

UPSC CSE (Main) 2021

General Studies Paper-III

- Q1. Explain the difference between computing methodology of India's Gross Domestic Product (GDP) before the year 2015, and after the year 2015. (150 words) [10]**

Approach to question:

Before 2015, India's computing methodology for Gross Domestic Product (GDP) relied on the factor cost approach, which estimated GDP by summing up the value added across different sectors of the economy. However, after 2015, India adopted the new computing methodology known as the market prices approach. This approach considers the prices prevailing in the market for final goods and services, thereby providing a more accurate representation of economic activities. Additionally, the new methodology incorporates updated data sources, improved coverage of economic sectors, and better measurement techniques. These changes have resulted in a significant revision of GDP figures and a more comprehensive assessment of India's economic growth.

Answer:

India's Gross Domestic Product (GDP) computation underwent a significant change in 2015 when the country shifted to a new methodology for calculating its economic output. The revised methodology aimed to capture economic activity more accurately and align with international standards.

Difference in Computing Methodology:

- Shift to Market Prices:** The new methodology adopted market prices instead of factor costs to value goods and services, providing a more comprehensive picture of economic activity.
- Incorporation of New Data Sources:** The updated methodology integrated data from various sources, including corporate filings and tax records, to enhance data accuracy and reliability.
- Change in Base Year:** The base year for computing GDP was updated to 2011-12, reflecting the changing economic structure and consumption patterns.
- Incorporation of Informal Sector:** The revised methodology sought to better account for the informal sector's contribution to the economy,

capturing previously unrecorded economic activities.

The adoption of the new GDP computing methodology in 2015 brought India's economic data in line with international best practices and improved the accuracy and reliability of its GDP estimates. The changes allowed policy makers and analysts to make more informed decisions and better understand the country's economic performance.

- Q2. Distinguish between Capital Budget and Revenue Budget. Explain the components of both these Budgets. (150 words) [10]**

Approach to question:

Distinguishing between Capital Budget and Revenue Budget:

Capital Budget:

It deals with the government's capital expenditure and investments in long-term assets.

Revenue Budget:

It pertains to the government's day-to-day expenses and revenue sources.

Components of Capital Budget:

Capital Expenditure: It includes investment in physical assets like roads, bridges, power plants, etc.

Components of Revenue Budget:

Revenue Receipts: It comprises revenue generated through taxes, fees, grants, and other sources.

Answer:

In the budgeting process, governments categorize their financial plans into two main components: Capital Budget and Revenue Budget. Each budget serves distinct purposes and comprises different elements.

Differences between Capital Budget and Revenue Budget:

- Purpose:** The Capital Budget focuses on capital expenditure and investments, while the Revenue Budget deals with day-to-day expenses and revenue generation.
- Expenditure Type:** Capital Budget includes outlays for acquiring assets and long-term projects,

while Revenue Budget encompasses operational expenses like salaries, subsidies, and maintenance costs.

Components of Capital Budget:

1. **Capital Expenditure:** Funds allocated for building infrastructure, purchasing assets, and initiating long-term projects.
2. **Loans and Borrowings:** Capital raised through borrowing for financing developmental activities.
3. **Disinvestment Proceeds:** Revenue generated by selling government assets and equity holdings.

Components of Revenue Budget:

1. **Tax Revenue:** Income from direct and indirect taxes, including income tax, GST, excise, etc.
2. **Non-Tax Revenue:** Revenue from non-tax sources such as fees, fines, dividends, and interest income.

The distinction between Capital Budget and Revenue Budget helps governments allocate funds efficiently and maintain fiscal discipline. Capital expenditure supports long-term growth and development, while revenue budget ensures the smooth functioning of day-to-day operations and public services.

Q3. How did land reforms in some parts of the country help to improve the socio-economic conditions of marginal and small farmers?
(150 words) [10]

Approach to question:

Land reforms in some parts of the country have significantly improved the socio-economic conditions of marginal and small farmers in the following ways:

1. **Redistribution of Land:** Land reforms involved the redistribution of land from large landowners to landless and marginal farmers. This provided access to land for the poor and enabled them to cultivate their own land, leading to increased agricultural productivity and income.
2. **Tenure Security:** Land reforms ensured legal recognition of land ownership for small farmers, protecting them from eviction and land grabbing. This tenure security boosted their confidence, encouraging long-term investments in land, such as irrigation, farm infrastructure, and soil conservation measures.

In conclusion, land reforms in various parts of the country have had a transformative impact on the socio-economic conditions of marginal and small farmers.

Answer:

Land reforms have played a crucial role in improving the socio-economic conditions of marginal and small farmers in some parts of the country. These reforms aimed to redistribute land holdings, provide land to landless farmers, and empower the rural poor.

Impact of Land Reforms on Marginal and Small Farmers:

1. **Land Redistribution:** Land reforms led to the redistribution of land from large landowners to landless and marginal farmers, providing them with ownership and control over agricultural resources.
2. **Tenancy Reforms:** Tenancy reforms protected tenant farmers' rights and ensured fair rental agreements, reducing exploitation by landlords.
3. **Credit Access:** Land reforms enabled marginal farmers to use land as collateral for obtaining credit, facilitating investment in agriculture and modern farming practices.
4. **Income Generation:** Increased land ownership and access to resources allowed small farmers to generate higher incomes, improving their standard of living.

Land reforms have proved to be instrumental in uplifting the socio-economic conditions of marginal and small farmers. By providing them with land ownership, access to credit, and protection of rights, these reforms have contributed to rural development and poverty alleviation in various parts of the country.

Q4. How and to what extent would micro-irrigation help in solving India's water crisis?
(150 words) [10]

Approach to question:

Micro-irrigation has the potential to significantly contribute to solving India's water crisis in the following ways:

1. **Water Conservation:** Micro-irrigation systems such as drip irrigation and sprinklers deliver water directly to the roots of plants, minimizing evaporation and reducing water wastage. This efficient water use can lead to substantial water savings and help address water scarcity issues.
2. **Increased Crop Yield:** Micro-irrigation ensures that plants receive water in a controlled and precise manner, optimizing their growth and productivity. With improved water management, farmers can achieve higher crop yields even in water-stressed regions, thus enhancing food security and rural livelihoods.

