Test-3

UP-PCS Mains (2024)

General Studies : Paper- III

Model Answers

Section-A

Q.1 Define inclusive development and discuss its significance in achieving Sustainable Development Goals (SDGs) in India.

Ans: Inclusive development refers to a growth process that ensures equitable access to opportunities and benefits for all sections of society, particularly the marginalized, disadvantaged, and vulnerable groups.

It integrates economic, social, and environmental dimensions of development while promoting participation, equity, and empowerment.

Significance of Inclusive Development in achieving SDGs in India

1. **Eradication of Poverty and Hunger (SDG 1 & 2)**
   - Inclusive development ensures targeted support for BPL families, small farmers, and marginalized communities through schemes like PM Garib Kalyan Anna Yojana and PM-KISAN.
   - Focus on nutritional security and rural livelihood diversification directly addresses hunger and income insecurity.
2. **Quality Education and Health (SDG 3 & 4)**
   - Promotes access to affordable healthcare (e.g., Ayushman Bharat) and inclusive education (NEP 2020 focuses on equity).
   - Reduces inequality in human capital development across gender, caste, and geography.
3. **Gender Equality and Social Justice (SDG 5, 10, 16)**
   - Inclusive policies like Beti Bachao Beti Padhao, reservation for women in local governance, and legal safeguards for SC/STs foster empowerment and social equity.
   - Encourages participation of diverse voices in decision-making, strengthening democratic institutions.
4. **Economic Growth and Employment (SDG 8 & 9)**
   - Inclusive growth creates decent job opportunities through MSME promotion, Start-Up India, and Skill India.
   - Infrastructure development is aligned with universal access, especially in backward regions.
5. **Environmental Sustainability (SDG 6, 7, 13)**
   - Empowers communities in climate action, water conservation (e.g., Jal Shakti Abhiyan), and renewable energy adoption (PM-KUSUM), ensuring development doesn't exclude ecological concerns.

Inclusive development is essential for holistic and sustainable progress in India. Without inclusion, the Sustainable Development Goals risk becoming unevenly implemented, leaving the most vulnerable behind. Inclusive governance, participatory planning, and equitable resource allocation are crucial to ensuring that India's development is truly sustainable and leaves no one behind.

Q.2 Discuss the role of globalization in shaping the status of women in Indian society. Highlight the positive and negative impacts, with suitable examples.

Ans: Globalization, marked by liberalization, privatization, and technological integration, has significantly influenced the status of women in India, producing both positive and negative outcomes.

Positive Impacts

1. **Economic Empowerment**
   - According to the World Bank (2022), India's female labour force participation (FLFP) in urban areas increased to 32.8% post-COVID, partially due to the rise of gig and digital economy jobs.
   - Globalized sectors like IT-BPM employ nearly 36% women, as per NASSCOM.
2. **Educational Advancement**
   - As per AISHE 2020-21, women now constitute 49% of total enrolment in higher education in India, influenced by global awareness of gender equity.
3. **Rise in Women Entrepreneurship**
   - 6.3 million women entrepreneurs in India, many leveraging global platforms like Etsy and Amazon Saheli for market access (NITI Aayog, 2021).
4. **Global Gender Discourses**
   - Movements like #MeToo found strong resonance in India, encouraging discussions on workplace harassment and women's rights.

Negative Impacts

1. **Informalization and Exploitation**
   - According to ILO, over 94% of working women in India are employed in the informal sector, many in global supply chains like garments and electronics with low wages and poor working conditions.
2. **Cultural Disparities**
   - Global media has sometimes led to a clash of values, contributing to backlash against women's freedom in conservative settings.
3. **Digital Divide**
   - As per NFHS-5, only 33.3% of rural women have ever used the internet, limiting their access to global opportunities.

Globalization has opened new avenues for Indian women, but its benefits remain uneven. Targeted interventions—such as improving digital access, social security for informal workers, and gender-sensitive education—are essential to make globalization a truly inclusive force for women's empowerment.

Q.3 Examine the main causes of poverty in India and discuss the effectiveness of government policies in addressing these causes.

Ans: Poverty in India remains a persistent socio-economic challenge despite sustained economic growth. As per the NITI Aayog's *Multidimensional Poverty Index (2023)*, approximately 14.96% of India's population was multidimensionally poor in 2019-21, though this marks a decline from previous years.

Main Causes of Poverty in India

1. **Unemployment and Underemployment**: The informal sector dominates employment, often without job security or adequate wages. For instance, over 90% of India's workforce is in the informal sector (NSSO, 2017-18).
2. **Low Agricultural Productivity**: With over 40% of the workforce dependent on agriculture, low productivity, fragmented land holdings, and dependence on monsoons perpetuate rural poverty.
3. **Inequality and Social Exclusion**: Marginalized communities, including SCs, STs, and women, face systemic discrimination, limiting access to opportunities and resources.
4. **Poor Access to Education and Health**: Human capital deficiencies due to inadequate access to quality education and health care limit upward mobility.
5. **Rapid Population Growth**: Puts strain on resources, infrastructure, and employment generation efforts.

Effectiveness of Government Policies

1. **MGNREGA**: Provided employment and income security to rural poor, especially during COVID-19. However, delays in wage payments and poor implementation remain concerns.
2. **PM-KISAN & MSP Schemes**: Offer direct income support to farmers, yet issues of exclusion and inefficiency persist.
3. **National Food Security Act (NFSA)**: Ensures food security to two-thirds of the population but suffers from leakages and poor targeting.
4. **Pradhan Mantri Awas Yojana (PMAY)** and **Swachh Bharat Abhiyan**: Address housing and sanitation, indirectly impacting poverty.
5. **Skill India Mission**: Aims to improve employability, though outcomes remain below potential due to quality and industry mismatch.

