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CREATING CIVIL SERVANTS FOR THE NATION

# **OPSC OAS MAINS EXAMINATION ANSWERS 2024**

**GS-III**

## GS III -2024

### GROUP A

**Q1. What do you mean by 'Dutch disease'? How do the authors use this concept to explain the Indian economy in their book A Sixth of Humanity? (Marks: 15)**

**Answer:**

#### **Introduction**

**Dutch Disease** refers to an economic phenomenon where a boom in one sector, particularly natural resources or foreign capital inflows, causes currency appreciation, making manufacturing and exports less competitive. The term originated after the Netherlands' natural gas boom in the 1960s.

#### **Body**

##### **What is Dutch Disease?**

The concept describes a situation where:

- Large foreign exchange inflows appreciate the domestic currency.
- Resources shift from manufacturing to the booming sector.
- Export competitiveness declines.
- Long-term industrial growth weakens.

Consequently, an economy may experience growth without broad-based structural transformation.

##### **Application to India in A Sixth of Humanity**

In their book *A Sixth of Humanity: What Can We Learn from India and How Can We Make It Better?*, economists **Dilip Mookherjee** and **Kaivan Munshi** use the Dutch Disease framework to explain certain features of India's development trajectory.

##### **Service-led Growth**

- Unlike East Asian economies, India witnessed rapid growth driven by services, especially IT and business-process outsourcing.
- High-skilled service exports generated substantial foreign exchange earnings and attracted global capital.

##### **Weak Manufacturing Base**

- Manufacturing's share in employment remains around **11-12%**, significantly lower than that of China during its industrialization phase.
- The authors argue that the success of skill-intensive services reduced policy urgency for labour-intensive manufacturing expansion.

##### **Employment Challenge**

- Growth became concentrated among educated and urban populations.
- A large workforce remained trapped in low-productivity agriculture and informal employment.

##### **Structural Imbalance**

- The coexistence of globally competitive services with underdeveloped manufacturing resembles a modified form of Dutch Disease.
- This contributed to **jobless growth**, regional disparities, and unequal income distribution.

##### **Conclusion**

The authors use Dutch Disease as a lens to highlight India's service-driven growth paradox. Sustained inclusive development requires strengthening manufacturing through initiatives such as **Make in India**, logistics reforms, and skill development while preserving the dynamism of the services sector.

**Q2. Discuss the evolution of India's biodiversity legal framework and critically examine the key changes and impact of the NBA Regulations, 2025. (Marks: 15)**

**Answer:**

**Introduction**

India's biodiversity governance evolved from global commitments under the **Convention on Biological Diversity (1992)** to a comprehensive domestic framework through the **Biological Diversity Act, 2002**, aimed at conservation, sustainable use, and equitable benefit sharing.

**Body**

**Evolution of India's Biodiversity Legal Framework**

| Phase | Key Development                                                                      |
|-------|--------------------------------------------------------------------------------------|
| 1992  | India signed the <b>CBD</b> at Rio Earth Summit                                      |
| 2002  | <b>Biological Diversity Act, 2002</b> enacted                                        |
| 2004  | Biological Diversity Rules notified                                                  |
| 2010  | <b>Nagoya Protocol</b> on Access and Benefit Sharing (ABS)                           |
| 2023  | Biological Diversity (Amendment) Act streamlined approvals and promoted AYUSH sector |
| 2024  | Biological Diversity Rules, 2024 digitised and simplified procedures                 |
| 2025  | NBA notified new <b>Access and Benefit Sharing (ABS) Regulations, 2025</b>           |

**Key Changes under NBA Regulations, 2025**

- Replaced the **2014 ABS Guidelines** with a more structured framework.
- Included **Digital Sequence Information (DSI)** within benefit-sharing provisions, aligning India with emerging global biodiversity governance.
- Introduced turnover-based benefit-sharing slabs and mandatory disclosures for larger users.
- Prescribed higher benefit-sharing (5-20%+) for high-value resources such as red sanders, sandalwood and threatened species.
- Established clearer provisions for IPR commercialization, transfer of research results and foreign access approvals.

**Impact and Critical Assessment**

**Positive Outcomes**

- Strengthens implementation of **Nagoya Protocol** principles.
- Protects traditional knowledge and local community rights.
- Enhances transparency through digital compliance systems.
- Facilitates biodiversity-based innovation and bioeconomy growth.

**Concerns**

- Local communities may receive limited bargaining power in benefit determination.
- Distinguishing academic and commercial research remains difficult.
- Compliance burden may persist for MSMEs and researchers.
- Weak institutional capacity of Biodiversity Management Committees may hinder implementation.

**Conclusion**

The NBA Regulations, 2025 mark a significant shift towards modern biodiversity governance by integrating DSI, ABS, and innovation. Their success, however, depends on robust community participation, institutional capacity, and equitable benefit distribution.

**Q3. What is space debris? What are its challenges and redressal mechanisms? How did it affect China's Spacecraft recently? (Marks: 15)**

**Answer:**

**Introduction**

**Space debris** refers to non-functional human-made objects in Earth's orbit, including defunct satellites, spent rocket stages, mission-related fragments, and collision debris. According to the European Space Agency (ESA), millions of debris fragments currently orbit the Earth, posing a growing threat to space operations.