By conserving water, increasing crop yields, reducing groundwater depletion, enhancing climate resilience, promoting sustainability, empowering farmers, and backed by government support, micro-irrigation can contribute to a more efficient and sustainable use of water resources in agriculture, thereby mitigating the water crisis in the country.

Answer:

India faces a severe water crisis due to increasing demand, declining water resources, and inefficient

irrigation practices. Micro-irrigation, which includes drip and sprinkler irrigation, can play a significant role in addressing this crisis.

Importance of Micro-Irrigation in Solving India's Water Crisis:

1. **Water Efficiency:** Micro-irrigation systems deliver water directly to the plant roots, minimizing water wastage and increasing irrigation efficiency.
2. **Reduced Water Stress:** By optimizing water usage, micro-irrigation reduces the strain on groundwater and surface water sources, helping to alleviate water stress.
3. **Increased Crop Yield:** Proper water management through micro-irrigation leads to better crop health and higher yields, enhancing agricultural productivity.
4. **Climate Resilience:** Micro-irrigation systems allow farmers to adapt to changing climatic conditions, ensuring water availability during periods of drought or erratic rainfall.

Micro-irrigation can significantly contribute to solving India's water crisis by conserving water resources and enhancing agricultural productivity. Widely adopting these efficient irrigation techniques will not only improve water availability but also promote sustainable water management practices in the country.

Q5. How is S-400 air defence system technically superior to any other system presently available in the world? (150 words) [10]

Approach to question:

The S-400 air defense system is considered technically superior to any other system presently available in the world due to the following reasons:

1. **Long-Range Capability:** The S-400 has an impressive range, with the ability to engage targets up to 400 kilometers away. This enables it to cover vast airspace and effectively defend against threats from a considerable distance.
2. **Multiple Target Engagement:** The system has the capability to track and engage multiple targets simultaneously. Its advanced radar systems and command and control capabilities allow it to handle a large number of threats simultaneously, enhancing its effectiveness in complex air defense scenarios.
3. **High Interception Altitude:** The S-400 can intercept targets at altitudes ranging from very low to very high, including ballistic missiles. This versatility makes it a robust and comprehensive air defense system capable of countering a wide range of threats.

In summary, the S-400 air defense system is technically superior to other systems due to its long-range capability, multiple target engagement capability, high interception altitude, advanced radar systems, diverse missile arsenal, electronic countermeasures, and mobility.

Answer:

The S-400 air defense system, developed by Russia's Almaz-Antey Concern, stands as a formidable technological marvel, surpassing other contemporary systems worldwide. Its superiority lies in several key aspects, making it a preferred choice for many nations.

Points:

1. **Range:** The S-400 boasts an extended engagement range of up to 400 kilometers, surpassing most other systems, enabling it to neutralize threats from a considerable distance.
2. **Multiple Targets:** With the ability to simultaneously track and engage multiple targets, the S-400 showcases unparalleled multitasking capabilities, enhancing its effectiveness in complex air defense scenarios.
3. **Advanced Radar:** Its cutting-edge radar systems can detect and track a wide range of aerial threats, including stealth aircraft and ballistic missiles, offering comprehensive situational awareness.
4. **Mobility:** The system's high mobility allows rapid deployment and relocation, ensuring enhanced operational flexibility and adaptability to changing threat landscapes.
5. **Countermeasures:** Equipped with advanced countermeasures against jamming and electronic warfare, the S-400 remains robust and reliable in contested environments.

In conclusion, the S-400 air defense system's technical superiority lies in its extended range, multitasking abilities, advanced radar systems, high mobility, and effective countermeasures, making it a sought-after solution for countries seeking an edge in modern warfare.

Q6. Explain the purpose of the Green Grid Initiative launched at World Leaders Summit of the COP26 UN Climate Change Conference in Glasgow in November 2021. When this idea was first floated in the International Solar Alliance (ISA)? (150 words) [10]

Approach to question:

The purpose of the Green Grid Initiative launched at the World Leaders Summit of the COP26 UN Climate Change Conference in November 2021 is to accelerate the deployment of renewable energy and facilitate the transition to a low-carbon future. The initiative aims to connect countries through an interconnected grid

infrastructure that enables the efficient transmission and distribution of clean energy across borders. This will facilitate the integration of renewable energy sources and help address challenges associated with intermittency. The idea of the Green Grid Initiative was first floated in the International Solar Alliance (ISA) during its Founding Conference held in New Delhi in March 2018.

Answer:

The Green Grid Initiative, launched at the World Leaders Summit of the COP26 UN Climate Change Conference in November 2021, serves as a crucial step towards combatting climate change and achieving sustainable development goals. This ambitious initiative aims to promote the integration of renewable energy sources and enhance cross-border electricity transmission, fostering a greener and cleaner global energy landscape.

Points:

- 1. Renewable Energy Integration:** The Green Grid Initiative seeks to facilitate the integration of renewable energy sources, such as solar, wind, and hydro, into existing energy grids worldwide, reducing reliance on fossil fuels and mitigating greenhouse gas emissions.
- 2. Cross-Border Electricity Transmission:** By developing interconnectivity between countries, the initiative enables efficient cross-border electricity transmission, enabling surplus renewable energy from one region to be shared and utilized in areas with higher demand, promoting energy efficiency.
- 3. Climate Resilience:** The initiative enhances climate resilience by diversifying energy sources, reducing vulnerability to fossil fuel price fluctuations, and strengthening energy security for participating nations.

In conclusion, the Green Grid Initiative, conceptualized within the International Solar Alliance, aims to promote renewable energy integration, cross-border electricity transmission, climate resilience, and sustainable development, providing a critical pathway towards a greener and more sustainable future.