While government policies have made significant strides in poverty reduction, structural issues like inequality, jobless growth, and implementation gaps hinder their full effectiveness. A holistic and targeted approach, focusing on education, skilling, and social equity, is vital to eradicate poverty sustainably.

Q.4 Discuss the significance of environmental security in the context of sustainable development.

Ans: Environmental security refers to safeguarding ecosystems, natural resources, and environmental conditions essential for human well-being and survival.

It is a critical pillar of sustainable development, which aims to balance economic growth, social equity, and environmental protection.

Significance of Environmental Security for Sustainable Development

1. **Resource Sustainability**: Unsustainable exploitation of water, forests, and minerals leads to degradation. For example, India faces over 70% groundwater stress, threatening agriculture and drinking water.
2. **Climate Change and Resilience**: Rising temperatures and erratic weather undermine food security, health, and livelihoods. The IPCC Sixth Assessment Report warns that India is highly vulnerable to climate impacts such as heatwaves and rising sea levels.
3. **Health and Air Quality**: Pollution compromises public health and productivity. As per WHO (2019), 22 of the 30 most polluted cities globally are in India. Poor air and water quality cost the economy over 5% of GDP (World Bank, 2013).
4. **Conflict Prevention and National Security**: Environmental degradation can cause displacement and resource-based conflicts. For instance, climate-induced migration in Sundarbans and water disputes among Indian states reflect the nexus between environment and security.
5. **Biodiversity and Ecosystem Services**: Forests, wetlands, and oceans provide ecosystem services like carbon sequestration and pollination. India's National Biodiversity Action Plan recognizes their role in climate adaptation and sustainable agriculture.

Prominent Initiative for Integrative Approaches

- **International Solar Alliance (ISA)**: Promotes clean energy and reduces dependence on fossil fuels.
- **Namami Gange Programme**: Aims to rejuvenate the Ganga while ensuring livelihoods and health.
- **National Action Plan on Climate Change (NAPCC)**: Balances developmental priorities with environmental protection.

Environmental security is not an isolated goal but a foundation for long-term development. A failure to integrate environmental concerns into planning will compromise sustainability, equity, and intergenerational justice. India's future depends on recognizing and reinforcing this vital link.

Q.5 Explain the role of biodiversity in maintaining ecological balance.

Ans: Biodiversity, encompassing the variety of species, genes, and ecosystems, forms the foundation of ecological balance. It enables natural systems to function efficiently, supporting life on Earth and ensuring the continuity of ecological processes vital for human survival.

Role of Biodiversity in Maintaining Ecological Balance

1. **Nutrient Cycling and Soil Fertility**: Microorganisms like bacteria and fungi break down organic matter, recycling nutrients essential for plant growth. The FAO has highlighted that such soil biodiversity is critical for sustainable agriculture and food security.
2. **Pollination and Food Security**: Over 75% of global crops depend to some extent on animal pollination. Bees, butterflies, and birds play a crucial role in this process, directly impacting crop yields and the availability of nutritious food.
3. **Climate Regulation**: Diverse ecosystems like forests and mangroves sequester carbon, helping mitigate climate change. India's *State of Forest Report 2021* emphasizes the role of forest cover in absorbing greenhouse gases and stabilizing the climate.
4. **Water Purification and Disaster Risk Reduction**: Wetlands filter pollutants and regulate water flow, acting as natural buffers against floods and droughts. The Ramsar Convention recognizes wetlands as essential for maintaining ecological integrity and supporting human well-being.
5. **Pest and Disease Control**: Biodiversity controls agricultural pests through natural predators and reduces the risk of zoonotic diseases by maintaining balanced ecosystems. The IPBES Global Assessment has warned that biodiversity loss increases the risk of pandemics and food insecurity.

Biodiversity is not just a reservoir of life forms but a life-support system. Its conservation is essential for ecological stability, climate resilience, and sustainable development for present and future generations.

Q.6 Discuss the technological innovations behind the Hyperloop transportation system and its feasibility in India

Ans: The Hyperloop is a futuristic mode of transportation that proposes to move passengers or cargo in levitating pods through low-pressure tubes at speeds exceeding **1,000 km/h**.

Originally conceptualized by **Elon Musk in 2013**, it combines innovations in magnetic levitation, vacuum systems, and electric propulsion.

Technological Innovations Behind Hyperloop

1. **Low-Pressure Tubes (Near-Vacuum Environment)**: The system uses sealed tubes with extremely low air pressure (~100 Pa), significantly reducing air resistance and allowing ultra-high speeds with minimal energy loss.
2. **Magnetic Levitation (Maglev)**: Hyperloop pods levitate using either electromagnetic suspension (EMS) or electrodynamic suspension (EDS), eliminating friction between wheels and tracks.
3. **Linear Electric Motors**: Instead of traditional rotary engines, Hyperloop employs linear induction motors that accelerate and decelerate the pod along the tube using magnetic fields.
4. **Energy Efficiency**: Solar panels installed along the tubes could potentially power the entire system, making it a low-emission transport option.
5. **Autonomous Navigation & Real-Time Systems**: The pods are designed to be autonomous and capable of adjusting speeds in real-time based on load and demand.

