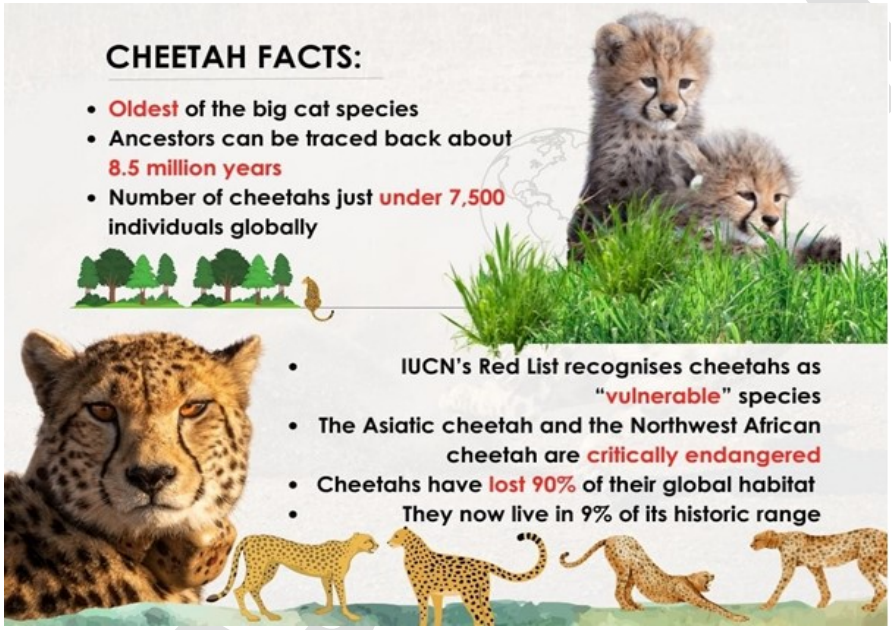
IN NEWS:

- Project Cheetah, which began with the introduction of African cheetahs into India, completed two years in September 2024.
- The project's main objectives are to establish a stable, breeding population of cheetahs and to use them as an umbrella species for restoring open natural ecosystems like grasslands, scrubs, savannahs, and degraded forests. Although the project has seen marginal successes, significant challenges remain that raise questions about its long-term viability.

PROJECT CHEETAH (INDIA'S CHEETAH REINTRODUCTION PROGRAMME):

- Project Cheetah is an ambitious initiative launched by the Government of India to reintroduce cheetahs into the country after their extinction over 70 years ago.
- This project, which began in **September 2022**, is a collaborative effort between India, Namibia, and South Africa, marking the **first transcontinental relocation of wild cheetahs.**
- This translocation took place in **two batches of eight and then 12 cheetahs.**
- The goal is not only to restore the species to its natural habitat but also to revitalize and conserve **India's grassland ecosystems**.
- In India, the Cheetah's population got **completely wiped out in the early 1950s, mainly due to over-hunting and habitat loss.**
- **Current Status of Project Cheetah**
    - **Cheetah Population:** 24 cheetahs, including 12 adults and 12 cubs, currently survive out of the original 20 translocated cheetahs and 17 cubs born in India.

- **Deaths:** 8 of the 20 translocated cheetahs have died, while 5 of the 17 cubs perished. Causes of death include mating-related injuries and septicaemia from tick infestation.
- **Breeding Success:** The project has achieved some success with cheetah breeding in the new climate and habitat. 12 out of the 17 cubs born have survived.
- **Future Translocations:** The next batch of 6-8 cheetahs is expected to be relocated to Gandhi Sagar Wildlife Sanctuary in Madhya Pradesh.



WHY WERE CHEETAHS REINTRODUCED IN THE COUNTRY?

- **Restore grassland ecosystems**: Cheetahs help restore grassland ecosystems by controlling herbivore populations, preventing overgrazing, and maintaining biodiversity. According to the **United Nations Convention to Combat Desertification (UNCCD)**, India has **lost 31% of its grasslands** in a decade, and cheetahs, as top predators, are vital to preserving these ecosystems.
- **Conserve natural heritage**: The reintroduction of cheetahs, extinct due to human actions, aligns with the government's efforts to conserve India's natural heritage.
- **Ensure survival of the fittest**: Unlike **ambush predators**, like tigers, leopards and lions, cheetahs hunt by chasing prey, culling weak animals and keeping the prey population healthy. For instance, the cheetah served as an **evolutionary force** and was **responsible for the fast speed of the blackbuck**, its major prey.

- **Successful conservation model**: The philosophy behind Project Tiger—using **top carnivores** to sustain ecosystems—applies to cheetahs in non-tiger regions, serving as a flagship species for conservation.
- **Livelihood opportunities**: Cheetah reintroduction can boost local livelihoods through ecotourism. Kuno Palpur could attract global tourists as the **only sanctuary hosting lions, tigers, cheetahs, and leopards**, benefiting local communities through eco-development initiatives.

KEY ACHIEVEMENTS OF PROJECT CHEETAH

- **Successful Translocation of African Cheetahs**: Project Cheetah saw the successful translocation of 20 cheetahs from Namibia and South Africa to Kuno National Park, Madhya Pradesh. This marked the first intercontinental relocation of wild cheetahs. This project is a notable example of international cooperation in wildlife conservation.
- **Establishment of Breeding Population:** One of the major successes of Project Cheetah has been the breeding of translocated cheetahs in India. In less than a year after their arrival, **the birth of 17 cubs** signalled a successful acclimatisation to the new habitat.Out of the 17 cubs born, 12 survived, reflecting a notable **breeding success rate of 71%.**

- **Adaptation to Indian Ecology**: The survival and successful breeding of African cheetahs in a new and challenging environment mark an important ecological achievement. Despite different climate conditions, these cheetahs have shown adaptability, as seen in their hunting behaviours and reproduction rates within the soft-release enclosures (bomas).
- **Public and Media Attention**: Project Cheetah has generated widespread public interest, both domestically and globally. It is seen as a flagship program for wildlife conservation and has drawn attention to the importance of biodiversity and the protection of endangered species. The project has also fostered educational initiatives on wildlife conservation. Schools and universities are using the project as a case study for conservation biology, bringing the plight of endangered species to the forefront of public discourse.
- **Expanding Protected Areas**: The project's goal is not just the survival of cheetahs within Kuno National Park but the development of an entire landscape-level conservation model. This involves the creation of wildlife corridors that connect protected areas across states, facilitating cheetah movement. For instance, the proposed conservation landscape between **Kuno National Park and Gandhi Sagar Wildlife Sanctuary**, which

spans multiple districts in Madhya Pradesh and Rajasthan, aims to accommodate around 60-70 cheetahs.