**Body**

**Challenges Posed by Space Debris**

**1. Threat to Spacecraft and Astronauts**

- Debris travels at speeds exceeding **25,000 km/hr**, making even tiny fragments highly destructive.
- Risks damage to satellites, spacecraft, and space stations.

**2. Kessler Syndrome**

- Collisions can generate more debris, triggering a cascading chain reaction that may render certain orbits unusable.

**3. Disruption of Critical Services**

- Damage to communication, navigation, weather forecasting, and defence satellites can affect economic and national security interests.

**4. Hindrance to Future Space Missions**

- Increasing congestion in Low Earth Orbit (LEO) raises operational costs and collision risks.

**Redressal Mechanisms**

**International Measures**

- **UN Committee on the Peaceful Uses of Outer Space (UNCOPUOS)** guidelines.
- Inter-Agency Space Debris Coordination Committee (IADC) mitigation standards.

**Technological Measures**

- End-of-life deorbiting of satellites.
- Active Debris Removal (ADR) technologies such as robotic capture systems, nets, and harpoons.
- Improved space situational awareness and collision-avoidance systems.

**Indian Initiatives**

- ISRO's **System for Safe and Sustainable Space Operations Management (IS4OM)**.
- **Project NETRA** for monitoring space objects and collision threats.
- Adoption of post-mission disposal guidelines.

**Recent Impact on China's Spacecraft**

In 2025, China's **Shenzhou-20** spacecraft suffered suspected damage from a tiny debris impact, causing cracks in its return capsule window. Authorities postponed the crew's return and eventually brought astronauts back using another spacecraft. The incident highlighted the increasing danger posed by orbital debris to human spaceflight.

**Conclusion**

With the rapid expansion of satellite constellations, ensuring **sustainable use of outer space** requires stronger international cooperation, robust debris mitigation norms, and advanced tracking technologies to protect future space activities.

**Q4. Analyse the economics of livestock rearing as having a big potential for generating non-farm employment in rural areas. Discuss some measures undertaken by the Odisha Government to promote this sector. (Marks: 15)**

**Answer:**

**Introduction**

Livestock rearing refers to the economic activity of raising cattle, poultry, goats, sheep and other animals for milk, meat, eggs and allied products. It has emerged as a major source of **non-farm employment** in rural India.

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## Body

### Livestock Rearing as a Source of Non-Farm Employment

#### *Income Diversification and Risk Reduction*

- Provides a regular income stream unlike seasonal agriculture.
- Acts as a buffer against crop failures and climate shocks.

#### *Employment Generation*

- Creates year-round jobs in dairy, poultry, goatery, feed production, veterinary services and marketing.
- According to the **Economic Survey**, the livestock sector contributes about **30% of agricultural GVA**, despite having a much smaller land footprint.

#### *Inclusive Growth*

- Benefits **small and marginal farmers**, women and landless households.
- The **National Livestock Mission (NLM)** promotes entrepreneurship and employment generation in livestock-based enterprises.

#### *Value Chain Development*

- Generates indirect employment in processing, cold storage, transportation and retailing of livestock products.

### Measures Undertaken by the Odisha Government

#### *Mukhyamantri Kamadhenu Yojana (MKY)*

- Launched to support small dairy units through subsidies, livestock insurance, calf feed support and fodder development.
- Odisha has earmarked substantial funding under the scheme to enhance milk production and farmers' income.

#### *Prani Sampad Samruddhi Yojana (PSSY)*

- Supports poultry, goatery and small-animal development, creating rural livelihood opportunities.

#### *GOMATA Scheme*

- Provides veterinary healthcare through hospitals, livestock aid centres and mobile veterinary units.

#### *Digital and Institutional Support*

- **GO-SUGAM Portal** facilitates access to livestock schemes and services.
- Strengthening of **OMFED cooperatives** and dairy infrastructure improves market access for producers.

## Conclusion

Livestock rearing offers a sustainable pathway for rural employment, poverty reduction and women's empowerment. Strengthening value chains, veterinary infrastructure and market linkages can transform Odisha into a major livestock-based rural economy.

## **Q5. Discuss the mandate and role of the Special Operation Group (SOG) of the Odisha Police in combating the left-wing extremist problem in Odisha. Has the group achieved its objective? Explain. (Marks: 15)**

Answer:

### Introduction

The **Special Operations Group (SOG)**, established by the Odisha Police in **2004**, is an elite anti-insurgency force mandated to combat **Left-Wing Extremism (LWE)**, particularly in the tribal and forested districts affected by Maoist activities. It forms a key pillar of Odisha's internal security architecture.

## Body

### Mandate and Role of SOG

#### *1. Counter-Insurgency Operations*

- Conducts intelligence-based operations against Maoist cadres in difficult forest and hilly terrains.
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- Undertakes search, combing, ambush, and area-domination exercises in LWE-affected districts such as Kandhamal, Malkangiri, Koraput, and Rayagada.

## **2. Intelligence-led Action**

- Works closely with the **Special Intelligence Wing (SIW)**, local police, CRPF, BSF, and District Voluntary Force (DVF).
- Facilitates targeted operations against Maoist leadership and infrastructure.