Feasibility in India

- **Opportunities**:
  - India's congested transport corridors (e.g., Mumbai–Pune, Bengaluru–Chennai) could benefit from faster and cleaner transit.
  - Projects like the **Virgin Hyperloop's Pune-Mumbai corridor** were proposed and received preliminary interest.
- **Challenges**:
  - **High capital costs**, land acquisition hurdles, and uncertain regulatory frameworks.
  - **Technology is still in testing**, with no full-scale commercial operations globally.

While Hyperloop represents a breakthrough in transport technology, its adoption in India hinges on cost-effectiveness, regulatory clarity, and successful pilot projects. Public-private partnerships, along with research collaboration, could pave the way for future feasibility.

Q.7 Discuss the applications of biotechnology in modern healthcare and agriculture.

Ans: Biotechnology, the application of biological systems and organisms to develop products and technologies, plays a transformative role in both healthcare and agriculture. Its contributions range from life-saving medicines to climate-resilient crops, making it integral to sustainable development.

Applications in Modern Healthcare

1. **Vaccine Development**: The rapid development of mRNA vaccines like those used against COVID-19 highlights biotechnology's role in responding to pandemics. Genetic engineering and recombinant DNA technology have also enabled the creation of vaccines for diseases like Hepatitis B and HPV.
2. **Genomic Medicine**: Techniques such as CRISPR-Cas9 and gene therapy allow targeted treatment of genetic disorders like sickle cell anemia and cystic fibrosis. The Human Genome Project laid the foundation for personalized medicine, improving treatment outcomes.
3. **Diagnostics and Biosensors**: Biotech-based RT-PCR and ELISA tests are critical tools for diagnosing infectious diseases. Lab-on-a-chip devices and nano-biosensors are enabling faster and more precise detection.
4. **Monoclonal Antibodies and Biopharmaceuticals**: Treatments for cancer (e.g., trastuzumab for breast cancer) and autoimmune diseases rely on monoclonal antibodies derived from biotechnology. India is a leading producer of biosimilars, making treatments more affordable.

Applications in Agriculture

1. **Genetically Modified (GM) Crops**: Crops like Bt cotton in India have improved resistance to pests, reducing pesticide use and increasing yields. GM technology is also being applied to develop drought- and flood-resistant varieties.
2. **Biofertilizers and Biopesticides**: Microbial inputs enhance soil fertility and reduce chemical dependency. The use of nitrogen-fixing bacteria, such as *Rhizobium*, promotes sustainable agriculture.
3. **Tissue Culture and Clonal Propagation**: This allows rapid multiplication of disease-free, high-yielding varieties, especially in horticulture and floriculture sectors.

Biotechnology bridges science and societal needs, ensuring healthier lives and food security. With enabling policies and ethical oversight, its integration into healthcare and agriculture can significantly boost India's development trajectory.

Q.8 Assess the success of Aspirational District Programme in improving human development indicators in Uttar Pradesh's underdeveloped districts.

Ans: The Aspirational Districts Programme (ADP) launched in January 2018 by NITI Aayog aims to transform 112 underdeveloped districts across India by focusing on key sectors: health and nutrition, education, agriculture and water resources, financial inclusion and skill development, and basic infrastructure. Uttar Pradesh, with 8 districts under ADP, has witnessed notable progress in enhancing human development indicators.

Successes in Uttar Pradesh

1. **Health and Nutrition**: Districts like Chandauli and Sonbhadra have shown significant improvements. Chandauli, for instance, achieved a notable reduction in malnutrition rates and enhanced maternal health services, earning recognition and a ₹3 crore award for outstanding progress .
2. **Education**: The transition rate from primary to upper-primary schools increased from 88% to 95% over the first two years of the programme . Initiatives like digital classrooms and teacher training have contributed to improved learning outcomes.
3. **Agriculture and Water Resources**: Implementation of micro-irrigation projects and promotion of high-yield crop varieties have enhanced agricultural productivity in districts like Bahraich and Shrawasti.
4. **Financial Inclusion and Skill Development**: The introduction of schemes like BC Sakhi has facilitated banking services in remote areas, empowering women and promoting financial literacy.

Challenges

- **Infrastructure Gaps**: Despite progress, some districts still face challenges in road connectivity and electricity supply, hindering overall development.
- **Data Discrepancies**: Inconsistent data reporting mechanisms have sometimes led to challenges in accurately assessing progress.

The Aspirational Districts Programme has catalysed positive changes in Uttar Pradesh's underdeveloped districts, particularly in health, education, and financial inclusion. While challenges persist, the programme's emphasis on data-driven governance and collaborative efforts offers a promising pathway toward holistic regional development.

Q.9 Evaluate the impact of PM-PRANAM scheme on agricultural sustainability in India.

Ans: The PM-PRANAM (Promotion of Alternate Nutrients for Agriculture Management) scheme, launched in 2023, aims to incentivize states and Union Territories to reduce the use of chemical fertilizers by promoting alternative and sustainable agricultural practices.

It aligns with the broader goal of doubling farmers' income and ensuring ecological balance.

Positive Impact on Agricultural Sustainability

1. **Reduction in Chemical Fertilizer Use**: Under PM-PRANAM, states receive 50% of the subsidy savings if they reduce the consumption of subsidized urea, DAP, and other fertilizers. For example, states like Karnataka and Sikkim, which have promoted organic and natural farming, have seen a decline in urea consumption and are eligible for financial incentives.
2. **Promotion of Biofertilizers and Natural Farming**: The scheme complements efforts like Bharatiya Prakritik Krishi Paddhati (BPKP) and encourages the use of Jeevamrit and other bio-inputs, reducing dependency on synthetic inputs while improving soil health.
3. **Improved Soil Health and Environmental Benefits**: Excessive fertilizer use has led to soil degradation, water pollution, and greenhouse gas emissions. PRANAM supports practices that can reverse this trend, especially in over-fertilized states like Punjab and Haryana.
4. **Institutional Convergence**: By linking incentives with schemes like the PM-KISAN and Soil Health Card, PRANAM promotes holistic nutrient management.