Q7. Describe the key points of the revised Global Air Quality Guidelines (AQGs) recently released by the World Health Organisation (WHO). How are these different from its last update in 2005? What changes in India's National Clean Air Programme are required to achieve these revised standards?

(150 words) [10]

Approach to question:

The revised Global Air Quality Guidelines (AQGs) recently released by the World Health Organization (WHO) have the following key points:

- 1. Lowering of Particulate Matter (PM) Standards:** The revised AQGs recommend stricter limits for fine particulate matter (PM_{2.5}) and coarse particulate matter (PM₁₀) to protect public health from the adverse effects of air pollution.

Compared to the 2005 update, the revised AQGs reflect advancements in scientific understanding of the health effects of air pollution and include stricter standards for particulate matter and additional pollutants. The inclusion of short-term exposure guidelines and the focus on health-driven policies further strengthen the recommendations.

To achieve these revised standards in India's National Clean Air Programme (NCAP), several changes are required. These may include:

- 1. Strengthening Emission Standards:** India needs to update and enforce stringent emission standards for industries, vehicles, and other pollution sources to control pollutant levels and meet the revised AQGs.
- 2. Implementing Comprehensive Monitoring:** A robust air quality monitoring network should be established across the country to track pollution levels accurately and identify pollution hotspots. This data will help in formulating targeted mitigation strategies.

India's National Clean Air Programme needs to strengthen emission standards, establish comprehensive monitoring, promote cleaner energy sources, enhance waste management, strengthen enforcement mechanisms, and promote public awareness to achieve these revised air quality standards.

Answer:

The World Health Organization (WHO) recently released the revised Global Air Quality Guidelines (AQGs) as a significant step towards combatting air pollution and safeguarding public health. These updated guidelines encompass crucial improvements compared to the 2005 version, setting more stringent standards for air quality worldwide.

Points:

- 1. Stringent Standards:** The revised AQGs set lower limits for pollutants such as particulate matter (PM_{2.5} and PM₁₀), ozone (O₃), nitrogen dioxide (NO₂), and sulfur dioxide (SO₂), reflecting a greater emphasis on protecting human health.
- 2. Health Impact Assessment:** The guidelines incorporate the latest scientific evidence on the health effects of air pollution, reflecting a more comprehensive understanding of its impact on various health conditions.
- 3. Cross-Border Impact:** The updated AQGs emphasize the need for regional and global cooperation to address air pollution, recognizing

its cross-border nature and international ramifications.

In conclusion, the revised WHO Global Air Quality Guidelines represent a significant advancement in combatting air pollution and safeguarding public health. To meet these updated standards, India's National Clean Air Programme must undergo crucial improvements, embracing stricter targets, adopting innovative measures, and promoting cross-border cooperation for effective air pollution control.

Q8. Discuss about the vulnerability of India to earthquake-related hazards. Give examples including the salient features of major disasters caused by earthquakes in different parts of India during the last three decades.
(150 words) [10]

Approach to question:

India is highly vulnerable to earthquake-related hazards due to its tectonic setting. The country is located at the complex interaction zone of the Indian Plate and the Eurasian Plate, leading to frequent seismic activity. Some salient examples of major earthquakes and their impacts in India over the last three decades include:

1. **2001 Gujarat Earthquake:** The 7.7 magnitude earthquake in Gujarat caused extensive damage and claimed over 20,000 lives.
2. **2004 Indian Ocean Earthquake and Tsunami:** The devastating 9.1 magnitude earthquake in the Indian Ocean triggered a massive tsunami that impacted several coastal regions, including the Andaman and Nicobar Islands and the states of Tamil Nadu, Andhra Pradesh, and Kerala.

Effective disaster preparedness, early warning systems, stringent building codes, and public awareness are crucial for minimizing the loss of life and infrastructure during future earthquakes.

Answer:

India, located in a seismically active region, is vulnerable to earthquake-related hazards due to its tectonic plate boundaries. Over the last three decades, several major earthquakes have struck different parts of the country, resulting in significant devastation and loss of life.

Points:

1. **Himalayan Seismic Zone:** The collision of the Indian and Eurasian plates makes the Himalayan region prone to earthquakes. The 1991 Uttarkashi earthquake (6.8 magnitude) and the 2005 Kashmir earthquake (7.6 magnitude) caused widespread destruction, resulting in thousands of fatalities.
2. **Indo-Gangetic Plains:** The Indo-Gangetic plains, characterized by weak soil and sedimentary layers, amplify seismic waves, posing risks to densely populated regions. The 2001 Bhuj earthquake (7.7

magnitude) in Gujarat led to vast destruction and claimed over 20,000 lives.

3. **Northeastern Region:** The Northeastern states are situated on the tectonic boundary between the Indian and Eurasian plates, making them susceptible to seismic events. The 2011 Sikkim earthquake (6.9 magnitude) caused significant damage in the region.

India's vulnerability to earthquake-related hazards is evident from the historical events that have caused significant devastation in various regions. Mitigation measures, public awareness, and earthquake-resistant infrastructure are crucial to reduce the impact of future seismic events.

Q9. Discuss how emerging technologies and globalization contribute to money laundering. Elaborate on the measures to tackle the problem of money laundering both at national and international levels.
(150 words) [10]

Approach to question:

Emerging technologies and globalization have contributed to the complexity and scale of money laundering. Here are the key points on their role in money laundering:

1. **Digitalization and Cryptocurrencies:** Emerging technologies like cryptocurrencies, online payment systems, and anonymous digital transactions provide opportunities for criminals to launder money discreetly, making it difficult to trace the origins and destinations of funds.

To tackle the problem of money laundering, both at national and international levels, the following measures are crucial:

1. **Strengthening Anti-Money Laundering (AML) Laws and Regulations:** Nations should enhance their legal frameworks by enacting comprehensive AML legislation that covers emerging technologies and globalization. These laws should mandate reporting of suspicious transactions, establish customer due diligence requirements, and impose penalties for non-compliance.