## **3. Capacity Building and Rapid Response**

- Trained in jungle warfare, guerrilla tactics, survival skills, and counter-terrorism operations.
- Functions as Odisha's specialized quick-reaction force in high-risk security situations.

### **Has SOG Achieved Its Objective?**

#### **Achievements**

- Maoist influence has drastically declined in Odisha over the last decade.
- Numerous Maoist leaders have been neutralized, arrested, or compelled to surrender through coordinated operations.
- According to Odisha Police, LWE activities have been largely contained, with extremist presence restricted to limited pockets.
- Odisha Police reported significant anti-Naxal successes, including neutralisation of several Maoists and large-scale surrenders.

#### **Continuing Challenges**

- Residual Maoist influence survives in remote tribal-border regions.
- Socio-economic deprivation, tribal alienation, and underdevelopment can create conditions for resurgence.

#### **Conclusion**

The SOG has substantially achieved its mandate by weakening Maoist networks and restoring state authority in affected regions. However, lasting success requires combining security operations with inclusive development, tribal empowerment, and good governance to prevent the re-emergence of Left-Wing Extremism.

**Q6. Ethanol blending in petrol is considered one of the promising solutions for reducing dependence on fossil fuels in the transport sector. Discuss the scientific and economic justification for ethanol blending in petrol, its major benefits, and key challenges. Evaluate alternative clean transport solutions and compare their long-term sustainability with ethanol blending. (Marks: 15)**

**Answer:**

#### **Introduction**

**Ethanol blending** involves mixing ethanol, a biofuel derived from sugarcane, maize, and biomass, with petrol. India has achieved the **20% ethanol blending (E20)** target ahead of schedule, making it a key component of energy transition and transport decarbonization.

#### **Body**

##### **Scientific and Economic Justification**

###### **Scientific Basis**

- Ethanol is an **oxygenated fuel**, enabling more complete combustion and reducing carbon monoxide and particulate emissions.
- It is a **renewable fuel** with lower lifecycle greenhouse gas emissions than fossil fuels.
- Higher octane value improves engine performance and combustion efficiency.

###### **Economic Rationale**

- Reduces dependence on imported crude oil, enhancing **energy security**.
  - Generates additional income for farmers through utilization of sugarcane, maize, and surplus food grains.
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- Promotes the rural biofuel industry and employment generation.
- India has reportedly saved significant foreign exchange through ethanol blending initiatives.

#### Major Benefits

- Reduction in vehicular emissions and carbon footprint.
- Diversification of energy sources.
- Better realization of agricultural produce.
- Supports India's commitments under the **Paris Climate Agreement**.
- Strengthens the circular economy through use of agricultural residues.

#### Key Challenges

- High water footprint of sugarcane cultivation.
- Possible diversion of food crops towards fuel production.
- Limited availability of feedstock during drought years.
- Vehicle compatibility and infrastructure constraints for higher blends.
- Concerns regarding land-use change and biodiversity impacts.

#### Alternative Clean Transport Solutions

| Solution                | Sustainability Assessment                                                   |
|-------------------------|-----------------------------------------------------------------------------|
| Electric Vehicles (EVs) | Highest long-term potential with renewable electricity integration          |
| Green Hydrogen          | Suitable for heavy transport; currently costly                              |
| CNG/Bio-CNG             | Cleaner than petrol but still carbon-based                                  |
| Ethanol Blending        | Effective transitional solution but constrained by land and water resources |

#### Conclusion

Ethanol blending is a practical **transition fuel** that enhances energy security and reduces emissions. However, in the long run, **EVs powered by renewable energy and green hydrogen** offer greater sustainability, while ethanol should complement rather than replace these technologies.

**Q7. Discuss the present infrastructure and capacity of India's Strategic Petroleum Reserve (SPR). What expansion has been planned, and what is the future outlook in this regard? Explain. (Marks: 15)**

**Answer:**

#### Introduction

A **Strategic Petroleum Reserve (SPR)** is an emergency stockpile of crude oil maintained by governments to safeguard energy security against supply disruptions, geopolitical conflicts, and price shocks. For an import-dependent country like India, SPR is a strategic necessity.

#### Body

##### Present Infrastructure and Capacity of India's SPR

India's SPR programme is managed by **Indian Strategic Petroleum Reserves Limited (ISPRL)** under the Ministry of Petroleum and Natural Gas.

##### Phase-I facilities (5.33 MMT capacity):

| Location                       | Capacity |
|--------------------------------|----------|
| Visakhapatnam (Andhra Pradesh) | 1.33 MMT |
| Mangaluru (Karnataka)          | 1.5 MMT  |

|                   |         |
|-------------------|---------|
| Padur (Karnataka) | 2.5 MMT |
|-------------------|---------|

These underground rock caverns provide about **9-10 days of crude oil cover**. Together with commercial stocks held by oil companies, India maintains roughly **70-75 days of oil availability**.

#### Planned Expansion

Under **Phase-II**, the Government has approved **6.5 MMT** of additional storage capacity through a PPP model:

- Chandikhol, Odisha – 4 MMT
- Padur Expansion, Karnataka – 2.5 MMT

Upon completion, India's SPR capacity will rise to about **11.83 MMT**, providing nearly **22 days of independent crude cover**.