Challenges

- **Behavioural Change:** Many farmers still rely on chemical fertilizers due to immediate yield benefits and lack of awareness.
- **Infrastructure Gaps:** Biofertilizer production and distribution mechanisms are underdeveloped in several states.

PM-PRANAM is a step in the right direction toward agricultural sustainability. Its success will depend on effective implementation, robust extension services, and coordinated policy efforts to mainstream organic and natural farming across India.

Q.10 The Union Budget 2025 has focused on infrastructure, fiscal consolidation, and social spending. How can these allocations help Uttar Pradesh achieve higher economic growth?

Ans: The Union Budget 2025–26, with its emphasis on infrastructure development, fiscal consolidation, and social spending, presents significant opportunities for Uttar Pradesh (UP) to accelerate its economic growth.

Here's how these allocations can benefit the state:

1. **Infrastructure Development:** Catalyzing Economic Activity: The Union Budget allocates ₹12 lakh crore for infrastructure, marking an 11% increase from the previous year . UP stands to gain substantially from this, especially through projects like the Ghaziabad–Jewar Regional Rapid Transit System, which aims to enhance connectivity between key economic zones . Complementing this, the UP state budget allocates 22% towards infrastructure, focusing on road construction, industrial expansion, and transport improvements . Such investments are poised to attract private sector participation, boost employment, and stimulate regional development.
2. **Fiscal Consolidation:** Ensuring Sustainable Growth: The Union Budget targets a fiscal deficit of 4.4% of GDP, down from 4.9% in the previous fiscal year . UP mirrors this commitment by aiming for a fiscal deficit of 3% of its GSDP in 2025–26, a reduction from 3.4% . This fiscal discipline ensures that borrowed funds are channelled into capital assets rather than revenue expenditures, laying a robust foundation for long-term economic stability and growth.
3. **Social Spending:** Enhancing Human Capital: The Union Budget's focus on inclusive development is evident in its increased allocations for education, healthcare, and social welfare. UP aligns with this vision by dedicating 13% of its budget to education and 6% to healthcare .

Initiatives like the establishment of ICT labs, smart classrooms, and digital libraries aim to bridge the digital divide and enhance the quality of education. In healthcare, investments in infrastructure and services are expected to improve accessibility and outcomes, contributing to a healthier workforce.

The strategic alignment between the Union and UP state budgets in prioritizing infrastructure, fiscal prudence, and social welfare creates a conducive environment for UP to achieve higher economic growth. By leveraging these allocations effectively, UP can accelerate its journey towards becoming a trillion-dollar economy.

Section-B

Q.11 With India aiming to become a $5 trillion economy, how is NITI Aayog strategizing to balance economic growth with sustainability?

Ans: India's aspiration to become a $5 trillion economy by FY2025-26 presents both an opportunity and a challenge. While rapid economic growth is crucial, it must be environmentally sustainable and socially inclusive.

NITI Aayog, as the apex public policy think tank of India, is spearheading a multi-pronged strategy to integrate sustainability into the country's developmental trajectory.

1. **Strategic Vision through "Strategy for New India @75"**
   - The document lays out 41 sector-specific goals to accelerate growth while ensuring environmental sustainability.
   - For instance, it targets doubling farmers' income, expanding renewable energy capacity, and achieving universal access to clean drinking water by 2022–23.
2. **Localization of Sustainable Development Goals (SDGs)**
   - As the nodal agency for SDG implementation, NITI Aayog developed the **SDG India Index**, which ranks states and UTs based on 17 SDG goals.
   - This index incentivizes states to align economic goals with sustainability benchmarks.
3. **Green Infrastructure through PM Gati Shakti and NIP**
   - The PM Gati Shakti plan integrates 16 ministries to coordinate multimodal infrastructure projects using a Geographic Information System (GIS)-based platform.
   - The National Infrastructure Pipeline (NIP), with a projected investment of ₹111 lakh crore (FY2020–25), earmarks ~25% for energy, roads, and urban development — sectors aligned with sustainability goals.

4. **Energy Transition and Climate Commitments**

- India aims to achieve 500 GW of non-fossil fuel capacity by 2030, with solar and wind energy forming the core. As of Jan 2025, India had already achieved over 217 GW of renewable capacity.
- NITI Aayog is coordinating the development of a Carbon Capture, Utilization, and Storage (CCUS) policy to decarbonize hard-to-abate sectors.
- It supports battery energy storage systems and electric vehicle ecosystems through initiatives like FAME-II.

5. **Cooperative Federalism through State Support Mission**

- NITI Aayog's State Support Mission helps states design growth strategies tailored to regional strengths while maintaining environmental safeguards.
- It facilitates technical assistance and peer learning to states, particularly in the Northeastern and Aspirational Districts.

6. **Natural Resource and Health Policy Integration**

- In water management, NITI Aayog's **Composite Water Management Index** (CWMI) ranks states on efficient use of water, essential for long-term economic sustainability.
- It also partners with international agencies like WHO and UNICEF to align health and sanitation policies under **Swachh Bharat Mission** and **Ayushman Bharat** with sustainability goals.

7. **Challenges and Critical Balancing**

- NITI Aayog's suggestion (2023) to defer flue gas desulfurization (FGD) in older thermal plants was criticized due to health and environmental concerns, highlighting the complexity of balancing cost-effective growth with ecological health.