By implementing these measures, both at the national and international levels, countries can strengthen their defenses against money laundering and disrupt the financial networks that facilitate illicit activities.

Answer:

Money laundering, a global menace, thrives due to the convergence of emerging technologies and globalization. The digital era enables rapid, anonymous cross-border financial transactions, making it easier for criminals to

launder illicit funds, posing significant challenges to national and international financial systems.

Points:

1. **Emerging Technologies:** Cryptocurrencies and digital payment platforms offer anonymity and decentralized transactions, facilitating money laundering by obscuring the source and destination of funds.
2. **Globalization:** Increased trade, cross-border investments, and complex corporate structures create opportunities to launder money through international transactions and offshore accounts.
3. **National Measures:** Governments must strengthen anti-money laundering (AML) laws, enforce customer due diligence, monitor financial transactions, and impose stringent penalties to deter criminals.
4. **International Cooperation:** Enhanced information exchange and cooperation among nations are crucial to track and freeze illicit funds flowing across borders.
5. **Technological Solutions:** Develop advanced technologies like blockchain and artificial intelligence to detect suspicious activities and automate AML compliance processes.

To combat money laundering effectively, a multi-pronged approach involving robust national regulations, international cooperation, and technological advancements is essential to safeguard the global financial system from criminal exploitation.

Q10. Keeping in view India's internal security, analyze the impact of cross-border cyber attacks. Also, discuss defensive measures against these sophisticated attacks.

(150 words) [10]

Approach to question:

Cross-border cyber attacks have a significant impact on India's internal security. Here are the key points:

Economic and Financial Implications: Cross-border cyber attacks targeting critical sectors such as banking, finance, and infrastructure can disrupt services, cause financial losses, and destabilize the economy.

Defensive measures against cross-border cyber attacks include:

Strengthening Cybersecurity Infrastructure: Enhancing the resilience of critical infrastructure, government networks, and private sector systems through robust cybersecurity measures, including firewalls, intrusion detection systems, and regular security audits.

By implementing these defensive measures, India can enhance its cyber resilience and effectively mitigate the impact of cross-border cyber attacks on its internal security.

Answer:

India's internal security faces significant challenges due to the rising threat of cross-border cyber attacks. These attacks, originating from foreign entities, can cause severe disruptions to critical infrastructure, financial systems, and government operations, posing a grave risk to national security.

Points:

1. **Impact of Cross-Border Cyber Attacks:** Such attacks can lead to data breaches, economic espionage, misinformation campaigns, and even cyber warfare, jeopardizing national sovereignty and stability.
2. **Defensive Measures:** Strengthening cybersecurity infrastructure, promoting public-private partnerships, enhancing intelligence sharing, conducting regular audits, and investing in cutting-edge technologies are crucial to mitigate the risks.
3. **International Cooperation:** Collaboration with other nations to trace and counter cyber threats is essential for a comprehensive defense against cross-border attacks.
4. **Public Awareness:** Educating the public and businesses about cyber hygiene and best practices can reduce the success of social engineering and phishing attacks.

Protecting India from cross-border cyber attacks requires a robust cybersecurity framework, collaborative efforts, and constant vigilance to safeguard the nation's critical assets and ensure internal security.

Q11. Do you agree that the Indian economy has recently experienced V-shaped recovery? Give reasons in support of your answer.

(250 words) [15]

Approach to question:

Yes, the Indian economy has recently experienced a V-shaped recovery. Here are the reasons in support of this answer:

1. **Rapid Economic Growth:** Following the pandemic-induced contraction in 2020, India has witnessed a sharp rebound in economic activity. The GDP growth rate has shown a significant improvement, indicating a V-shaped recovery trajectory.
2. **Rebounding Industrial Production:** Industrial production, including manufacturing, mining, and electricity has shown a strong recovery. The industrial sector has witnessed an uptick in production, reflecting increased demand and business activity.

These factors collectively support the argument that the Indian economy has experienced a V-shaped

recovery. While challenges remain, such as the need for sustainable job creation and addressing structural issues, the recent economic indicators suggest a strong rebound from the downturn caused by the COVID-19 pandemic.

Answer:

The question of whether the Indian economy has recently experienced a V-shaped recovery has been a subject of debate among economists and policy makers. A V-shaped recovery implies a sharp decline in economic activity followed by an equally rapid rebound. Let's analyze the factors to determine if this recovery pattern holds true for the Indian economy.

Points:

- 1. Initial Contraction:** The Indian economy witnessed a significant contraction during the COVID-19 pandemic-induced lockdowns in 2020, leading to a sharp decline in GDP and economic activity.
- 2. Subsequent Rebound:** Following the easing of restrictions and government stimulus measures, there has been a noticeable revival in economic activity, particularly in sectors like manufacturing, services, and agriculture.
- 3. Mixed Indicators:** While some economic indicators, such as manufacturing output and tax collections, showed signs of strong recovery, other sectors like hospitality and aviation continued to face challenges.
- 4. Uneven Recovery:** The recovery has been uneven across sectors and regions, with rural areas showing greater resilience than urban centers.
- 5. Persisting Challenges:** Structural issues like unemployment, fiscal deficit, and high inflation continue to pose challenges to sustained economic growth.

While there has been a notable bounce-back in economic activity after the initial contraction, it is essential to acknowledge the uneven nature of the recovery and the persisting challenges. A conclusive verdict on a V-shaped recovery in the Indian economy remains a matter of ongoing observation and analysis. Policy makers must focus on inclusive and sustainable measures to strengthen the economy further.

Q12. "Investment in infrastructure is essential for more rapid and inclusive economic growth". Discuss in the light of India's experience.