Further proposals include:

- Bikaner (Rajasthan) salt-cavern reserve.
- Bina (Madhya Pradesh) storage facility.
- Additional expansion at Mangaluru.

#### Future Outlook

- Rising geopolitical risks in West Asia and the Strait of Hormuz make SPR expansion imperative.
- India imports over **85% of its crude oil requirements**, necessitating stronger energy buffers.
- Partnerships with ADNOC (UAE) and private players can improve financing, commercialization, and operational efficiency.

#### Conclusion

India's SPR programme has evolved into a critical pillar of national energy security. Expeditious completion of Phase-II and movement towards the **IEA benchmark of 90-day reserves** will enhance resilience against future energy shocks and geopolitical uncertainties.

### Q8. Do you think that the small average size of landholdings is an impediment to productivity growth in Indian agriculture? Justify your answer. (Marks: 15)

Answer:

#### Introduction

Landholding size significantly influences agricultural productivity. In India, the average operational holding has declined to **1.08 hectares**, while small and marginal farmers constitute over **86% of holdings**, raising concerns regarding productivity and viability.

#### Body

##### How Small Landholdings Act as an Impediment

##### *Fragmentation and Diseconomies of Scale*

- Small plots hinder the adoption of modern machinery such as combine harvesters and precision farming tools.
- Higher per-unit production costs reduce profitability.

##### *Limited Access to Credit and Technology*

- Financial institutions often perceive small farmers as high-risk borrowers.
- Lower access to quality seeds, irrigation, storage, and extension services.

##### *Reduced Market Power*

- Small farmers possess weak bargaining power in input and output markets.
- Dependence on intermediaries reduces farm incomes.

##### *Difficulty in Diversification*

- Limited land constrains crop diversification, agro-processing, and commercial agriculture.

**However, Small Holdings Need Not Necessarily Reduce Productivity**

### *Inverse Relationship Theory*

- Studies by economists such as **A.K. Sen** show that small farms often achieve higher productivity per hectare due to intensive family labour use.

### *Successful Indian Examples*

- Punjab's vegetable farming, Kerala's horticulture, and Odisha's millet cultivation demonstrate high productivity on small farms.
- Dairy, poultry, fisheries, and horticulture generate substantial income despite limited land.

### *Institutional Innovations*

- **Farmer Producer Organisations (FPOs)**, contract farming, and cooperative models help farmers achieve economies of scale.
- The **Ashok Dalwai Committee on Doubling Farmers' Income** emphasized aggregation rather than physical consolidation of land.

### *Way Forward*

- Promote FPOs and cooperative farming.
- Accelerate land record digitisation under **SVAMITVA**.
- Expand custom hiring centres for farm machinery.
- Encourage high-value agriculture and allied activities.

### *Conclusion*

Small landholdings pose structural challenges, but they are not an insurmountable barrier to productivity. With aggregation, technology, and market reforms, India's small farms can become both productive and profitable.

## **Q9. Evaluate the effectiveness of Strategic Environmental Assessment (SEA) in promoting sustainability in India's infrastructure megaprojects. How can institutional frameworks be strengthened for integrated environmental planning and decision-making? (Marks: 15)**

Answer:

### *Introduction*

**Strategic Environmental Assessment (SEA)** is a systematic tool that integrates environmental considerations into **policies, plans and programmes** before project-level approvals. Unlike EIA, SEA adopts a broader and long-term sustainability perspective.

### *Body*

#### **Effectiveness of SEA in India's Infrastructure Megaprojects**

##### *Positive Contributions*

- **Early-stage environmental integration** helps identify ecological risks before project design and investment decisions.
- Promotes **sustainable alternatives** by evaluating cumulative and regional impacts rather than isolated project impacts.
- Enhances **inter-sectoral coordination** among infrastructure, environment, water, energy and transport agencies.
- Improves **public participation and transparency**, thereby reducing conflicts and litigation.
- Supports India's commitments under **SDGs, National Action Plan on Climate Change (NAPCC)** and climate-resilient infrastructure goals.

##### *Illustrative Relevance*

- Large projects such as industrial corridors, river-linking proposals, ports and coastal economic zones require assessment of **cumulative impacts**, which conventional EIA often overlooks.
  - SEA can address landscape-level concerns in projects such as the **Great Nicobar development programme**, where ecological and developmental objectives must be balanced.
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### **Limitations in India**

- SEA lacks a **comprehensive statutory framework**, unlike project-level EIA.
- Environmental appraisal remains largely **project-centric and reactive**.
- Weak institutional capacity and shortage of multidisciplinary experts.
- Fragmented governance among ministries leads to silo-based decision-making.
- Limited use of geospatial data, climate-risk assessment and ecosystem valuation.

### **Strengthening Institutional Frameworks**

- Enact a **national SEA legislation** aligned with sustainable development principles.
- Establish an independent **National Strategic Environmental Assessment Authority**.
- Integrate SEA with **NITI Aayog-led regional and infrastructure planning** processes.
- Mandate cumulative-impact and climate-risk assessments for megaprojects.
- Strengthen State Environment Impact Assessment Authorities with technical expertise.
- Expand digital platforms using **GIS, remote sensing and environmental databases**.
- Institutionalize stakeholder consultations and social impact integration.