- **Interstate Coordination**: Project Cheetah has brought attention to the importance of interstate landscape management for the long-term survival of cheetahs. Radio-collar data showed that cheetahs like Veera and Pawan often ventured beyond park boundaries, indicating the need for coordinated conservation efforts across different jurisdictions.

- **Wildlife Research and Monitoring**: The project has enabled advancements in wildlife research, particularly in the study of cheetah behaviour, movement, and habitat preferences. The use of radio collars to monitor cheetah movements provides valuable data for future conservation strategies. For instance, research shows that free-ranging cheetahs **travel 4-6 km per day**, highlighting their territorial needs and the importance of maintaining large, interconnected habitats.

- **Boost to Ecotourism**: The reintroduction of cheetahs is expected to boost ecotourism in Madhya Pradesh and surrounding states. As cheetahs begin to establish themselves, tourists will flock to Kuno National Park and other regions, providing economic benefits to local communities. For instance, Kuno has already seen an uptick in tourism interest since the project's launch, with visitors hoping to catch a glimpse of the reintroduced cheetahs.

CHALLENGES AND CONCERNS:

- **Mortality Among Translocated Cheetahs**: Out of the 20 cheetahs translocated from Namibia and South Africa, 8 have died due to various causes, such as injuries sustained during mating, infections caused by tick infestations (leading to septicaemia), and other environmental factors.

- **Infections from Collars**: Some cheetahs developed infections, particularly septicaemia, due to **tick infestations under their radio collars**. These health issues have been difficult to manage, contributing to several deaths. Experts have questioned whether the design of the collars was suitable for the cheetahs in India's humid climate.

- **Prolonged Captivity**: Most of the cheetahs introduced to Kuno National Park have remained in **enclosures (bomas) for over a year**, despite the initial plan to release them into the wild after a few months of acclimatization. While some cheetahs were released briefly, they were later **brought back into enclosures** after facing threats in the wild, including deaths. This extended confinement has raised questions about the ability of the cheetahs to adapt to the wild and establish their territories independently.

- **Lack of Freedom to Roam**: Cheetahs are wide-ranging animals, and confinement in small enclosures limits their natural movement and hunting behaviours. For instance, critics argue that Kuno National Park is not be suitable for cheetahs, as they need wide-ranging habitats, and **Kuno's area is under 500 square miles.**
- **Need to survive competition:** Reintroduced cheetahs currently face no competition from other predators like lions and leopards, so it remains uncertain if they can establish themselves in India.
- **Conservation of indigenous species:** Experts argue that funds should focus on conserving indigenous threatened species like wolves, caracal, blackbuck, and bustards rather than reintroducing cheetahs, which may be a case of misplaced priorities.
- **Violation of Namibian Protocols**: According to Namibian wildlife policy, large carnivores like cheetahs should not be kept in captivity **for more than three months**. The fact that many cheetahs in Project Cheetah have been in enclosures for over a year has drawn criticism from conservationists, who argue that this could affect the cheetahs' ability to thrive in the wild.
- **Prey Base Deficit:** The prey base in Kuno National Park, particularly chital (spotted deer), has seen a significant decline from **23.43 animals per sq km in 2021 to 17.5 animals per sq km in 2024.** The current prey population, approximately 6,700 chital and 100 other ungulates, is inadequate to support the park's predators. The 12 surviving adult cheetahs and 91 leopards in Kuno National Park require far more prey animals than are currently available. Leopards need about **23,600 prey animals** annually, while cheetahs require around **3,120 prey animals.**
- **Leopard-Cheetah Conflict:** Leopards in Kuno National Park may outcompete cheetahs for limited prey due to their strength and dominance. Reports suggest that cheetahs struggle to establish themselves in areas with high leopard density, increasing their mortality risks amid the prey shortage
- **Open Ecosystem Restoration**: Cheetahs thrive in grassland, savannah, and scrubland ecosystems. However, the focus on forest conservation in India over the years has led to the degradation of these open ecosystems. Project Cheetah aims to restore these areas, but this will take time and require concerted efforts to balance biodiversity conservation across different habitats.
- **Interstate Conservation Challenges:** Cheetahs like Veera and Pawan have ventured beyond Kuno National Park into neighboring states, requiring coordinated conservation

efforts across borders. While plans between Madhya Pradesh and Rajasthan are being discussed, implementation may face logistical and political challenges.

- **Logistical and Administrative Challenges: Wildlife corridors connecting Kuno to other protected areas like Gandhi Sagar** are essential for cheetahs' movement and reducing conflicts. However, this requires habitat restoration, land acquisition, and coordination between agencies and communities, making it a complex and time-consuming process.
- **Risk of Conflict**: The movement of cheetahs outside protected areas and into human settlements increases the risk of human-wildlife conflict. While cheetahs are not known to attack humans, their presence in agricultural fields or near villages could lead to retaliatory killings by local communities if livestock is harmed.

WAY FORWARD:

- **Strengthening Prey Base:** Immediate efforts should focus on increasing the prey population in Kuno National Park to sustain both cheetahs and other predators like leopards.
- **Improving Habitat Connectivity:** Establish wildlife corridors connecting Kuno to other protected areas like Gandhi Sagar to ensure cheetahs have access to larger territories for movement and survival.
- **Addressing Health Concerns:** Regular health monitoring and improvements in radio collar design should be prioritized to prevent infections and ensure the well-being of translocated cheetahs.
- **Fostering Interstate Cooperation:** Strengthen coordination between states for interstate landscape conservation and develop protocols to manage cheetahs crossing state boundaries.
- **Promoting Ecotourism:** Utilize the successful aspects of the project to boost ecotourism, thereby creating economic incentives for local communities to support conservation efforts.
- **Focus on Indigenous Species:** Allocate resources to the conservation of indigenous threatened species alongside the cheetah reintroduction to ensure balanced biodiversity conservation.