(250 words) [15]

Approach to question:

Investment in infrastructure is essential for more rapid and inclusive economic growth. Here are the key points in the light of India's experience:

- 1. Enhanced Productivity:** Infrastructure development improves connectivity, reduces transportation costs, and enhances efficiency in the movement of goods and services. This boosts productivity across sectors, leading to higher economic growth.
- 2. Job Creation:** Infrastructure projects generate employment opportunities, especially in construction, engineering, and related industries. This contributes to income generation, poverty reduction, and inclusive growth.
- 3. Attracting Investments:** A robust infrastructure framework attracts both domestic and foreign investments. Improved connectivity, reliable utilities, and modern amenities create a conducive environment for businesses, fostering economic expansion.

It enhances productivity, generates employment, attracts investments, promotes regional development, improves public welfare, boosts industrial competitiveness, creates multiplier effects, attracts investors, supports connectivity and trade, and contributes to sustainable development. Continued emphasis on infrastructure development is necessary to leverage its potential and achieve long-term economic prosperity.

Answer:

Investment in infrastructure plays a pivotal role in fostering rapid and inclusive economic growth. India's experience provides compelling evidence of how strategic investments in infrastructure have contributed to the nation's economic development and improved the standard of living for its citizens.

Points:

- 1. Connectivity and Mobility:** Investments in roads, railways, and airports have enhanced connectivity, enabling efficient movement of goods and people, thus stimulating trade and economic activity.
- 2. Industrial Growth:** Infrastructure development has attracted investments in manufacturing and industries, fostering job creation and economic diversification.
- 3. Power and Energy:** Improved energy infrastructure has bolstered industrial productivity and brought electricity to remote areas, benefiting millions of households and promoting social inclusivity.
- 4. Urban Development:** Investments in urban infrastructure like water supply, sanitation, and affordable housing have improved the quality of life for urban dwellers, reducing urban-rural disparities.
- 5. Digital Connectivity:** Expansion of digital infrastructure has accelerated digital inclusion, leading to increased access to services, education, and e-commerce, particularly in rural areas.

India's experience underscores the importance of investing in infrastructure for rapid and inclusive economic growth. However, to sustain this momentum, India must continue prioritizing infrastructural development, focusing on innovative financing models, and ensuring equitable distribution of resources to bridge regional and social disparities.

Q13. What are the salient features of the National Food Security Act, 2013? How has the Food Security Bill helped in eliminating hunger and malnutrition in India?

(250 words) [15]

Approach to question:

Salient features of the National Food Security Act, 2013:

1. **Legal Entitlement:** The Act provides a legal right to food by ensuring access to subsidized food grains to eligible beneficiaries.
2. **Targeted Public Distribution System (TPDS):** The TPDS aims to provide food grains to priority households and Antyodaya Anna Yojana beneficiaries at subsidized rates.

The Food Security Act has played a crucial role in addressing hunger and malnutrition in India. Here's how it has helped:

1. **Enhanced Access to Food:** The Act ensures subsidized food grains to a large section of the population, thereby enhancing their access to food. This has reduced food insecurity and hunger among vulnerable households.
2. **Improved Nutritional Status:** The Act emphasizes the provision of nutritious food, benefiting pregnant women, lactating mothers, and children. Continued efforts, including strengthening the implementation mechanism and addressing these challenges, are essential for achieving the Act's objectives of eliminating hunger and malnutrition in India.

Answer:

The National Food Security Act (NFSA), enacted in 2013, is a significant social welfare legislation in India aimed at ensuring food security for the most vulnerable sections of society. It seeks to alleviate hunger and malnutrition by providing subsidized food grains to eligible beneficiaries.

Salient Features of NFSA, 2013:

1. **Targeted Public Distribution System (TPDS):** The act identifies priority and general households, ensuring specific entitlements to each category.
2. **Coverage:** It covers around two-thirds of the population, with 75% in rural and 50% in urban areas entitled to subsidized food grains.
3. **Entitlements:** Beneficiaries receive 5 kilograms of food grains (rice, wheat, and coarse grains) per person per month at affordable prices.

4. **Maternal and Child Nutrition:** Special provisions for pregnant and lactating women and children under the age of 14 years are made to address malnutrition.
5. **Reforms in TPDS:** The act aims to improve transparency, efficiency, and accountability in the public distribution system through the use of technology.

Impact on Hunger and Malnutrition:

1. **Improved Access:** The NFSA has increased access to affordable food for millions of vulnerable households, reducing hunger.
2. **Nutritional Support:** Special provisions for pregnant women and children have positively impacted maternal and child nutrition, combating malnutrition.
3. **Poverty Alleviation:** The act helps reduce the financial burden of food expenses for low-income families, contributing to poverty alleviation.

The National Food Security Act, 2013, has been instrumental in addressing food insecurity and malnutrition in India by providing subsidized food grains to eligible beneficiaries. However, challenges like leakages and targeting errors need to be continually addressed to ensure effective implementation and broader impact on hunger and malnutrition eradication.

Q14. What are the present challenges before crop diversification? How do emerging technologies provide an opportunity for crop diversification?

(250 words) [15]

Approach to question:

Present challenges before crop diversification:

1. **Limited market demand:** Farmers face challenges in finding a diverse range of buyers and ensuring profitable prices for non-traditional crops.
2. **Lack of infrastructure:** Insufficient storage, transportation, and processing facilities hinder the effective distribution and marketing of diversified crops.

Emerging technologies providing opportunities for crop diversification:

Precision agriculture: Technologies like remote sensing, drones, and IoT devices enable farmers to optimize crop management practices, leading to increased yields and reduced risks.

These technologies can overcome existing challenges by enhancing productivity, reducing risks, improving market access, and promoting sustainable agricultural practices, thereby providing opportunities for successful crop diversification.

Answer:

Crop diversification, the practice of cultivating a variety of crops, is crucial for sustainable agriculture

and food security. However, several challenges hinder its widespread adoption. At the same time, emerging technologies offer promising solutions to overcome these challenges and promote crop diversification.

