RPSC AEn-2024 Main Test Series

STREAMS: CE, ME, EE

Test 11

Test Mode : • Offline • Online

Subject : Social Aspects of Engineering: Part -2

(Development processes, Rural Economy and Indian Ethos, Globalization, Economic Growth, Industry 4.0 and Sustainable Infrastructure)

DETAILED EXPLANATIONS

1. Solution:

It is the total market value of all final goods and services produced by a country's residents globally in a year, excluding foreign residents' domestic output.

2. Solution:

It measures the total Greenhouse gas emissions, expressed as CO_2 equivalent, caused directly or indirectly by an individual, organization, event, or product life cycle.

3. Solution:

It is measured as the number of deaths of children under one year of age per 1,000 live births in a year.

4. Solution:

Malnutrition is an abnormal physiological condition caused by inadequate, unbalanced, or excessive consumption of macronutrients and micronutrients, manifesting as undernutrition like wasting or stunting, or obesity.

5. Solution:

Human values are principles guiding behavior, emphasizing qualities like empathy, dignity, honesty, harmony, probity, compassion, etc. which foster ethical living and harmonious relationships.

6. **Solution:**

   It is a sustainable land-use system integrating trees and shrubs with crops or livestock on the same land unit to increase biodiversity and agricultural productivity.

7. **Solution:**

   Key sources include traditional biomass (firewood, cow dung), biogas, solar power (photovoltaic), wind energy, and increasingly, grid-electricity under schemes like Saubhagya.

8. **Solution:**

   Drought is a meteorological hazard of precipitation deficit; if unmanaged, it causes crop failure and food insecurity, escalating into famine, a socio-economic crisis.

9. **Solution:**

   Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM-KUSUM) was launched in 2019, to promote solar pumps and grid-connected solar power plants for farmers.

10. **Solution:**

    It is a technique of collecting, filtering, and storing rainwater from rooftops or surface catchments for direct use or recharging groundwater aquifers to mitigate scarcity.

11. **Solution:**

    It implies economic independence by prioritizing local village industries, indigenous goods, and self-governance (Gram Swaraj) over foreign dependency.

12. **Solution:**

    Probity is strict adherence to the highest principles of integrity, uprightness, and honesty in public service, ensuring transparency and freedom from corruption.

13. **Solution:**

    Honesty is truthful expression like speech; Integrity is the steadfast adherence to a strict moral code and ethical consistency in actions like character.

14. **Solution:**

    Adopted by the UN in 2015, these 17 global goals aim to achieve a sustainable, equitable future by 2030.

15. **Solution:**

    Sarvodaya signifies the 'Welfare of All' through holistic progress; Antyodaya specifically targets the 'Rise of the Last Person' in the socioeconomic queue.

16. Solution:

Public-Private Partnership (PPP) is a long-term cooperative arrangement between government and private sectors to finance, build, and operate public projects, sharing risks and rewards.

17. Solution:

Build-Operate-Transfer (BOT) is a concession model where a private firm finances and builds a project, operates it to recover costs, and then transfers it to the government.

18. Solution:

The examples of AI platforms include OpenAI's ChatGPT, Google's Gemini, Microsoft Azure AI, Perplexity, etc.

19. Solution:

It is a high-speed, high-capacity railway corridor built exclusively for freight transport to reduce logistics costs and decongest the Indian Railway network.

20. Solution:

Launched in 2000, this centrally sponsored scheme provides all-weather road connectivity to eligible unconnected rural habitations to boost socio-economic development.

21. Solution:

Carbon Credit System is a market-based mechanism where one credit represents the right to emit one ton of CO_2. It allows entities with lower emissions to sell excess credits to those exceeding their limits. Its benefits include monetizing green initiatives, incentivizing low-carbon technologies, and helping nations meet Paris Agreement targets cost-effectively.

22. Solution:
- Wind Power is a clean, renewable energy source.
- **Advantages:** Zero Greenhouse gas emissions, low operational costs post-installation, and reduced fossil fuel reliance.
- **Limitations:** It is intermittent (weather-dependent), requires large land areas, causes noise pollution, poses threats to avian life, and involves high initial capital costs for turbines and grid integration.

23. Solution:
- Poverty stems from a complex mix of economic, social, and historical factors.
- Economic causes include low agricultural productivity, high unemployment, and inflation.
- Social causes involve illiteracy, caste-based discrimination, and rapid population growth.
- Historical factors include colonial de-industrialization, while policy gaps like unequal asset distribution further perpetuate deprivation.