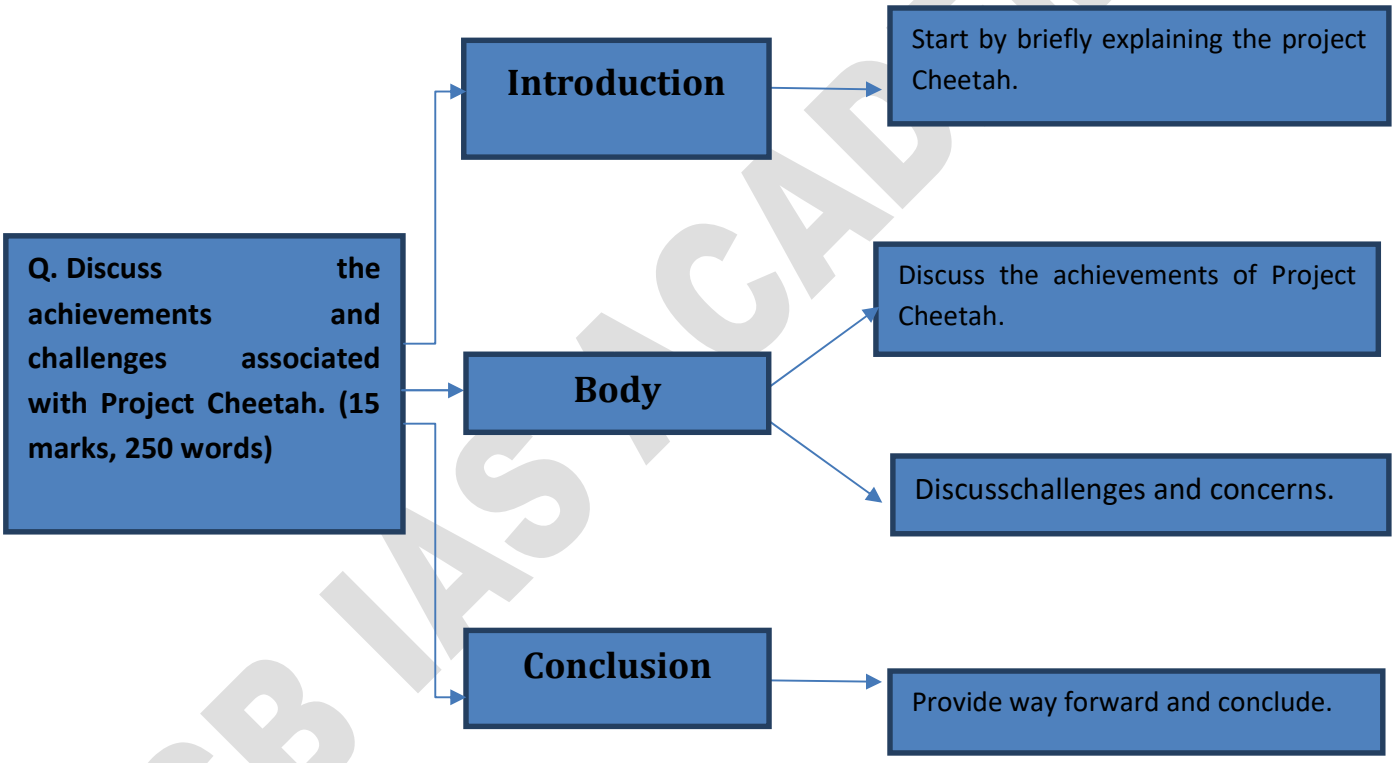
CONCLUSION: Project Cheetah represents an ambitious step towards restoring India's lost biodiversity and revitalizing its grassland ecosystems. While the project has seen successes in translocation and breeding, significant challenges remain, including habitat limitations, prey

shortages, and competition with other predators. A well-coordinated, long-term strategy focusing on habitat restoration, prey base enhancement, and interstate collaboration is crucial to ensuring the long-term success of cheetah conservation in India.

PRACTICE QUESTION

Q. Discuss the achievements and challenges associated with Project Cheetah. (15 marks, 250 words)

APPROACH



MODEL ANSWER

Project Cheetah, which completed two years in September 2024, is India's ambitious initiative to reintroduce the cheetah, extinct in the country for over 70 years. The project, launched in September 2022, is a collaboration between India, Namibia, and South Africa and involves the transcontinental relocation of cheetahs to restore grassland ecosystems and enhance biodiversity. While it has achieved significant milestones, several challenges and concerns remain.

Achievements of Project Cheetah:

1. Successful Translocation of Cheetahs: Project Cheetah marked the first transcontinental relocation of wild cheetahs, with 20 cheetahs translocated from Namibia and South Africa to Kuno National Park, Madhya Pradesh. This project stands as a notable example of **international cooperation** in wildlife conservation.**24 cheetahs currently survive**, including 12 adults and 12 cubs.

2. Breeding Success: Within a year of their relocation, **17 cubs were born**, signifying that the cheetahs successfully adapted to their new habitat. Of the 17 cubs, 12 have survived, reflecting a breeding **success rate of 71%.**

3. Conservation of Grassland Ecosystems: As an umbrella species, cheetahs play a crucial role in maintaining grassland ecosystems by regulating herbivore populations, thus preventing overgrazing. This helps restore degraded ecosystems such as grasslands, savannahs, and scrublands.*For instance,* Cheetahs contribute to biodiversity by **controlling species like chital**, preventing their overpopulation.

4. Public Awareness: Project Cheetah has garnered widespread public and media attention, making it a flagship wildlife conservation effort. It has fostered educational initiatives, helping to raise awareness about biodiversity and the need to protect endangered species.

5. Boost to Ecotourism:The project has created opportunities for ecotourism, which benefits local communities. Tourists flock to Kuno National Park, and as the cheetah population grows, the potential for sustainable tourism increases.

Challenges and Concerns:

1. Deaths Among Translocated Cheetahs: Out of the 20 cheetahs introduced, 8 have died due to factors such as mating-related injuries and infections caused by tick infestations. Infections from radio collars have been particularly concerning, leading to septicaemia in some cheetahs.Five cubs have also perished, raising concerns about the survival of the remaining cheetah population.

2. Prolonged Captivity : Most cheetahs have remained in soft-release enclosures (bomas) for over a year, despite initial plans to release them into the wild after a short acclimatization period. This prolonged captivity has raised questions about their ability to establish territories and thrive independently.Conservationists have criticised the delay in releasing cheetahs into the wild, with many arguing that extended captivity violates Namibian wildlife protocols, which limit captivity for large carnivores to three months.

3. Prey Base Deficit: The prey base in Kuno National Park, particularly chital, has significantly declined from 23.43 animals per sq km in 2021 to 17.5 animals per sq km in 2024. This shortfall poses a significant threat to the survival of both cheetahs and other predators, such as leopards, in the park.

4. Competition from Other Predators: Leopards in Kuno National Park may outcompete cheetahs for the limited prey available. Cheetahs struggle to establish themselves in areas with a high density of leopards, increasing their mortality risk amid the prey shortage.Reports indicate that cheetahs have difficulty establishing territories due to competition from dominant predators like leopards.

5. Logistical and Administrative Challenges: Cheetahs require large territories for free-ranging movement, but Kuno National Park's area of under 500 square miles is insufficient. Expanding protected areas and establishing wildlife corridors to connect Kuno with other sanctuaries, like Gandhi Sagar Wildlife Sanctuary, is necessary but challenging.Some cheetahs, like Veera and Pawan, have ventured beyond Kuno's boundaries into neighbouring states, highlighting the need for coordinated conservation efforts across state borders. However, the implementation of such efforts faces logistical and political hurdles.