Present Challenges Before Crop Diversification:

1. **Monoculture Dominance:** The over-reliance on a few cash crops leads to ecological imbalances, soil degradation, and pest outbreaks.
2. **Market Constraints:** Limited market access and price volatility discourage farmers from trying new crops.
3. **Lack of Knowledge:** Inadequate awareness about diverse crop options and their cultivation techniques hinders diversification efforts.
4. **Risk Aversion:** Farmers often resist diversification due to uncertainty about the success of new crops.

Emerging Technologies as an Opportunity for Crop Diversification:

1. **Precision Agriculture:** Technology-driven tools like IoT, drones, and GIS enable precise farm management, optimizing resources for diverse crop production.
2. **Climate Resilience:** Climate-smart technologies aid in identifying crops resilient to changing climate conditions, supporting diversification.
3. **Digital Marketplaces:** Online platforms connect farmers to buyers, expanding market opportunities for diverse crops.
4. **Genetic Engineering:** Biotechnology facilitates the development of high-yielding, pest-resistant, and nutrition-rich crop varieties suitable for diversification.

Addressing the challenges before crop diversification and leveraging emerging technologies present significant opportunities to promote sustainable agriculture, enhance farmers' income, and ensure food security in the long run. Policymakers and agricultural stakeholders must collaborate to embrace technological advancements and support crop diversification initiatives for a more resilient and prosperous agricultural sector.

Q15. What are the research and developmental achievements in applied biotechnology? How will these achievements help to uplift the poorer sections of society?

(250 words) [15]

Approach to question:

Research and developmental achievements in applied biotechnology:

1. **Genetically modified crops (GMOs):** Development of GMOs has led to crop varieties with improved traits such as resistance to pests, diseases, and adverse environmental conditions.

2. **Marker-assisted breeding:** The use of molecular markers has revolutionized breeding programs, allowing for the selection of desired traits with greater precision and efficiency.

How these achievements uplift the poorer sections of society:

1. **Improved crop varieties:** Genetically modified crops provide higher yields, resistance to pests, and tolerance to adverse climatic conditions, benefiting small-scale farmers who are more vulnerable to crop losses.
2. **Affordable access to planting material:** Tissue culture techniques make disease-free planting material accessible to small-scale farmers at affordable prices, enhancing their productivity and reducing dependence on external sources.

By leveraging applied biotechnology research and development, marginalized sections of society can benefit from increased agricultural productivity, improved nutrition, and enhanced healthcare.

Answer:

Applied biotechnology has witnessed remarkable research and developmental achievements that have the potential to transform various sectors and uplift the poorer sections of society. These advancements offer promising solutions to address pressing challenges and improve the lives of marginalized communities.

Research and Developmental Achievements in Applied Biotechnology:

1. **Crop Improvement:** Genetically modified crops with traits like drought resistance, pest resistance, and increased yield contribute to food security, benefiting farmers, including smallholders.
2. **Healthcare:** Biopharmaceuticals and gene therapies have revolutionized disease treatment, offering affordable and accessible healthcare solutions to underserved populations.
3. **Renewable Energy:** Biofuels and biogas derived from agricultural residues present sustainable energy alternatives, reducing dependence on fossil fuels and empowering rural communities.
4. **Environmental Remediation:** Bioremediation technologies help clean up polluted sites, contributing to environmental conservation and improved living conditions.

Uplifting the Poorer Sections of Society:

1. **Enhanced Livelihoods:** Biotechnological interventions in agriculture uplift the poor by increasing crop productivity and income opportunities.
2. **Affordable Healthcare:** Biopharmaceuticals and diagnostics offer cost-effective medical solutions, ensuring healthcare access for marginalized communities.

3. **Sustainable Energy Access:** Bioenergy initiatives provide decentralized, renewable energy solutions in rural areas, empowering communities with access to electricity and income-generating activities.
4. **Environmental Benefits:** Bioremediation improves environmental quality, benefiting poor communities residing in polluted areas.

Applied biotechnology's research and developmental achievements have the potential to significantly impact the lives of the poorer sections of society. These advancements offer sustainable solutions in agriculture, healthcare, energy, and environmental conservation, contributing to poverty alleviation, empowerment, and social upliftment. Policy makers should foster inclusive technology adoption and create an enabling environment to maximize the benefits of biotechnological innovations for all segments of society.

Q16. The Nobel Prize in Physics of 2014 was jointly awarded to Akasaki, Amano and Nakamura for the invention of Blue LEDs in 1990s. How has this invention impacted the everyday life of human beings?

(250 words) [15]

Approach to question:

The invention of Blue LEDs in the 1990s by Akasaki, Amano, and Nakamura, for which they were awarded the Nobel Prize in Physics in 2014, has had a significant impact on everyday life:

1. **Energy-efficient lighting:** Blue LEDs have paved the way for highly energy-efficient lighting solutions. They consume less electricity compared to traditional incandescent bulbs, reducing energy costs and environmental impact.
2. **White LED lighting:** Blue LEDs, when combined with phosphors, can produce white light, enabling the development of efficient and long-lasting LED bulbs. White LED lighting has become widely used in homes, offices, and public spaces.

It has transformed the way we illuminate our surroundings, interact with digital devices, store and transmit information, and address environmental concerns.

Answer:

The invention of Blue Light Emitting Diodes (LEDs) in the 1990s, recognized by the Nobel Prize in Physics in 2014, has had a profound impact on the everyday life of human beings. This ground breaking innovation revolutionized lighting technology and led to numerous practical applications with wide-ranging benefits.

Impact on Everyday Life:

1. **Energy-Efficient Lighting:** Blue LEDs paved the way for energy-efficient lighting solutions,

significantly reducing electricity consumption and carbon emissions worldwide.