### **Conclusion**

SEA can transform India's infrastructure planning from a clearance-based approach to a sustainability-led model. Strong legal backing, institutional capacity and integrated planning are essential for achieving environmentally responsible development.

**Q10. India's border regions face unique security challenges due to their geographical, socio-economic, and political conditions. Discuss the security threats in India's border areas with reference to the linkages between organized crime and terrorism. (Marks: 15)**

Answer:

#### **Introduction**

India shares over **15,000 km of land borders** with seven countries. Diverse terrain, porous boundaries, and socio-economic vulnerabilities make border regions susceptible to security threats. The nexus between **organized crime and terrorism** has emerged as a major national security challenge.

#### **Body**

#### **Security Threats in India's Border Areas**

##### **1. Cross-Border Terrorism**

- Infiltration of terrorists through borders, particularly along the India-Pakistan border.
- Use of drones for transporting arms, explosives, and narcotics.

##### **2. Drug Trafficking**

- India lies between the **Golden Crescent** (Afghanistan-Pakistan-Iran) and **Golden Triangle** (Myanmar-Laos-Thailand), making it vulnerable to narcotics smuggling.
- Drug proceeds often finance extremist and terrorist activities.

##### **3. Arms and Explosives Smuggling**

- Illegal networks supply sophisticated weapons to insurgent and terrorist groups.
- Recent investigations have revealed Maoist attempts to procure and loot explosives in border regions of Odisha and Jharkhand.

##### **4. Human Trafficking and Illegal Migration**

- Porous borders with Nepal, Bangladesh, and Myanmar facilitate trafficking, document forgery, and recruitment by criminal syndicates.

##### **5. Left-Wing Extremism and Insurgency**

- Maoist groups exploit remote border areas of Odisha, Chhattisgarh, and Jharkhand for logistics, extortion, and movement of cadres.

#### Organized Crime-Terrorism Nexus

- Criminal syndicates provide **funding, weapons, fake currency, logistics, and safe havens** to terrorist organizations.
- Hawala networks facilitate money laundering and terror financing.
- Smuggling routes used for narcotics and arms are often shared by terrorist groups.
- This convergence creates a "**crime-terror continuum**", complicating law-enforcement efforts.

#### Measures Required

- Strengthen **Integrated Border Management System (IBMS)** and smart fencing.
- Enhance coordination among **BSF, Assam Rifles, NIA, State Police, and intelligence agencies**.
- Promote border-area development through the **Vibrant Villages Programme**.
- Intensify international cooperation against terror financing and organized crime.

#### Conclusion

Securing India's borders requires a comprehensive approach combining technology, development, intelligence-sharing, and international cooperation to dismantle the growing nexus between organized crime and terrorism.

### Q11. How do Google Maps or any other software-based maps work? On what basis do they suggest the shortest or least congested routes? (Marks: 15)

Answer:

#### Introduction

Software-based maps such as Google Maps use **Geographic Information Systems (GIS), Global Navigation Satellite Systems (GNSS), satellite imagery, digital cartography, and Artificial Intelligence (AI)** to provide real-time navigation and route optimization.

#### Body

##### How Do Software-Based Maps Work?

##### 1. Location Detection

- Smartphones determine location through **GPS, GLONASS, Galileo, and NavIC** satellites.
- Signals from multiple satellites help calculate precise latitude, longitude, and altitude.

##### 2. Digital Mapping Database

- Roads, buildings, landmarks, terrain, and transport networks are stored in a vast GIS database.
- Data are collected through satellites, survey vehicles, government agencies, and user contributions.

##### 3. Real-Time Data Collection

- Anonymous location data from millions of users provide information on:
  - Vehicle speed
  - Traffic density
  - Road closures
  - Accidents and diversions

##### 4. AI and Machine Learning

- AI continuously analyzes traffic patterns and predicts travel time.
- Machine learning improves route recommendations based on historical and live data.

#### Basis for Suggesting the Shortest or Least Congested Route

##### Shortest Route

Maps employ graph-theory algorithms such as:

- **Dijkstra's Algorithm**
- **A\* (A-Star) Algorithm**

These calculate the route with the minimum distance between source and destination.

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### ***Least Congested Route***

The system considers:

- Real-time traffic speed
- Historical traffic trends
- Road capacity
- Traffic signals and junction delays
- Construction work and accidents
- Weather-related disruptions

### ***Dynamic Route Optimization***

- Routes are recalculated continuously when traffic conditions change.
- Alternative routes are suggested to minimize travel time rather than distance.

### ***Challenges***

- Privacy concerns regarding location data.
- GPS inaccuracies in dense urban areas.
- Dependence on internet connectivity.
- Algorithmic biases due to incomplete data.

### ***Conclusion***

Software-based maps combine satellite navigation, GIS, big data analytics, and AI to deliver efficient navigation. As India expands NavIC-based services and digital infrastructure, map technologies will become more accurate, secure, and intelligent.

## **Q12. Discuss the structure and key priorities of the Odisha State Budget. To what extent does the budget reflect the state's social development goals, and in what ways does it diverge from them? (Marks: 15)**

Answer:

### ***Introduction***

The Odisha State Budget is a key fiscal instrument for achieving the state's vision of inclusive growth, human development, and infrastructure-led economic transformation. The Budget 2025-26 seeks to balance welfare commitments with capital-intensive development.