NITI Aayog's strategies demonstrate a conscious effort to embed sustainability into India's growth architecture. By combining economic planning with environmental indices, cooperative federalism, and energy transition policies, it aims to ensure that the journey to a $5 trillion economy is resilient, inclusive, and environmentally sound.

Q.12 Critically analyse the achievements of economic planning in India in addressing issues of poverty, unemployment, and regional disparity. Provide relevant examples.

Ans: Economic planning in India began with the First Five-Year Plan in 1951, aiming to accelerate growth, ensure social justice, and achieve balanced regional development. Over the decades, planning has contributed significantly to poverty alleviation, employment generation, and infrastructural expansion.

However, persistent issues of poverty, unemployment, and regional disparity reveal limitations in the planning process as well.

1. Poverty Alleviation: Mixed Success

Achievements:

- Poverty headcount ratio declined from 55% in 1973-74 to 21.9% in 2011-12 (Tendulkar Method).
- Targeted poverty alleviation programmes such as:
  - Integrated Rural Development Programme (IRDP) (1978)
  - Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) (2005), providing 100 days of guaranteed employment to over 6 crore households annually.
- Direct Benefit Transfers (DBT) and PM Jan Dhan Yojana improved financial inclusion and leak-proof welfare delivery

Limitations:

- Despite growth, India still had over 230 million poor in 2020 (World Bank estimates using $2.15/day PPP).
- Multidimensional Poverty Index (2021): 25% of Indians still suffer from deprivations in health, education, or standard of living.
- Urban poverty and slum expansion reflect weak urban planning.

2. Unemployment: Structural and Persistent

Achievements:

- Plans promoted labour-intensive sectors (e.g., agriculture in early plans; services in later ones).
- MGNREGA provided counter-cyclical employment, especially during crises like COVID-19.
- Services sector now contributes ~54% of GDP but employs only ~32% of the workforce, indicating jobless growth.
- Periodic Labour Force Survey (PLFS) 2022–23: Urban unemployment rate fell to 6.6%, but youth unemployment (15–29 age group) remains high at ~17%.

Limitations:

- Excessive focus on capital-intensive industrialisation in earlier plans (e.g., Mahalanobis strategy) led to inadequate employment generation.
- Failure to modernize agriculture and limited support to MSMEs worsened informal employment (over **90%** of workers remain in informal sector).

3. Regional Disparity: Unresolved Divide

Achievements:

- Backward Regions Grant Fund, Special Category Status, and North East Industrial Development Scheme aimed to bridge the regional gap.
- Physical infrastructure (e.g., rural roads under PMGSY) has improved connectivity in tribal and hilly regions.
- States like Kerala and Tamil Nadu have human development indices comparable to upper-middle income countries, while Bihar and Jharkhand lag significantly.
- As per RBI's Handbook (2023), states like Maharashtra and Gujarat contribute over 35% to India's industrial output, while states in East and Northeast together contribute less than 10%.

Limitations:

- Planning was too centralised, often neglecting state-specific needs.
- Fiscal capacity of poorer states remains low, limiting their ability to implement development schemes.
- Regional inequality is now reflected in inter-state migration, particularly from UP and Bihar to southern and western states.

While economic planning in India has significantly reduced absolute poverty and enhanced infrastructure, it has struggled to eliminate structural unemployment and narrow regional disparities. The shift from centralized planning to cooperative federalism via bodies like **NITI Aayog** offers new hope—if supported by credible data, state-led innovation, and targeted investments. Going forward, planning must focus on inclusive growth, skilling, and regionally tailored strategies to address the remaining gaps.

Q.13 Critically examine the role of agricultural subsidies and public distribution systems in ensuring food security in India. What are the reforms needed to improve these systems?

Ans: Food security in India rests heavily on two policy pillars: **agricultural subsidies** and the **Public Distribution System (PDS)**. While subsidies aim to make farming viable and boost food production, the PDS ensures affordable access to essential foodgrains for the vulnerable population.

Together, they have played a crucial role in achieving self-sufficiency in food and reducing hunger, but they also face significant structural and operational challenges.

1. Contribution of Agricultural Subsidies

- **Increased Foodgrain Production**: Subsidies on fertilizers, electricity, and irrigation led to a rise in foodgrain output from 50 million tonnes (1950–51) to 330+ million tonnes (2022–23).
- **MSP Support**: **Minimum Support Prices (MSP)** incentivize farmers to produce key staples, ensuring supply for buffer stocks and PDS.
- **Crisis Management**: During **COVID-19**, subsidies and procurement ensured food supply continuity and resilience.

2. Role of Public Distribution System (PDS)

- **Widespread Coverage**: 81 crore people are covered under the National Food Security Act (2013), receiving foodgrains at subsidized rates.
- **Nutritional Support**: Supports programs like ICDS and Mid-Day Meals, contributing to food access for children and women.
- **Price Stabilization**: Acts as a buffer against inflation and ensures minimum food access for the vulnerable.

3. Limitations and Challenges

- **Environmental Impact**: Excessive input use led to soil degradation and water depletion, especially in Punjab and Haryana.

- **Fiscal Burden**: Subsidies exceed ₹2.5 lakh crore (2022–23), reducing fiscal space for investment.
- **PDS Leakages**: Leakage and inclusion-exclusion errors affect 20–30% of beneficiaries in some states.
- **Limited Food Basket**: PDS focuses heavily on rice and wheat, neglecting pulses, millets, and oils.