2. **White LED Lighting:** Combining blue LEDs with phosphors allowed the creation of white LED lights, leading to widespread use in homes, offices, and public spaces, providing brighter and long-lasting illumination.
3. **Display Technology:** The invention facilitated the development of flat-panel displays for televisions, smartphones, and computer monitors, offering improved picture quality and energy savings.
4. **Optical Data Storage:** Blue laser diodes enabled high-capacity optical data storage in devices like Blu-ray discs, enhancing multimedia experiences.
5. **Medical Applications:** Blue LEDs have found applications in medical devices, such as photodynamic therapy, aiding in the treatment of certain medical conditions.

The invention of Blue LEDs by Akasaki, Amano, and Nakamura has transformed modern lighting, display technology, data storage, and medical applications. The widespread adoption of this innovation has led to energy conservation, enhanced visual experiences, and improved quality of life for people worldwide. This Nobel Prize-winning discovery continues to be a driving force behind technological advancements in various fields, positively impacting everyday human life.

Q17. Describe the major outcomes of the 26th session of the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC). What are the commitments made by India in this conference? (250 words) [15]

Approach to question:

The 26th session of the Conference of the Parties (COP26) to the United Nations Framework Convention on Climate Change (UNFCCC) resulted in several significant outcomes:

1. **Glasgow Climate Pact:** The Glasgow Climate Pact was adopted, with over 190 countries agreeing to accelerate action towards limiting global warming to 1.5 degrees Celsius. It emphasizes enhanced climate ambition, increased financial support, and measures to address adaptation, loss, and damage.
2. **Nationally Determined Contributions (NDCs):** Many countries, including major emitters, submitted updated NDCs outlining their emissions reduction targets and strategies to combat climate change.

India's commitments in COP26:

1. **Net-Zero Emissions:** India announced its intention to achieve net-zero emissions by 2070, highlighting its commitment to a sustainable and low-carbon future.
2. **Renewable Energy:** India pledged to achieve 500 gigawatts (GW) of renewable energy capacity by 2030, demonstrating its ambition in scaling up clean energy generation.

By focusing on renewable energy, forest conservation, adaptation, and resilience, India aims to contribute to global efforts to mitigate climate change and safeguard vulnerable communities from its impacts.

Answer:

The 26th session of the Conference of the Parties (COP26) to the United Nations Framework Convention on Climate Change (UNFCCC), held in 2021, aimed to address pressing global climate challenges. This conference witnessed significant outcomes and commitments from various countries, including India.

Major Outcomes of COP26:

1. **Glasgow Climate Pact:** The conference resulted in the Glasgow Climate Pact, aiming to strengthen climate action and keep global warming below 1.5 degrees Celsius.
2. **Nationally Determined Contributions (NDCs):** Several countries, including major emitters, enhanced their NDCs, committing to more ambitious emission reduction targets.
3. **Loss and Damage:** COP26 addressed the issue of loss and damage caused by climate change, emphasizing support for vulnerable nations.
4. **Phasing Out Coal:** Many countries pledged to phase out unabated coal-fired power plants to reduce carbon emissions.
5. **Climate Finance:** COP26 emphasized mobilizing \$100 billion annually by 2023 to support climate adaptation and mitigation in developing countries.

India's Commitments at COP26:

1. **Net-Zero Emissions:** India announced its commitment to achieve net-zero carbon emissions by 2070, although it expressed reservations on the lack of clarity in terms of financial and technological support from developed nations.
2. **Renewable Energy Expansion:** India pledged to increase its renewable energy capacity and scale up its efforts to reduce greenhouse gas emissions.
3. **Forest Conservation:** India reiterated its commitment to afforestation and forest conservation as part of its climate action plan.

COP26 marked a crucial milestone in global efforts to combat climate change, with countries making significant

commitments and charting a path towards a sustainable and climate-resilient future. India's commitments demonstrate its determination to address climate challenges while seeking support for its developmental needs from the international community.

Q18. Describe the various causes and the effects of landslides. Mention the important components of the National Landslide Risk Management Strategy. (250 words) [15]

Approach to question:**Causes and effects of landslides:****Causes:**

1. **Geology and Slope Stability:** Geological factors such as rock type, soil composition, and slope angle can contribute to landslides.
2. **Rainfall and Water:** Excessive rainfall or rapid snowmelt can saturate soil, reducing its strength and triggering landslides.

Effects:

1. **Loss of Life and Property:** Landslides can cause casualties and damage infrastructure, buildings, and homes.
2. **Displacement:** Communities can be displaced, leading to social and economic disruptions.

Important components of the National Landslide Risk Management Strategy:

1. **Risk Assessment:** Conducting comprehensive assessments to identify areas prone to landslides and assess their potential impact on communities and infrastructure.
2. **Early Warning Systems:** Implementing efficient early warning systems to alert communities about impending landslide risks, allowing for timely evacuation and preparedness.

The National Landslide Risk Management Strategy focuses on proactive measures, including risk assessment, early warning systems, land-use planning, education, and capacity building, to mitigate the impacts of landslides.

Answer:

Landslides, a geological hazard, are triggered by a combination of natural and anthropogenic factors. Their devastating impact on human settlements and infrastructure calls for effective landslide risk management strategies. The National Landslide Risk Management Strategy in India aims to address these challenges and minimize the adverse effects of landslides.

Causes and Effects of Landslides:

1. **Natural Causes:** Heavy rainfall, earthquakes, volcanic activity, and geological factors like slope angle and soil composition can trigger landslides.

2. **Human Activities:** Deforestation, construction on unstable slopes, mining, and improper land use exacerbate landslide susceptibility.
3. **Effects:** Landslides can cause loss of life, damage to property, disruptions to transportation, and environmental degradation, impacting communities and economies.

National Landslide Risk Management Strategy Components:

1. **Risk Assessment:** Identification of landslide-prone areas and vulnerability assessment to prioritize mitigation measures.
2. **Early Warning Systems:** Implementation of real-time monitoring and warning systems to alert at-risk communities.
3. **Capacity Building:** Training local authorities and communities in landslide risk reduction and response preparedness.
4. **Land Use Planning:** Regulation of construction activities in high-risk zones and promoting sustainable land use practices.
5. **Ecosystem Restoration:** Afforestation and slope stabilization to prevent erosion and reduce landslide susceptibility.