### ***Body***

#### **Structure and Key Priorities of the Odisha Budget**

Odisha's Budget 2025-26 has an outlay of about Rs.2.90 lakh crore, with emphasis on programme expenditure, social sectors, agriculture, and infrastructure.

#### ***Major Priorities***

- **Human Development:** Increased allocations for health, education, nutrition, and social security.
- **Agriculture and Rural Development:** Support for farmers through irrigation, crop diversification, and rural infrastructure.
- **Infrastructure Push:** High capital expenditure on roads, urban development, water resources, and industrial corridors.
- **Regional Balance:** Dedicated allocations for Southern Odisha Development Council and Northern Odisha Development Council.
- **Women and Child Welfare:** Continued support to Mission Shakti and welfare programmes.
- **Disaster Resilience:** Investments in climate adaptation and disaster management, reflecting Odisha's cyclone-prone geography.

#### ***Reflection of Social Development Goals***

The budget aligns substantially with social development objectives by:

- Enhancing investments in **healthcare**, education, and nutrition.
  - Strengthening tribal and backward-region development.
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- Expanding social protection and women's empowerment initiatives.
- Supporting SDGs related to poverty reduction, health, education, and gender equality.

#### Areas of Divergence

- Infrastructure and capital expenditure receive relatively greater emphasis than outcome-based social sector reforms.
- Persistent challenges remain in **learning outcomes, maternal health, malnutrition, and tribal deprivation**.
- Regional disparities between coastal and interior districts continue despite targeted allocations.
- Fund utilization and service delivery gaps often limit the effectiveness of welfare spending.

#### Conclusion

The Odisha Budget broadly reflects the state's social development aspirations. However, greater focus on human capital outcomes, governance reforms, and equitable implementation is necessary to translate fiscal allocations into inclusive and sustainable development.

### GROUP B

**Q13. Who is a 'money mule'? How does this happen, and what are the consequences? What actions are being taken by the Reserve Bank of India in this regard? Suggest some remedial measures to control it. (Marks: 20)**

Answer:

#### Introduction

A **money mule** is a person who knowingly or unknowingly allows his/her bank account, digital wallet, or financial credentials to be used for transferring illegally acquired money. The RBI identifies mule accounts as a major conduit for cyber fraud, money laundering, and financial crimes.

#### Body

##### How Does Money Mule Fraud Occur?

Money mules are recruited through:

- Fake job offers promising easy commissions.
- Social media advertisements.
- Online gaming and betting networks.
- Phishing, identity theft, and account takeover frauds.
- Exploitation of students, unemployed youth, and vulnerable individuals.

##### Process:

Fraudsters → Transfer stolen money into mule account → Multiple layering transactions → Withdrawal or transfer to final beneficiaries.

This makes tracing the original cybercriminal difficult.

##### Consequences of Money Mule Activities

###### Economic Consequences

- Facilitates money laundering and tax evasion.
- Increases cyber-financial fraud.
- Weakens confidence in digital payment systems.

###### Legal Consequences

- Liability under the **Prevention of Money Laundering Act (PMLA)**, 2002, IT Act, and IPC/BNS provisions.
- Freezing of accounts and criminal prosecution.

###### Social Consequences

- Victimization of innocent account holders.
  - Loss of public trust in banking and fintech ecosystems.
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## RBI Initiatives

### MuleHunter.AI

- RBI has launched **MuleHunter.AI**, an AI/ML-based solution for detecting suspicious mule accounts.
- The system is operational in multiple banks and is being expanded nationwide.

### Strengthened KYC Framework

- Enhanced customer due diligence and risk-based monitoring.
- Continuous transaction surveillance to identify suspicious patterns.

### Financial Literacy Campaigns

- RBI's public awareness campaigns and Financial Literacy Week highlight the dangers of becoming a money mule.

### Remedial Measures

- Strengthen **e-KYC**, **CKYC**, and biometric verification.
- Real-time data sharing among banks, RBI, FIU-IND, and law-enforcement agencies.
- AI-based fraud analytics across the banking sector.
- Strict accountability for bank officials violating KYC norms.
- Cyber-awareness campaigns in schools, colleges, and rural areas.
- Faster freezing and recovery mechanisms for fraudulent transactions.

### Conclusion

With India's rapidly expanding digital economy, combating money mule networks is essential for financial stability. A combination of **technology**, **regulatory vigilance**, **inter-agency coordination**, and **public awareness** can significantly reduce this growing cyber-financial threat.

**Q14. Discuss the roadmap of Vikshit Odisha for Vikshit Bharat: its core goals and strategies, core pillars, focus areas, and its targets. Are the same feasible in a short time period? Give your opinion. (Marks: 20)**

Answer:

### Introduction

"Viksit Odisha for Viksit Bharat" is Odisha's long-term development blueprint aligned with India's **Viksit Bharat@2047** vision. It aims to transform Odisha into a prosperous, inclusive, technology-driven and globally competitive state by **2036** (Odisha's centenary year) and **2047**.