4. Reforms Needed

- **Targeted Support**: Shift to direct income transfers like PM-KISAN.
- **Diversified Procurement**: Promote nutritional and climate-resilient crops.
- **Modernize PDS**: Implement One Nation One Ration Card, digitize tracking, and expand food diversity.

While agricultural subsidies and the PDS have been instrumental in making India food secure, their sustainability is being questioned due to **economic inefficiency, environmental stress, and poor targeting**. Moving forward, reforms must focus on **ecological balance, fiscal prudence, and nutritional adequacy**, aligning these systems with the goals of inclusive growth and long-term food security.

Q.14 Discuss how disasters act as a non-traditional security threat. What steps should be taken for effective disaster management?

Ans: Disasters—both natural and man-made—are increasingly being recognized as **non-traditional security threats**. Unlike conventional threats that originate from military conflict, non-traditional threats undermine **human security, economic stability, and national integrity** through indirect yet severe disruptions.

Disasters as Non-Traditional Security Threats

1. **Human Security Disruption**: Disasters result in large-scale loss of life and displacement. For instance, the **2004 Indian Ocean Tsunami** claimed over 230,000 lives across 14 countries, severely impacting coastal India.
2. **Economic Vulnerability**: Disasters disrupt economic activities. According to the World Bank, **India loses about 2% of GDP annually due to disasters**. Cyclone Amphan (2020) caused damage worth ₹1 lakh crore in West Bengal and Odisha.
3. **Strain on Governance**: Post-disaster management often exposes administrative inefficiencies and coordination gaps. The 2013 Uttarakhand floods revealed gaps in early warning and evacuation systems.
4. **Social Conflict and Migration**: Displacement due to floods, droughts, and earthquakes creates **refugee-like scenarios**, leading to pressure on urban infrastructure. For example, **the 2018 Kerala floods displaced over a million people**, creating long-term resettlement issues.
5. **Environmental and Health Crises**: Disasters increase the risk of disease outbreaks and environmental degradation. Post-earthquake Haiti (2010) saw a **cholera outbreak killing thousands**.

Steps for Effective Disaster Management

1. **Institutional Strengthening**: Strengthening bodies like the National Disaster Management Authority (NDMA) and integrating disaster risk reduction (DRR) across planning processes.
2. **Early Warning Systems**: Investments in satellites and forecasting technologies like the Indian National Centre for Ocean Information Services (INCOIS) are critical.
3. **Community Participation**: Promoting Community-Based Disaster Risk Management (CBDRM) ensures last-mile resilience.
4. **Climate-Resilient Infrastructure**: Building to withstand extreme events.
5. **Capacity Building and Training**: Regular drills, education in schools, and NDMA guidelines must be part of the governance model.
6. **Technology and GIS Mapping**: Use of drones, **Geographic Information Systems**, and AI for planning and real-time response.

Disasters, as non-traditional security threats, demand a multi-dimensional approach combining technology, policy, community resilience, and inter-governmental coordination. India's Sendai Framework-aligned disaster policy offers a roadmap but requires rigorous implementation and political prioritization to secure the nation holistically.

Q.15 What is deepfake technology, and what challenges does it pose in the digital age?

Ans: Deepfake technology refers to the use of artificial intelligence (AI), particularly deep learning algorithms, to create synthetic media—videos, audios, or images—that appear convincingly real but are digitally manipulated.

It primarily uses Generative Adversarial Networks (GANs) to superimpose faces or mimic voices, often making it difficult to distinguish between authentic and fabricated content.

Challenges Posed by Deepfake Technology

1. **Misinformation and Disinformation**: Deepfakes can be used to spread fake news, especially during elections or conflicts. For example, a deepfake video of Ukrainian President Zelenskyy urging surrender circulated during the Russia-Ukraine war in 2022.
2. **Threat to Democracy and Governance**: Politically motivated deepfakes can erode public trust, manipulate voters, or create diplomatic tensions by attributing false statements to leaders.
3. **Cybersecurity Risks**: Deepfakes can be used in voice spoofing attacks to bypass biometric authentication or conduct financial fraud. A 2019 case in the UK involved deepfake voice technology used to defraud a company of $243,000.
4. **Social and Psychological Harm**: Deepfake pornography, especially targeting women, leads to harassment, defamation, and emotional trauma. India ranks among the top countries in reported cases of deepfake misuse for such content.
5. **Legal and Ethical Gaps**: Current IT laws in India, such as the IT Act 2000, lack specific provisions for regulating deepfakes, creating accountability and traceability issues.

Way Forward

- **Legal Reforms**: Specific laws or amendments under IT Rules 2021 to address deepfake creation and dissemination.
- **Technological Countermeasures**: Tools like Microsoft's Video Authenticator to detect deepfakes.
- **Public Awareness and Digital Literacy**: Strengthening media literacy campaigns to build resilience against manipulated content.
- **Global Collaboration**: International frameworks for cyber ethics and AI governance are essential.

Deepfakes represent a growing non-traditional threat in the digital age, blurring the lines between truth and fiction. Tackling them requires a synergistic approach involving law, technology, and public vigilance.

Q.16 India has seen an increasing trend of "gig economy" jobs and platform-based work. Analyse their role in tackling urban unemployment and social Inequalities.

Ans: The gig economy refers to a labour market characterized by short-term contracts, freelance work, and on-demand jobs, often mediated by digital platforms like Uber, Swiggy, Urban Company, etc.

With rapid urbanization and digital penetration, India has witnessed a significant rise in gig and platform-based work, creating new employment avenues.