Way Forward:

- **Strengthening Prey Base**: Immediate efforts should focus on increasing the prey population in Kuno National Park through prey augmentation strategies to sustain both cheetahs and other predators.
- **Improving Habitat Connectivity**: Creating wildlife corridors connecting Kuno to other sanctuaries like Gandhi Sagar Wildlife Sanctuary is essential to provide cheetahs with larger territories, reducing competition with leopards.
- **Health Monitoring and Collar Redesign**: Regular health checks and improvements in the design of radio collars should be prioritised to prevent infections and ensure the well-being of cheetahs in their new environment.
- **Fostering Interstate Cooperation**: Strengthening coordination between Madhya Pradesh and Rajasthan is crucial for managing the interstate movement of cheetahs and ensuring their protection across borders.
- **Promoting Ecotourism**: Utilising the successful aspects of the project to boost ecotourism will create economic incentives for local communities to support conservation efforts, ensuring long-term sustainability.

Project Cheetah is a crucial step in restoring India's biodiversity and revitalizing grassland ecosystems. While successes include cheetah translocation and breeding, challenges like prey shortages, habitat limitations, and competition with other predators persist. A coordinated approach focusing on habitat restoration, prey augmentation, and interstate collaboration is vital for the long-term success of cheetah conservation in India.

GENERAL STUDIES-IV

29. ETHICAL CONCERNS ASSOCIATED WITH BULLDOZER JUSTICE

iMPACT ANALYSIS

SYLLABUS:

GS 4 > Ethics

REFERENCE NEWS:

- Recently, the Supreme Court of India strongly criticized the practice of "bulldozer justice" where properties of individuals accused of crimes, or their families, are demolished without proper legal procedures. Justices Bhushan R Gavai and KV Viswanathan emphasized the necessity of following due process even in cases of conviction, highlighting the inappropriateness of demolishing properties based merely on accusations.
- This practice of "bulldozer justice" has gained momentum as a symbol of instant justice, prompting widespread concerns about its legality, morality, and ethical implications.

MORE ON NEWS:

- The court was reviewing applications that challenge demolitions conducted in **Rajasthan and Madhya Pradesh**, where properties were destroyed post-allegations of crimes leading to communal tensions. These cases were linked to a broader petition initiated by Jamiat-Ulama-i-Hind against the **2022 demolitions in Delhi's Jahangirpuri.**
- The court indicated its intention to develop **pan-India guidelines** to standardize and regulate the demolition processes, ensuring they are conducted legally and justly across all states.

INSTANCES OF BULLDOZER JUSTICE:

- **Rajasthan**: In Udaipur, a property was demolished for encroaching forest land after the tenant's son was arrested over a communal incident. Legal provisions from the Rajasthan Municipalities Act, 2009, and Rajasthan Forest Act, 1953 dictate that proper notices and legal processes are prerequisites for such actions.
- **Madhya Pradesh**: A property was demolished without notice on the same day an FIR was lodged against the owner's son. The Madhya Pradesh Municipalities Act, 1961, requires that owners are given a chance to respond to demolition notices, which was not adhered to in this instance.
- **Uttar Pradesh**: Following violent protests in 2022, demolitions were carried out under the Uttar Pradesh Urban Planning and Development Act, 1973, which also mandates a notice

and appeal process before any demolitions.

- **Delhi**: Post-communal violence during a religious procession in 2022, illegal encroachments were targeted for demolition. The Delhi Municipal Corporation Act, 1957, outlines procedures that include immediate removals without notice under specific conditions, yet also provides for appeals against demolition orders.

ETHICAL CONCERNS ASSOCIATED WITH 'BULLDOZER JUSTICE'

- **Retributive Justice:**
  - Ethically, justice should aim at reforming and rehabilitating offenders rather than merely punishing them. The retributive nature of bulldozer justice misses an opportunity to address the root causes of crime and instead **focuses on punishment** that does little to rehabilitate the offender or reconcile with the community.

Retributive justice	Restorative justice
1. Crime defined as violation of the state	1. Crime defined as violation of one person by another
2. Focus on establishing blame, on guilt, on past (did he/she do it?)	2. Focus on problem-solving, on liabilities and obligations, on future (what should be done?)
3. Adversarial relationships & process normative	3. Dialogue and negotiation normative
4. Imposition of pain to punish and deter/prevent	4. Restitution as a means of restoring both parties; reconciliation/restoration as goal
5. Justice defined by intent and by process: right rules	5. Justice defined as right relationships; judged by the outcome

- **Impact on Reformative Justice:**
  - Restorative justice aims to rehabilitate offenders by reconciling them with victims and the community, promoting a transformative a**pproach to repair the harm caused by crime**. This method seeks to restore, as much as possible, the situation to what it was before the crime occurred. Bulldozer justice, in contrast, hinders these goals:
    - **Undermining Rehabilitation:** By employing punitive measures like property demolition, bulldozer justice eliminates opportunities for offenders to make amends and reintegrate into society. Such actions can lead to **long-term resentment and social exclusion**, increasing the likelihood of recidivism.

- **Damage to Community Relations:** The aggressive nature of property demolitions, especially in communities where the accused are **minorities or economically disadvantaged**, can lead to increased tensions and a breakdown in community trust. This is counterproductive to the restorative goals of understanding and healing.

- **Violation of Due Process and Natural Justice:**
  - The practice of bulldozer justice often bypasses due process, swiftly executing property demolitions without proper legal proceedings. This denies the accused their right to defense, **violating thecategorical imperativeby disregarding the universal need for fairness and transparency** in judicial processes.

- **Presumption of Guilt:**
  - Demolishing someone's property based on accusations or even convictions presupposes their guilt and punishment without the opportunity for defense or appeal that a court of law would normally provide. This contradicts the fundamental legal principle of **'innocent until proven guilty.'**

- **Collective punishment:**
  - Employing bulldozers to demolish properties without a trial impacts not just the accused but also their families, constituting collective punishment and a severe breach of **utilitarian ethics**, which seeks to **minimize harm and maximize benefits** for the greatest number.

- **Disregard for Human Dignity:**
  - The sudden and forceful eviction of families and the demolition of homes not only deprive affected individuals of their **physical belongings but alsostrip them of their dignity and security.** Such actions transform the justice system into an exhibition of power that disregards the **ethics of care**, which emphasizes **maintaining human dignity and empathy.**

- **Violation of Human Rights:**
  - From a human rights perspective, punitive demolitions without due process are seen as violations of human dignity and the right to a fair trial. These actions often contravene international human rights standards set by documents such as **the Universal Declaration of Human Rights and the International Covenant on Civil and Political Rights**, to which India is a signatory. These standards advocate for the protection of individuals' rights and dignity against arbitrary and disproportionate actions by the state.