### Body

#### Core Goals and Targets

The vision seeks to:

- Achieve a **USD 500 billion economy by 2036** and **USD 1.5 trillion economy by 2047**.
- Raise Odisha's contribution to national GDP.
- Create **over 1 crore non-farm jobs** by 2047.
- Improve human development indicators and quality of life.
- Position Odisha as a leading manufacturing, logistics and innovation hub.

#### Six Core Pillars

| Pillar             | Objective                                         |
|--------------------|---------------------------------------------------|
| People First       | Quality education, healthcare and social security |
| Rural Empowerment  | Agricultural prosperity and rural transformation  |
| Prosperity for All | Inclusive economic growth and employment          |

|                            |                                                       |
|----------------------------|-------------------------------------------------------|
| Technology Leadership      | Digital economy, AI and innovation-driven development |
| Citizen-Centric Governance | Efficient, transparent and accountable administration |
| Legacy and Pride           | Promotion of Odia culture, heritage and identity      |

#### Major Focus Areas and Strategies

- Industrial expansion through mineral-based industries and value addition.
- Port-led development leveraging Odisha's 480-km coastline.
- Agriculture modernization, irrigation expansion and millet promotion.
- Green energy, renewable power and green hydrogen ecosystem.
- Skill development through World Skill Centre and industry partnerships.
- Urban growth hubs under initiatives like *Samrudha Sahar*.
- Women-led development through Mission Shakti.
- Strengthening logistics, tourism, fisheries and digital infrastructure.

#### Feasibility: A Critical Assessment

##### Supporting Factors

- Rich mineral resources and strategic coastal location.
- Strong disaster-management model.
- Rising investment inflows and industrial corridors.
- Demographic dividend and improving infrastructure.

##### Challenges

- Poverty and regional disparities in KBK districts.
- Learning and health outcome gaps.
- Climate vulnerability and cyclones.
- Need for massive capital investment and administrative capacity.
- Requirement of sustained double-digit growth over a long period.

#### Conclusion

The vision is ambitious yet achievable if Odisha combines **high economic growth, human capital development, governance reforms and technological innovation**. Success will depend on consistent implementation, cooperative federalism and inclusive development that leaves no region or community behind.

**Q15. Critically examine the SHANTI Act, 2025, with respect to its objectives, key provisions, and concerns. Will this Act aid India's nuclear development? Discuss. (Marks: 20)**

**Answer:**

#### Introduction

The Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India (SHANTI) Act, 2025 represents the most significant reform in India's nuclear sector since the Atomic Energy Act, 1962. It seeks to expand nuclear energy capacity, attract investment, and support India's target of **100 GW nuclear capacity by 2047**.

#### Body

##### Objectives of the SHANTI Act, 2025

- Create a **unified legal framework** by replacing the Atomic Energy Act, 1962 and Civil Liability for Nuclear Damage Act, 2010.
- Facilitate private participation and investment in civil nuclear energy.
- Promote advanced technologies such as **Small Modular Reactors (SMRs)**.
- Strengthen energy security and support India's **Net Zero 2070** commitment.

- Improve regulatory certainty and align with global nuclear norms.

#### Key Provisions

##### Liberalisation of Nuclear Sector

- Allows Indian private companies and joint ventures to build and operate nuclear power plants.
- Ends the exclusive operational monopoly of NPCIL.

##### Regulatory Reforms

- Grants statutory status to the **Atomic Energy Regulatory Board (AERB)**.
- Enhances parliamentary oversight and safety regulation.

##### Liability Framework

- Removes supplier liability.
- Caps operator liability based on plant capacity.
- Establishes a dedicated Atomic Disputes Tribunal.

##### Strategic Safeguards

- Retains government control over uranium enrichment, radioactive waste management, and other strategic activities.

##### Concerns and Criticisms

- **Dilution of Accountability:** Removal of supplier liability weakens the "polluter pays" principle.
- **Safety Risks:** Private participation in a high-risk sector demands robust oversight.
- **Liability Caps:** Compensation limits may inadequately address large-scale nuclear disasters.
- **Public Trust Deficit:** Concerns similar to Fukushima and Chernobyl may intensify local resistance.
- **Regulatory Capacity:** AERB must remain independent from commercial and political pressures.

##### Will It Aid India's Nuclear Development?

Yes, substantially.

- Nuclear power currently contributes only about 3% of India's electricity generation despite rising energy demand.
- The Act can unlock private capital, accelerate reactor deployment, promote indigenous SMRs, and reduce dependence on fossil fuels.
- It also strengthens India's climate commitments and long-term energy security. However, benefits will materialise only if safety, liability, and regulatory safeguards remain uncompromised.

#### Conclusion

The SHANTI Act marks a paradigm shift from a state-dominated nuclear regime to a regulated partnership model. Its success will depend on balancing **investment, innovation, safety, and public accountability**, thereby enabling sustainable nuclear growth for a Viksit Bharat by 2047.

**Q16. The easing of sulphur emission standards for coal-fired power plants represents a significant rollback of environmental regulation. Critically evaluate its impact on India's air quality goals, climate commitments, and environmental justice, particularly in vulnerable and marginalised regions. (Marks: 20)**

Answer:

#### Introduction

The recent relaxation of **SO<sub>2</sub> emission norms** for coal-fired thermal power plants, including exemptions from mandatory **Flue Gas Desulphurisation (FGD)** installation for a majority of plants, marks a significant shift in India's environmental regulatory framework. It raises concerns regarding air quality, climate governance, and environmental justice.