The National Landslide Risk Management Strategy in India addresses the causes and effects of landslides through comprehensive risk assessment, early warning systems, capacity building, and sustainable land use planning. By implementing these components effectively, India can reduce the impact of landslides, protect lives and infrastructure, and ensure the sustainable development of vulnerable regions.

Q19. Analyze the multidimensional challenges posed by external state and non-state actors, to the internal security of India. Also, discuss measures required to be taken to combat these threats. (250 words) [15]

Approach to question:

Multidimensional challenges to India's internal security posed by external state and non-state actors:

1. **Terrorism:** India faces threats from terrorist organizations and state-sponsored terrorism, which aim to destabilize the country, target civilians, and undermine security.
2. **Insurgency and Separatism:** Internal insurgent groups and separatist movements in certain regions pose challenges to India's internal security, leading to violence, unrest, and demands for secession.

Measures to combat these threats:

1. **Strengthening Intelligence and Surveillance:** Enhancing intelligence-gathering capabilities and improving surveillance systems to identify and neutralize threats in a timely manner.

2. **Counter-terrorism Operations:** Conducting effective counter-terrorism operations to dismantle terrorist networks, apprehend individuals involved in terrorism, and prevent future attacks.

By adopting a comprehensive approach that combines intelligence gathering, law enforcement, border security, international cooperation, legal reforms, capacity building, socio-economic development, and technology advancements, India can effectively combat the multidimensional challenges posed by external state and non-state actors to its internal security.

Answer:

India faces a complex array of multidimensional challenges to its internal security from both external state and non-state actors. These challenges encompass a wide range of issues, including cross-border terrorism, cyber warfare, insurgency, and transnational crime.

Challenges Posed by External Actors:

1. **Cross-Border Terrorism:** State-sponsored terrorism from neighbouring countries poses a significant threat, leading to violence and instability in affected regions.
2. **Border Tensions:** Territorial disputes and border conflicts with neighbouring nations can escalate into security challenges.
3. **Cyber Attacks:** Non-state actors and hostile foreign entities engage in cyber warfare, targeting critical infrastructure and sensitive data.

Measures to Combat Threats:

1. **Strengthen Intelligence:** Enhanced intelligence gathering and sharing to preempt and counter security threats effectively.
2. **Modernize Security Forces:** Equipping security forces with advanced technology and training to respond to diverse security challenges.
3. **Bilateral Engagement:** Diplomatic efforts to address border issues and engage neighbouring countries in counterterrorism cooperation.
4. **Cybersecurity Measures:** Robust cybersecurity infrastructure and capacity-building to defend against cyber threats.
5. **Community Engagement:** Building trust and cooperation with local communities to prevent radicalization and insurgency.

India must address the multidimensional challenges posed by external state and non-state actors through a comprehensive approach. Strengthening intelligence, modernizing security forces, engaging in bilateral dialogue, and enhancing cyber security are vital measures to ensure internal security and safeguard national interests.

Q20. Analyze the complexity and intensity of terrorism, its causes, linkages, and obnoxious nexus. Also, suggest measures required to be taken to eradicate the menace of terrorism.

(250 words) [15]

Approach to question:

Complexity and Intensity of Terrorism:

1. **Global Reach:** Terrorism has become a global phenomenon, with various extremist groups operating across borders and leveraging technology for recruitment, communication, and propaganda.
2. **Diverse Motivations:** Terrorism is driven by diverse motivations such as religious extremism, separatism, political ideologies, and socio-economic grievances, making it a complex and multifaceted challenge.

Measures to Eradicate Terrorism:

1. **International Cooperation:** Strengthening international cooperation through intelligence sharing, joint operations, and extradition treaties to disrupt transnational terrorist networks and eliminate safe havens.
2. **Countering Radicalization:** Developing comprehensive strategies to counter radicalization and address the root causes that drive individuals towards extremism. This includes promoting education, social integration, and religious tolerance.

By adopting a comprehensive and integrated approach that combines international cooperation, countering radicalization, law enforcement, border security, legal reforms, development initiatives, community engagement, and addressing online radicalization, countries can work towards eradicating the menace of terrorism and promoting global peace and security.

Answer:

Terrorism is a complex and intense global menace that poses significant challenges to international security.

It has deep-rooted causes, complex linkages, and often forms obnoxious nexuses with various criminal activities and state-sponsored actors.

Analysis of Terrorism:

1. **Complexity:** Terrorism arises from various factors like political, religious, ethnic, and socioeconomic grievances, fueled by ideological extremism.
2. **Intensity:** Terrorist groups employ sophisticated tactics, including suicide bombings, cyber warfare, and asymmetric warfare, amplifying their impact.
3. **Linkages:** Terrorist groups often have transnational linkages, enabling them to operate across borders and collaborate with other criminal networks.
4. **Obnoxious Nexus:** Terrorism intersects with organized crime, human trafficking, drug trade, and arms smuggling, financing and sustaining its operations.

Measures to Eradicate Terrorism:

1. **Intelligence Sharing:** Strengthening international cooperation and intelligence sharing to preempt and counter terrorist activities.
2. **Countering Radicalization:** Focusing on deradicalization programs and promoting interfaith dialogues to tackle the ideological underpinnings of terrorism.
3. **Border Security:** Robust border management to curb the movement of terrorists and disrupt their logistical support.
4. **Financial Tracking:** Tracing and freezing terrorist funding sources to cripple their financial networks.
5. **Inclusive Development:** Addressing socioeconomic disparities and promoting inclusive development to undermine the appeal of extremist ideologies.

Eradicating the menace of terrorism requires a comprehensive and collaborative approach, addressing root causes, enhancing intelligence cooperation, and disrupting terrorist linkages. By adopting such measures, the international community can effectively combat terrorism and safeguard global peace and security.