- **Psychological Impact:**
  - The abrupt and forceful nature of demolitions can cause significant psychological trauma, instilling fear and helplessness, and violating principles of **human dignity and the ethics of care.**

- **Political Abuse of Power:**
    - Bulldozer justice risks manipulation for political objectives, targeting adversaries under the guise of legality. This misuse **undermines the rule of law and erodes democratic processes, violating the fairness principle** by leveraging state machinery for political gains.
    - The practice of bulldozer justice has been notably prevalent in states like Uttar Pradesh, Madhya Pradesh, Rajasthan, and Maharashtra, where it has been used as a **political tool rather than a lawful enforcement strategy.**

WAY FORWARD:

- **Need for Balanced Justice:**
    - Ethically, justice systems should strive for a balance between **retributive and restorative principles.** Bulldozer justice, in its current form, heavily leans towards punitive retribution without the checks and balances provided by thorough judicial review and community involvement.
- **Guideline Proposals:**
    - The Supreme Court has proposed the creation of **pan-India guidelines** to regulate these practices. This move aims to standardize the procedures and ensure that demolitions are carried out lawfully and justly, preventing the arbitrary destruction of property.
- **Upholding the Principle of Proportionality:**
    - Ensure that the response to crime through mechanisms like property demolition is proportionate to the offense and does not extend punishment beyond the individual directly involved. This respects the ethical principle of fairness and avoids collective punishment.
- **Adhering to the Principle of Justice as Fairness:**
    - Implement strict guidelines to ensure that demolitions are used **as a last resort and only after due process** has been thoroughly applied. This includes providing ample opportunity for the accused to respond and defend against allegations, ensuring that all actions are justified and transparent.
- **Strengthening Legal Frameworks:**
    - Revise and clarify the existing laws that allow for property demolitions to ensure they are only used under strict legal scrutiny and genuine necessity. Implement a mandatory

judicial review for any demolition orders where the basis is linked to alleged criminal activities, ensuring oversight and fairness.

- **Support and Resettlement Programs:**
    - Implement comprehensive support and resettlement programs for those affected by demolitions. This includes providing adequate resettlement options, financial assistance, and access to services that can help displaced families recover and reintegrate into communities.

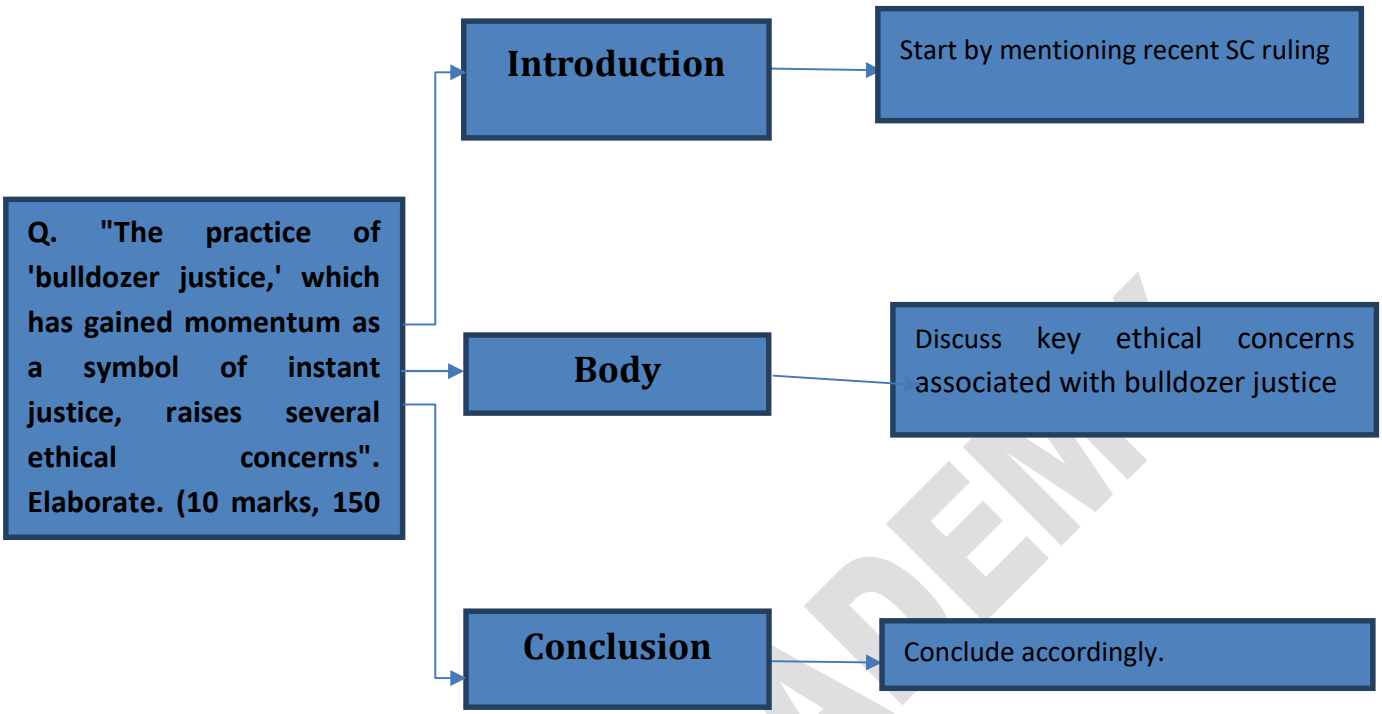
CONCLUSION:

- The practice of "bulldozer justice" challenges ethical and legal norms, straying from principles of fairness and due process. This shift from restorative to retributive justice underscores the urgency of reevaluation to align actions with justice, human rights, and the rule of law. The Supreme Court's scrutiny highlights the necessity for implementing stringent guidelines and enhancing judicial oversight. Such measures are crucial to curbing misuse and maintaining an equitable justice system that upholds human dignity and balances retributive actions with restorative goals.

PRACTICE QUESTION

Q. "The practice of 'bulldozer justice,' which has gained momentum as a symbol of instant justice, raises several ethical concerns". Elaborate. (10 marks, 150 words)

APPROACH



MODEL ANSWER

Recently, the Supreme Court of India criticized the practice of "bulldozer justice," where properties of individuals accused of crimes are demolished without following proper legal procedures. This practice has gained momentum in several states as a form of instant justice, prompting widespread debate about its legality, morality, and ethical implications. The court emphasized the importance of due process and expressed concerns over actions based merely on accusations.

Ethical Concerns Associated with Bulldozer Justice

- **Retributive Justice:** Bulldozer justice leans towards retributive rather than reformative justice. Ethically, the justice system should aim to rehabilitate and reintegrate offenders into society. By focusing on punitive measures like property demolition, the opportunity for rehabilitation and reconciliation is lost, often increasing social resentment and marginalization.