24. Solution:

Unemployment manifests in various forms:
1. **Disguised Unemployment:** More workers than needed (common in agriculture).
2. **Structural Unemployment:** Mismatch between worker skills and available jobs.
3. **Seasonal Unemployment:** Unemployment during specific times (e.g., post-harvest).
4. **Cyclical Unemployment:** Caused by economic downturns.
5. **Frictional Unemployment:** Temporary unemployment while shifting jobs.

25. Solution:
- Desertification is the degradation of land in arid regions, driven by human and natural factors.
- Anthropogenic causes include overgrazing, which strips vegetation cover, deforestation for fuel, and unsustainable irrigation leading to soil salinity.
- Natural causes involve wind erosion and shifting sand dunes.
- In Rajasthan, climatic variability and rapid urbanization exacerbate the issue. These factors collectively reduce biological productivity, threatening food security and expanding the boundaries of the Thar Desert.

26. Solution:
- Disaster Management in India is structured by the Disaster Management Act, 2005, establishing a three-tier framework: National Disaster Management Authority (NDMA), State Disaster Management Authority (SDMA), and District Disaster Management Authority (DDMA).
- The paradigm has shifted from reactive post-disaster relief to proactive prevention, mitigation, and preparedness.
- Key agencies like the NDRF ensure rapid response, while the IMD provides early warnings.
- The current focus includes building 'Disaster Resilient Infrastructure' to minimize economic losses and mainstreaming disaster risk reduction into sustainable development planning.

27. Solution:
- Drip Irrigation is a micro-irrigation method delivering water directly to root zones via emitters. In arid Rajasthan, it is vital for maximizing water use efficiency (up to 90%), reducing evaporation, and preventing salinization associated with flood irrigation. It significantly boosts yields in crops like citrus and olives under the Pradhan Mantri Krishi Sinchayee Yojana.
- By enabling fertigation and minimizing weed growth, it supports the state's goal of 'Per Drop More Crop'.

28. Solution:
- Antyodaya, meaning "Rise of the Last Person", guides development by prioritizing the poorest citizens. It helps rural areas by targeting resources such as food via Antyodaya Anna Yojana (AAY), housing via Pradhan Mantri Awas Yojana - Gramin (PMAY-G), and skills via National Rural Livelihood Mission (NRLM), directly to the most marginalized households first.
- This bottom-up approach ensures that economic growth is inclusive, bridging the rural-urban divide, reducing inequality, and ensuring that the benefits of governance reach the last person in the socioeconomic queue.

29. Solution:
- Bharatmala Pariyojana is an umbrella highway project by Ministry of Road Transport & Highways (MoRTH), aimed at optimizing freight and passenger efficiency. Its primary objectives are to connect underdeveloped districts, develop Economic Corridors, Inter-corridors, and Feeder Routes to reduce logistics costs.
- It focuses on improving connectivity to border areas and ports to boost exports. By bridging critical infrastructure gaps, the project aims to accelerate economic growth and enhance vehicular speed across the national road network.

30. Solution:
- Harmony in Indian society is the bedrock of stability in a nation defined by immense linguistic, religious, and cultural diversity.
- Social harmony upholds the constitutional value of Fraternity and prevents internal conflicts that derail progress. It fosters trust and cooperation, which are essential for economic development and foreign investment.
- By ensuring peaceful coexistence, harmony strengthens national integration, making society resilient against divisive forces and ensuring the collective well-being of all citizens.

31. **Solution:**
- TRIPS Agreement is the Trade-Related Aspects of Intellectual Property Rights agreement under the WTO. It establishes minimum global standards for protecting IP rights, including Patents, Copyrights, Trademarks, and Geographical Indications (GI).
- It obliges member nations to enforce these rights, balancing the interests of innovators with public welfare. The agreement has profound implications for sectors like pharmaceuticals and agriculture, influencing access to medicines and the protection of traditional knowledge.

32. **Solution:**
- Blockchain Technology is a decentralized, distributed ledger technology ensuring secure data recording. Key features include immutability, meaning records cannot be altered once added, and transparency, allowing all participants to view transactions.
- It eliminates the need for central intermediaries, reducing costs and enhancing trust. Secured by cryptographic hashing, it is the backbone of cryptocurrencies like Bitcoin and finds applications in smart contracts, supply chain tracking, and secure land record management in governance.

33. **Solution:**
Adequate sanitation in India requires a multi-faceted approach moving beyond mere infrastructure creation to sustainable waste management and behavioral change. Improvement relies on ensuring functional toilets in every household, maintaining community sanitary complexes, and establishing robust solid and liquid waste management systems in rural and urban areas. Crucially, a shift in public mindset through Information, Education, and Communication (IEC) is vital to sustain Open Defecation Free (ODF) status.