#### Body

##### Impact on India's Air Quality Goals

##### Adverse Consequences

- **Sulphur dioxide (SO<sub>2</sub>)** is a major precursor of secondary **PM<sub>2.5</sub>**, which contributes significantly to respiratory and cardiovascular diseases.
-

- Coal-based power plants remain among the largest industrial sources of SO<sub>2</sub> emissions in India.
- Relaxation of norms may undermine the objectives of the **National Clean Air Programme (NCAP)**, which targets substantial reductions in particulate pollution.
- Studies indicate that widespread FGD adoption could significantly reduce SO<sub>2</sub> emissions and associated health burdens.

#### **Government's Rationale**

- Government-backed studies by IITs and NEERI argue that Indian coal has relatively lower sulphur content and FGD installation may increase costs and auxiliary energy consumption.

#### **Impact on Climate Commitments**

##### **Potential Positive Aspects**

- FGD systems increase energy consumption, leading to additional CO<sub>2</sub> emissions and higher electricity tariffs.
- Avoiding blanket FGD installation may reduce operational costs and support energy security.

##### **Limitations**

- Climate action cannot be viewed solely through carbon emissions.
- Sustainable development requires simultaneous control of **air pollutants and greenhouse gases**.
- Relaxed standards may weaken India's image as a responsible environmental steward despite commitments under the **Paris Agreement** and **Panchamrit goals**.

#### **Environmental Justice Concerns**

##### **Disproportionate Burden on Vulnerable Communities**

- Thermal plants are often located near **tribal, rural, and economically weaker regions**.
- Increased pollution exposure aggravates health vulnerabilities, livelihood losses, and ecological degradation.
- Communities in coal-bearing regions of **Odisha, Jharkhand, Chhattisgarh, and eastern Maharashtra** bear pollution costs while receiving limited developmental benefits.

#### **Constitutional Dimension**

- Relaxation may conflict with **Article 21** (Right to Life) and the principles of **inter-generational equity and polluter pays**, upheld by the Supreme Court.

#### **Conclusion**

While cost and energy-security concerns deserve consideration, environmental regulation should not disproportionately burden vulnerable populations. A balanced approach involving **region-specific compliance, cleaner technologies, stricter monitoring, and just transition policies** is essential to reconcile development with environmental sustainability.

**Q17. Discuss the role of micro-irrigation in increasing water-use efficiency in India. How do you relate the changes in cropping patterns with the development of the irrigation system in the country? (Marks: 20)**

**Answer:**

#### **Introduction**

Micro-irrigation refers to the application of water directly to the root zone through **drip and sprinkler systems**. In a water-stressed country where agriculture consumes nearly 80% of freshwater, it is crucial for enhancing **water-use efficiency (WUE)** and sustainable agriculture.

#### **Body**

##### **Role of Micro-Irrigation in Enhancing Water-Use Efficiency**

###### **1. Significant Water Savings**

- Drip and sprinkler systems reduce conveyance and evaporation losses.
  - Under the **Per Drop More Crop (PDMC)** component of PMKSY, micro-irrigation aims to maximize output from every unit of water.
  - Studies indicate water savings of 25-50% and substantial improvement in WUE.
-

## 2. Higher Agricultural Productivity

- Precise water and nutrient delivery improves crop yields and quality.
- Particularly beneficial for horticulture, sugarcane, cotton, vegetables and plantation crops.

## 3. Climate Resilience

- Reduces dependence on erratic monsoons.
- Supports cultivation in drought-prone regions of Maharashtra, Karnataka, Rajasthan and Odisha.

## 4. Resource Conservation

- Minimizes waterlogging, soil erosion and nutrient leaching.
- Facilitates fertigation, reducing fertilizer consumption.

## 5. Policy Support

- PMKSY-PDMC, RKVY support and state-level subsidy programmes have expanded adoption.
- Economic Survey 2024-25 notes rising irrigation coverage and intensity in Indian agriculture.

## Irrigation Development and Changes in Cropping Pattern

The expansion of irrigation has significantly altered India's cropping pattern.

| Irrigation Development             | Change in Cropping Pattern                                  |
|------------------------------------|-------------------------------------------------------------|
| Canal irrigation in Punjab-Haryana | Shift towards water-intensive rice-wheat system             |
| Groundwater expansion              | Increased cultivation of sugarcane, paddy and cash crops    |
| Micro-irrigation                   | Growth of horticulture, fruits, vegetables and floriculture |
| Assured irrigation                 | Multiple cropping and higher cropping intensity             |

## Positive Outcomes

- Diversification towards high-value agriculture.
- Increased farm income and export-oriented production.

## Emerging Concerns

- Excessive irrigation has encouraged cultivation of water-intensive crops in water-scarce regions.
- NITI Aayog's Composite Water Management Index highlighted groundwater stress in several states.

## Conclusion

Micro-irrigation embodies the principle of "More Crop per Drop." However, sustainable water management requires aligning irrigation expansion with crop diversification, MSP reforms, and climate-resilient agricultural practices to ensure long-term food and water security.