< Include a table or diagram showing the difference between Retributive Justice and reformative justice>

- **Impact on Reformative Justice:**

- **Undermining Rehabilitation:** Punitive measures like property demolitions prevent offenders from reintegrating into society, fostering long-term resentment and increasing recidivism.
- **Damage to Community Relations:** Aggressive demolitions, especially in marginalized communities, heighten tensions and erode trust, undermining efforts for reconciliation.

- **Violation of Due Process and Natural Justice:** Bulldozer justice often bypasses due process, executing property demolitions swiftly without proper legal proceedings, denying the accused their defense rights, and violating the **categorical imperative of fairness and transparency.**
- **Presumption of Guilt:** Properties are demolished based on accusations, presupposing guilt without a court's defense or appeal opportunities, contradicting the 'innocent until proven guilty' principle.
- **Collective Punishment:** Demolitions impact not just the accused but also their families, constituting collective punishment and breaching **utilitarian ethics** by failing to minimize harm.
- **Disregard for Human Dignity:** Forceful evictions and demolitions strip affected individuals of dignity and security, transforming justice into a display of power, in direct contradiction to the **ethics of care.**
- **Violation of Human Rights:** Punitive demolitions without due process contravene international human rights standards, including the Universal Declaration of Human Rights and the International Covenant on Civil and Political Rights, advocating for the protection against arbitrary state actions.
- **Psychological Impact:** The sudden nature of demolitions causes psychological trauma, instilling fear and violating principles of human dignity and ethics of care.
- **Political Abuse of Power:** Bulldozer justice can be manipulated for political aims, targeting opponents under the guise of legality, thereby undermining the rule of law and eroding democracy, **violating the fairness principle**.

Way Forward:

- **Balanced Justice:** Ensure a balance between retributive and restorative justice with proper judicial checks.
- **SC Guidelines:** Establish pan-India guidelines to standardize lawful and just demolitions.
- **Proportionality:** Ensure punishment, like property demolition, is proportionate and limited to the individual involved.
- **Justice as Fairness:** Use demolitions only as a last resort with due process and transparency.

- **Strengthen Legal Frameworks:** Clarify laws and enforce mandatory judicial review for demolitions linked to criminal activities.

The practice of "bulldozer justice" raises profound ethical and legal concerns, primarily due to its disregard for due process, human rights, and justice. The need for reformation and the preservation of human dignity must guide any punitive actions. The Supreme Court's scrutiny and efforts to develop guidelines are vital steps towards ensuring that **justice is served fairly, lawfully, and ethically.**

30. RIGHT TO DISCONNECT

iMPACT ANALYSIS

SYLLABUS:

GS 4>Ethics >> Work-Life Balance

REFERENCE NEWS:

Australia has recently taken a significant step in promoting **work-life balance**, by granting employees the right to ignore work calls after office hours, with the new **'right to disconnect**' law.This policy shift addresses a growing concern in today's digital age, where the lines between work and personal life are increasingly blurred.

RIGHT TO DISCONNECT:

Constantly being connected to work may seem like a way to stay productive, but research suggests it can actually have the opposite effect, **leading to burnout**, **reduced creativity**, and a **decline in overall job satisfaction**.The introduction of laws allowing Australian employees to ignore work calls after hours marks **a critical shift in the global conversation around work-life balance.**

Employees who are unable to switch off from work often feel that their **personal life is being overshadowed by their professional responsibilities**. Additionally, when work intrudes on personal time, employees often feel like they are losing autonomy over their schedules, which can lead to frustration and **resentment towards their job** or employer.

Australia's legal **RIGHT TO DISCONNECT** allows:

- Workers to **refuse to monitor, read, or respond to work-related communications outside their official hours** unless such refusal is deemed unreasonable.
- The determination of what constitutes an "unreasonable" refusal will be based on various factors, including the **nature of the employee's role and compensation for extra hours.**
- Australia's legislation is in line with similar laws in **European and Latin American countries**, reflecting a global movement against the "**always on" work culture.**
- France introduced a similar right to disconnect in 2017, aiming to combat the constant connectivity facilitated by smartphones and other digital devices.

- India has also explored similar protections with the **Right to Disconnect Bill of 2018.** However, this bill has yet to gain significant legislative traction.

CHALLENGES OF A RIGHT TO DISCONNECT IN INDIA:

Work Culture and Expectations:

- **Overwork culture**: In many industries, especially in competitive sectors like finance, tech, law, medicine there is a culture of **"always-on"** where responding to work-related queries after hours is expected. This norm is difficult to break and might face resistance from both employers and employees.

Global and Cross-Time Zone Operations:

- Many companies, particularly **multinational corporations**, operate across different time zones, making it difficult to determine when employees should be expected to disconnect. For instance, an employee in India working for a U.S.-based company may receive communications outside their regular working hours due to time zone differences.

Gig Economy and Freelancers:

- Many workers today are employed in the **gig economy**, where they have **flexible hours** but are often expected to be available at all times to secure more work. Implementing the Right to Disconnect could be problematic in this context, as gig workers and freelancers often **lack clear boundaries between working and non-working hours.**Unlike full-time employees, **gig workers may not have formal contracts** that define working hours, making the enforcement of such rights ambiguous.

Monitoring and Enforcement:

- **How to enforce**: It is challenging to monitor compliance with the Right to Disconnect without infringing on **privacy**. Ensuring that employers are not overstepping boundaries while also respecting employees' autonomy to work beyond hours voluntarily presents a legal and practical issue.
- **Penalties for violations**: Establishing appropriate penalties or consequences for employers who violate the Right to Disconnect can be tricky. Employers might find subtle ways to discriminate against or penalize employees who exercise this right, making enforcement less effective.

Economic Pressures and Flexibility:

- **Business needs**: In highly dynamic industries like IT or customer service, emergencies and critical situations may arise that necessitate after-hours communication. The Right to Disconnect could limit the flexibility companies need to address urgent matters, particularly for employees in key roles.
- **Employee willingness**: Some employees prefer flexible working hours and may not want rigid enforcement of the Right to Disconnect, as they might use after-hours work to complete tasks or meet deadlines at their convenience.
- **India's economic prosperity**: Countries like Iceland are unique, with a high concentration of public-sector jobs that are less dependent on strict productivity metrics, and cannot be compared to India, with its growing youth population and private sector industries which thrive and sustain on high performance.
- In India, the **right to profession envisaged as a fundamental right** enshrined in the Constitution, underscores the importance of work in an individual's life, akin to their right to equality and life. In this context, the concept of a "right to disconnect" might seem at odds with the cultural ethos that celebrates continuous striving and professional growth. A **reduction in work hours** could lead to a **slower pace of development and a diminished capacity to respond to market demands** — a mammoth risk the Indian economy cannot afford to take.