Role in Tackling Urban Unemployment

1. **Employment Generation**: According to NITI Aayog (2022), India had over 7.7 million gig workers and is projected to reach 23.5 million by 2030. These jobs absorb urban youth, migrants, and semi-skilled workers who struggle to find formal employment.
2. **Low Entry Barriers**: Most gig jobs require minimal formal education or training, enabling inclusion of workers from underprivileged backgrounds. For instance, delivery and ride-hailing jobs provide livelihoods to large numbers of first-generation urban workers.
3. **Flexibility and Autonomy**: Gig work offers flexible schedules, helping individuals manage dual roles, such as students or homemakers engaging in part-time work.

Role in Addressing Social Inequalities

1. **Economic Inclusion**: Gig platforms have enabled women, persons with disabilities, and marginalized communities to participate in urban economies. Startups like HeyDeedee employ women delivery agents, promoting gender inclusion.
2. **Income Supplementation**: Gig jobs often act as secondary sources of income, helping urban poor diversify their earnings and reduce dependence on traditional low-paying sectors.

Challenges

- **Lack of Social Security**: No health insurance, provident fund, or job security.
- **Precarious Work Conditions**: Long hours, low pay, and algorithmic control.
- **Digital Divide**: Access to smartphones and internet remains uneven.

While the gig economy partially mitigates urban unemployment and social exclusion, it is not a panacea. Policy interventions, such as the Code on Social Security, 2020, must be fully implemented to ensure dignified work conditions and sustainable livelihoods for gig workers.

Q.17 The Union government's push for millets (Shree Anna) aims at tackling nutritional security and climate-resilient agriculture. How can India benefit from this initiative?

Ans: The Government of India's promotion of millets as "Shree Anna"—especially during the International Year of Millets (2023)—marks a significant policy shift toward nutritional security and climate-resilient agriculture.

Millets, often referred to as "nutri-cereals," include jowar, bajra, ragi, and small millets. This initiative supports the double goals of improving public health and promoting sustainable farming.

Nutritional Security

1. **Rich in Nutrients**: Millets are high in iron, calcium, protein, and dietary fiber. Ragi, for instance, contains three times more calcium than milk, helping to combat malnutrition and anaemia.
2. **Gluten-Free and Diabetic-Friendly**: Millets have a low glycemic index, making them ideal for diabetics and heart patients. With rising non-communicable diseases in India, this dietary shift is crucial.
3. **Mid-Day Meal & PDS Integration**: States like Karnataka and Odisha have begun integrating millets into Mid-Day Meal Schemes and Public Distribution Systems (PDS) to improve the nutritional status of children and the poor.
4. **Combating Hidden Hunger (Micronutrient Deficiency):** Millets are rich in micronutrients like zinc, iron, and B-vitamins, helping address "hidden hunger" a form of malnutrition caused by a lack of essential vitamins and minerals despite sufficient calorie intake.
5. **Improving Maternal and Child Health:** Including millets in Integrated Child Development Services (ICDS) and maternal nutrition programs can improve birth outcomes, growth, and cognitive development in children and pregnant women.
6. **Addressing Obesity and Lifestyle Disorders:** Due to their high fiber content, millets enhance satiety, aid in digestion, and help prevent obesity and metabolic disorders, increasingly common in urban populations.
7. **Strengthening Gut Health and Immunity:** Millets are rich in prebiotic fiber, which supports healthy gut microbiota and enhances immune function, particularly important in post-COVID dietary reforms.

8. **Support for Geriatric Nutrition:** Their easy digestibility and nutrient density make millets ideal for elderly nutrition, helping manage age-related conditions like osteoporosis, hypertension, and diabetes.
9. **Local Superfoods for Local Diets:** Promoting millets encourages a shift from highly processed to traditional, whole foods, aligning with culturally rooted, nutritious diets tailored to regional needs.

Climate-Resilient Agriculture

1. **Drought-Tolerant Crops**: Millets require 70% less water than rice and can thrive in semi-arid and degraded soils, making them ideal for India's rain-fed regions.
2. **Short Growing Season**: With short crop cycles and low input requirements, millets reduce the carbon footprint and support sustainable agriculture.
3. **Boosting Farmer Income**: By promoting millets under PM-Poshan and MSP inclusion, the government aims to diversify farmer income and reduce dependency on water-intensive crops like paddy.

India's Shree Anna mission offers a holistic pathway to tackle malnutrition, climate change, and rural distress. For this initiative to succeed, it requires mass awareness, market linkages, MSP support, and a strong supply chain to make millets mainstream in both production and consumption.

Q.18 How can the ongoing instability in Bangladesh and Myanmar pose challenges to India's internal security? Discuss India's potential strategies to address these challenges.

Ans: India shares long and porous borders with both Bangladesh (4,096 km) and Myanmar (1,643 km). The ongoing political instability, ethnic unrest, and refugee crises in both countries pose complex challenges to India's internal security, especially in the Northeast region.

Security Challenges to India

1. **Refugee Influx & Demographic Pressures:**
    - Political repression in Bangladesh and the military crackdown on pro-democracy groups and minorities in Myanmar (post-2021 coup) have led to refugee inflows.
    - Rohingya influx through Bangladesh into India has created tensions in states like Jammu & Telangana, raising communal and security concerns.
2. **Cross-Border Militancy:**
    - Myanmar's Chin and Sagaing regions serve as hideouts for Indian insurgent groups like NSCN-K and PLA-Manipur.
    - Bangladesh has improved post-2009 in counter-insurgency cooperation, but radicalisation threats from extremist elements like Jamaat-e-Islami persist.
3. **Smuggling & Trafficking Networks:**
    - Weak governance in both countries facilitates arms, drug, and human trafficking, destabilizing India's border regions.
4. **Ethnic Tensions in Northeast India:**
    - Spillover of ethnic violence in Myanmar (Kuki-Chin) has aggravated tensions in Manipur and Mizoram, affecting communal harmony and law enforcement.