Sector-Specific Challenges:

- **Essential services**: Certain sectors, like **healthcare, security**, or **emergency services**, operate 24/7, requiring constant communication. In such industries, applying the Right to Disconnect may not be practical or feasible.
- **Management roles**: Senior employees or managers are often expected to be available outside regular hours to handle critical decisions, making it harder to impose disconnection policies uniformly across all levels of an organization.

Legal and Regulatory Frameworks:

- **Varying legislation**: Countries have different approaches to labour laws, and not all have provisions for the Right to Disconnect. Even in countries that have adopted the legislation, such as **France**, enforcement mechanisms and penalties can vary, creating inconsistencies.
- **Balancing employer and employee rights**: Crafting legislation that balances the needs of both employees for rest and employers for flexibility is challenging. Employers may

argue that such laws would impede productivity and reduce the competitiveness of their business.

Psychological Factors:

- **Fear of repercussions**: Even if the Right to Disconnect is legally granted, employees may hesitate to exercise it out of fear of losing favour with management or missing out on promotions. The psychological pressure to stay connected can undermine the effectiveness of such a right.
- **Burnout and mental health**: Employees who do not disconnect regularly face the risk of burnout. However, even with the Right to Disconnect, many workers may continue working out of habit or due to a perceived need to be productive, leading to similar mental health issues.
- The reality of constant connectivity, fuelled by digital tools and remote working, has blurred the lines between professional and personal lives. Checking work emails or dealing with work-related stress late into the evening can **disrupt sleep patterns.** This not only **affects cognitive function** but also contributes to other health issues such as weakened immunity and increased risk of chronic conditions like **hypertension.**

Technology Dependency:

- **Constant connectivity**: With the rise of smartphones, laptops, and remote work software, employees are often expected to be reachable around the clock. Reducing this constant connectivity and redefining communication protocols will be essential but difficult in the digital age.
- **Remote work culture**: The COVID-19 pandemic has accelerated the adoption of remote work, which inherently depends on digital tools. Establishing clear boundaries in remote work environments for when employees can disconnect is more challenging than in traditional office setups.

PROSPECTS OF INDIA HAVING A RIGHT TO DISCONNECT:

- **Growing overwork culture**: India's competitive job markets, especially in sectors like IT, banking, and consulting, often promote a culture of overwork, where employees are expected to be available even after working hours. The Right to Disconnect would help in creating a boundary between personal life and work, ensuring employees can disengage after official hours.

- **Improves family and social life**: By establishing clear work boundaries, employees can spend quality time with their families and engage in personal activities, which contributes to overall **social well-being and work-life balance.**
- **Mental health concerns**: Prolonged working hours and the constant need to stay connected lead to increased stress, anxiety, and even burnout. The Right to Disconnect would protect employees from the psychological pressures of always being on-call, helping to improve mental well-being.
- **Healthier workforce:** By reducing stress and improving mental health, the workforce becomes more productive, motivated, and creative in the long run. A healthy work-life balance reduces absenteeism and health-related issues among employees.
- **Quality over quantity**: Employees who are encouraged to disconnect after work hours may become more productive during working hours. When workers are well-rested, they tend to be more efficient, focused, and less prone to errors.
- **Reduces presenteeism**: The expectation of being constantly available often leads to presenteeism (being physically present but not productive), which can drain overall efficiency. Disconnecting helps employees to recharge and return to work with renewed energy.
- **Flexible yet regulated**: While remote work offers flexibility, it can also make employees feel compelled to work beyond their contractual hours. The Right to Disconnect ensures that flexibility does not become exploitation.
- **Global trend**: Countries like France, Italy, and Portugal have already implemented the Right to Disconnect, setting international standards for labour rights. For India, introducing this right would align its labour laws with global best practices, strengthening its position as a responsible nation in terms of labour welfare.
- **Attracts talent**: Companies that respect employees' time are more likely to attract and retain top talent. As India seeks to become a global economic hub, providing such protections can enhance the attractiveness of Indian companies in the global labour market.
- **Preventing exploitation**: Without fixed hours, gig workers are at risk of being called to work at any time. Enforcing the Right to Disconnect would ensure their right to rest, regardless of their contractual nature.
- **Beneficial for working women**: Many women in India balance professional responsibilities with household duties. Being constantly connected to work can add to

the double burden of managing work and home. The Right to Disconnect ensures that women, especially those in demanding jobs, can separate their work from personal responsibilities, promoting gender equality in the workplace.

- **Reduced healthcare costs**: A more balanced workforce is less likely to suffer from stress-related illnesses, leading to fewer medical costs for both employees and employers. In the long term, this could help reduce national healthcare expenditures.

WAY FORWARD FOR A PERSONAL PROFESSIONAL AND ECONOMIC DEVELOPMENT BALANCE:

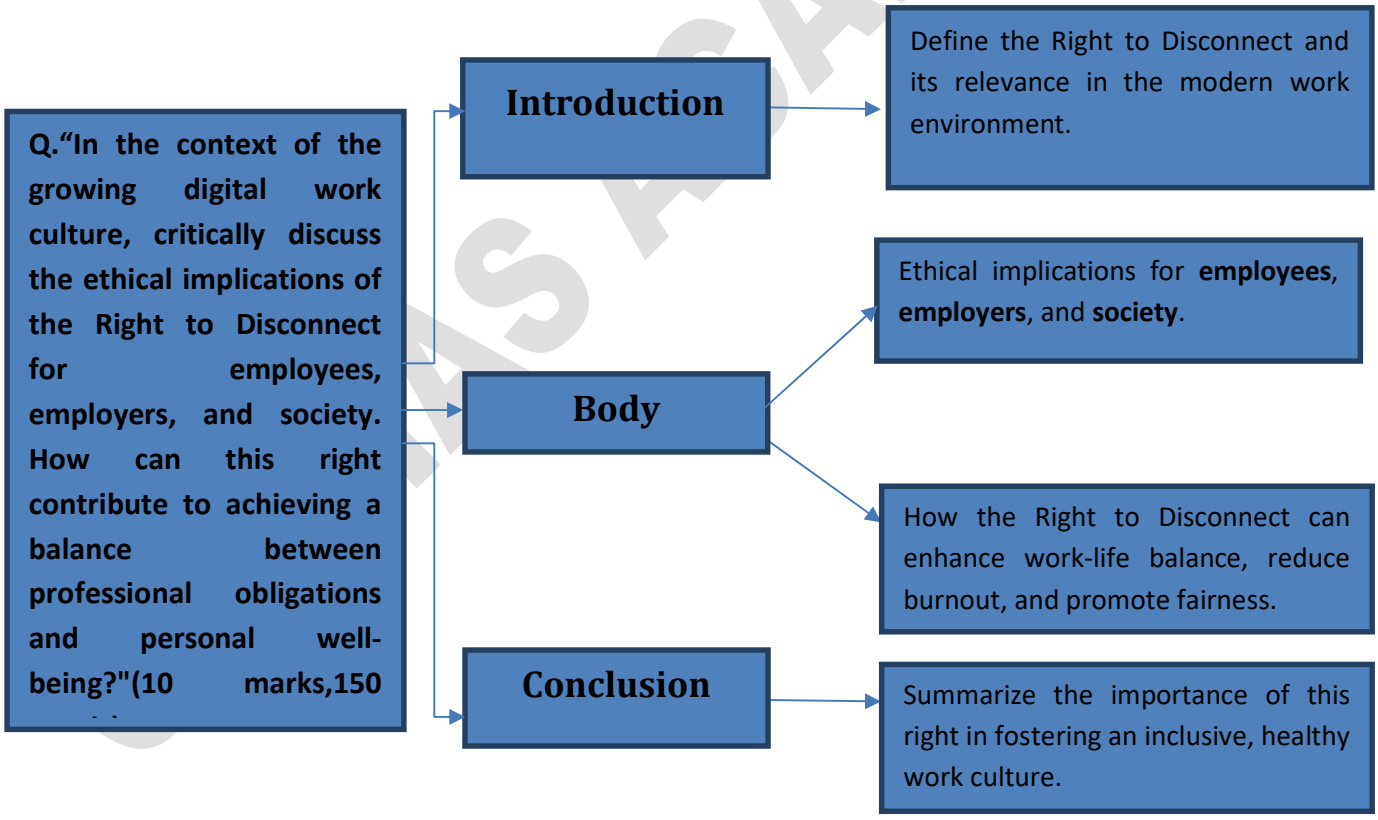
- **Gradual Implementation with Pilot Programs:** Portugal has implemented the Right to Disconnect by initially applying it to specific sectors.
- **Digital Detox and Mental Health Awareness**: In France, employees can legally ignore work-related emails after hours. Some companies, such as Volkswagen in Germany, have voluntarily disabled work emails during non-working hours. Promote a "digital detox" by encouraging companies to adopt voluntary policies that limit or turn off access to work-related platforms after working hours.
- **Compensation for After-Hours Work**: Countries like Italy and Belgium mandate compensating employees for responding to work after hours. Transparency is key—employers should clearly define which employees are expected to be available after hours and under what conditions, ensuring workers are aware of their responsibilities and rights.
- **Accommodating the Gig and Informal Economy**: Some European countries, including France, have started discussing the need to extend the Right to Disconnect to freelancers and gig workers. India could offer "right to rest" protections for gig workers, ensuring that they are not required to be available 24/7.
- **Promote Employer-Employee Agreements**: In Germany, some companies implement company-specific agreements where employees and employers mutually decide on communication expectations outside working hours.
- **Strengthen Labor Laws and Enforcement:** Countries like France have specific legislation around the Right to Disconnect, mandating businesses with over 50 employees to negotiate disconnect policies.
- **Incorporate Technology Solutions**: France and Germany use technology to enforce disconnection policies by automatically disabling email access after work hours. Develop tech-enabled solutions that restrict work-related communications after office hours, but still allow for urgent or critical communications if necessary. For example, companies could implement auto-responses for after-hours emails or set systems to distinguish between normal and urgent communications.

- **Addressing Cross-Time Zone and Multinational Challenges**: France's law on disconnection provides exemptions for multinational operations that deal with different time zones.
- **Encourage Corporate Social Responsibility (CSR)**: In countries like Germany, the Right to Disconnect is viewed not just as a legal mandate but also as a matter of corporate ethics.

PRACTICE QUESTION

Q. "In the context of the growing digital work culture, critically discuss the ethical implications of the Right to Disconnect for employees, employers, and society. How can this right contribute to achieving a balance between professional obligations and personal well-being?"(10 marks,150 words)

APPROACH



MODEL ANSWER

The **Right to Disconnect** refers to employees' legal entitlement to disengage from work-related communication outside official working hours. In an increasingly digital and remote-working environment, this right raises several ethical questions regarding the balance between professional obligations and personal well-being.

For **employees**, the ethical importance of the Right to Disconnect lies in protecting their mental health and personal autonomy. Constant connectivity can lead to burnout, stress, and the erosion of personal life, undermining their overall productivity and happiness. Ethically, employees deserve the right to enjoy their personal time without fear of professional repercussions, such as missing out on promotions or being penalized.

For **employers**, the challenge is to balance operational efficiency with ethical responsibilities toward employee welfare. While businesses may require flexibility to handle urgent matters, respecting employees' right to rest is fundamental to promoting fairness and avoiding exploitation. An ethical employer recognizes that overworking employees can lead to diminished creativity and long-term harm to the workforce.

On **a societal level**, the Right to Disconnect promotes a more balanced work culture, reducing societal pressure to be constantly available and fostering a healthier work-life dynamic. It also supports gender equality, particularly for working women, who often juggle professional and household responsibilities.

How the Right to Disconnect can enhance work-life balance, reduce burnout, and promote fairness?

- **Clear boundaries between work and personal life**: The Right to Disconnect empowers employees to establish defined work hours, ensuring they can fully disengage from professional duties outside these hours. This separation allows individuals to dedicate time to personal activities, family, hobbies, and self-care, which are essential for a fulfilling personal life.
- **Mental and physical rejuvenation**: By allowing employees to disconnect after work, they are given time to rest and recharge. This helps them return to work with greater focus and productivity, enhancing their ability to perform at a higher level during working hours.
- **Preventing constant work-related stress**: Always being available for work-related communication can lead to excessive stress, which is a key factor in burnout. The Right to Disconnect limits after-hours work demands, preventing overwork and the mental fatigue that results from being "always on."

- **Promoting mental health**: Disconnecting from work outside office hours allows employees to decompress, reducing anxiety and stress levels. This promotes a healthier work environment and contributes to long-term mental well-being.
- **Encouraging rest and relaxation**: Without the pressure to be constantly responsive, employees can focus on self-care and relaxation, leading to better sleep, improved concentration, and overall better health. This contributes to reducing the cumulative effect of stress and burnout.
- **Equal treatment across roles**: The Right to Disconnect ensures that all employees, regardless of their role or seniority, have the same opportunity to disconnect from work. This prevents exploitation of junior employees, who might otherwise feel compelled to work beyond hours to prove their commitment.
- **Equal opportunities for all workers**: It is particularly beneficial for workers juggling multiple roles, such as **working parents** or **caregivers**, ensuring that they are not disadvantaged by an expectation of after-hours availability.

The Right to Disconnect fosters a more **inclusive** and **healthy work environment** by ensuringethical treatment of employees. It allows for a sustainable professional life where personal well-being is prioritized, thus benefiting both individuals and society at large.

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