India's Potential Strategies

1. **Tight Border Management**: Complete fencing and advanced surveillance (drones, thermal sensors) along sensitive stretches, especially the India-Myanmar Free Movement Regime zone.
2. **Intelligence and Military Cooperation**: Deepen cooperation with Myanmar's Tatmadaw and Bangladesh's intelligence for joint operations against insurgents.
3. **Humanitarian Yet Secure Refugee Policy**: Implement a balanced approach: humanitarian assistance via UN agencies but strict documentation and vetting to avoid infiltration of extremists.
4. **Development Diplomacy & Connectivity**: Fast-track regional connectivity projects like the Kaladan Multi-Modal Transit Project and BBIN Motor Vehicle Agreement to stabilise the region economically.
5. **Diplomatic Engagement**: Use platforms like BIMSTEC and ASEAN to push for democratic restoration and regional stability.

Instability in Bangladesh and Myanmar directly threatens India's border security, ethnic harmony, and internal peace. A multi-pronged strategy involving security, diplomacy, and development is essential to convert border vulnerabilities into opportunities for regional cooperation and peace.

Q.19 What is meant by "digital arrest"? Discuss its implications for individual rights and national security in India.

Ans: "Digital arrest" is an emerging cybercrime trend where individuals are coerced by fraudsters into believing they are under legal surveillance or investigation—often by impersonating police, CBI, or customs officials—and are forced to remain "digitally confined" via continuous video calls or app surveillance.

Victims are manipulated to transfer money as "bail" or "penalty" under duress. In 2024, several Indian citizens were targeted by fake "Interpol" agents via WhatsApp and Zoom, demanding ransom under the guise of criminal investigation.

Implications for Individual Rights

1. **Violation of Privacy**: Victims are often forced to keep their devices' cameras on continuously, amounting to unauthorized surveillance, violating the right to privacy (Justice K.S. Puttaswamy judgment, 2017).
2. **Psychological Trauma & Fear**: Victims undergo mental harassment, isolation, and public humiliation, undermining their dignity and security.
3. **Financial Exploitation**: Most cases involve monetary extortion, threatening the victim's right to property and economic safety.

Implications for National Security

1. **Cybersecurity Vulnerability**: These scams often originate from cross-border syndicates, indicating weaknesses in India's cyber law enforcement and digital infrastructure.
2. **Erosion of Public Trust**: Impersonation of official agencies damages public confidence in law enforcement and digital governance platforms.
3. **Data Theft Risk**: In many cases, victims unknowingly share sensitive data, which can be misused for espionage, money laundering, or identity theft.

Way Forward

- **Strengthen Cybercrime Helplines** and increase public awareness campaigns.
- Fast-track implementation of the **Digital India Act**, which is meant to replace the outdated IT Act, 2000.
- **International cooperation** to trace and curb cybercrime syndicates operating across borders.
- **Training law enforcement agencies** in cyber forensics and digital literacy.

Digital arrest is a modern form of psychological and digital coercion that threatens both individual liberties and national security. India must proactively strengthen its cyber governance, legal framework, and public awareness to counter such evolving threats.

Q.20 Analyse the role of nanotechnology for health in India. Also Discuss its potential applications across various sectors.

Ans: Nanotechnology, the science of manipulating matter at the atomic and molecular scale (1–100 nanometers), is rapidly emerging as a transformative force in healthcare and other sectors. In India, nanotechnology has gained momentum under initiatives like the Nano Mission (2007) and increased focus in recent science and technology policies.

Role in Healthcare in India

1. **Targeted Drug Delivery**: Nanocarriers like liposomes and dendrimers are being developed for targeted drug delivery systems, especially for cancer and tuberculosis, reducing side effects and improving treatment outcomes.
2. **Diagnostic Advancements**: Nano-biosensors and lab-on-a-chip technologies help in early and accurate detection of diseases like cancer, diabetes, and infections (e.g., COVID-19 rapid tests).
3. **Regenerative Medicine**: Use of nano-scaffolds and nanomaterials in tissue engineering and bone regeneration is being explored in AIIMS and IITs.
4. **Antimicrobial Solutions**: Silver and zinc oxide nanoparticles are used in antimicrobial coatings for hospital surfaces and PPEs to reduce hospital-acquired infections.
5. **Affordable Solutions**: India is leveraging nanotech for low-cost diagnostics and treatment tools, critical for public health outreach in rural areas.

Applications in Other Sectors

1. **Agriculture:**
   - Nano-fertilizers and nano-pesticides reduce chemical use and enhance productivity.
   - For ex- IFFCO's nano urea launched for efficient nitrogen delivery.
2. **Water Purification:**
   - Nano-filters and graphene-based membranes help in removing contaminants like arsenic and bacteria from drinking water.
3. **Energy:**
   - Nanomaterials are used in solar panels, batteries, and fuel cells to improve efficiency and storage.
4. **Environment:**
   - Nanoparticles can aid in pollution control, air filtration, and remediation of toxic waste.
5. **Defense and Electronics:**
   - Use in smart textiles, sensors, lightweight armor, and high-speed processors.

Nanotechnology has the potential to revolutionize public health, agriculture, energy, and environmental sustainability. For India, fostering research, ethical regulations, public-private partnerships, and capacity-building is crucial to fully harness this emerging domain while ensuring safety and accessibility.