Major Initiatives of the Union Government:
1. **Swachh Bharat Mission (SBM) - Gramin and Urban (2014-Present):** Launched on October 2, 2014, this flagship program aimed to make India open-defecation free (ODF) by 2019.
   - Phase I (2014-2019): Achieved 100% rural sanitation coverage by constructing over 100 million household toilets, declaring over 6 lakh villages ODF.
   - Phase II (2020-2025): Focuses on sustaining ODF status (ODF Plus) and improving Solid and Liquid Waste Management (SLWM).

2.   **NAMASTE (National Action for Mechanised Sanitation Ecosystem)**: Launched in July 2023 by the Ministry of Social Justice and Empowerment and the Ministry of Housing and Urban Affairs, it aims to achieve zero fatalities in sanitation work by promoting mechanized cleaning and ensuring safety and dignity for sewage/septic tank workers.

3.   **GOBARdhan Scheme:** The Galvanizing Organic Bio-Agro Resources Dhan (GOBARdhan) initiative supports converting biodegradable waste and cattle dung into biogas and organic manure, promoting "Waste to Wealth" in rural areas.

4.   **Atal Mission for Rejuvenation and Urban Transformation (AMRUT):** While primarily for urban renewal, it significantly improves sewerage networks and septage management in cities.

34.   **Solution:**

Sustainable Water Management refers to the practice of planning, developing, and distributing water resources to meet current societal and economic needs without compromising the ability of future generations to meet their own. It involves balancing demand and supply, ensuring water quality, and preserving aquatic ecosystems through efficiency and conservation.

Role in Development of Rural and Desert Areas of Rajasthan: In the arid landscape of Rajasthan, where surface water is scarce and groundwater is over-exploited, sustainable management is the lifeline of development of rural and desert areas.

1.   **Drought Mitigation:** Reviving traditional rainwater harvesting structures like Tankas (underground cisterns), Khadins (agricultural embankments), and Johads helps rural communities survive prolonged dry spells by capturing every drop of rain.

2.   **Agricultural Stability:** Schemes like Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) promote micro-irrigation (drip and sprinkler systems). This efficiency allows desert farmers to grow high-value crops, like cumin and isabgol, with minimal water, boosting rural incomes.

3.   **Drinking Water Security:** The Jal Jeevan Mission, supported by sustainable source strengthening, ensures tap water reaches remote desert hamlets (Dhanis), reducing the drudgery of women who traditionally walk miles for water.

4.   **Checking Desertification:** Sustainable forestry and Agro-forestry initiatives (using treated wastewater) help stabilize sand dunes and prevent the eastward expansion of the Thar Desert.

5.   **Community Empowerment:** Programs like Mukhya Mantri Jal Swavlamban Abhiyan (MJSA) involve local participation in water budgeting, making villages self-reliant and reducing distress migration.

35. Solution:

Sympathy is a feeling of pity or sorrow for someone else's misfortune. It creates a disconnect, implying "I feel bad for you" without necessarily understanding the depth of their pain.

- Empathy is the ability to understand and share the feelings of another. It is "feeling with" the person, stepping into their shoes to cognitively and emotionally experience their situation.

- Compassion goes a step further. It is empathy combined with a strong desire to alleviate the suffering. It translates the feeling into action: "I feel your pain, and I will help you."

Role of Human Values in Engineering: Engineering is not just about technical competence; it is about serving humanity. Promoting values is crucial because:

1. **Ethical Decision Making:** Values like integrity and honesty prevent engineers from cutting corners or using sub-standard materials, avoiding disasters (e.g., bridge collapses) caused by corruption.

2. **Sustainability:** A value-driven engineer considers the environmental impact of their designs, ensuring that development today does not destroy the planet for future generations.

3. **Safety and Public Welfare:** Engineering codes of ethics are rooted in the value of Care for human life. An engineer with high human values prioritizes public safety over profit margins.

4. **Social Responsibility:** Values like compassion drive engineers to design inclusive solutions for the marginalized (e.g., affordable housing or assistive devices for the disabled), bridging the social gap.

36. Solution:

The World Trade Organization (WTO), established in 1995, acts as the primary institutional framework facilitating globalization by regulating international trade. It replaced the General Agreement on Tariffs and Trade (GATT) and has played a pivotal role in integrating the global economy.

The Role of WTO in Globalization:

1. **lowering Trade Barriers:** The WTO has successfully negotiated significant reductions in tariffs and non-tariff barriers, enabling the free flow of goods and services across borders. This has allowed companies to fragment production processes globally.

2. **Rules-Based System:** It provides a predictable and transparent set of rules (e.g., Most Favoured Nation, National Treatment) that prevents arbitrary protectionism. This stability encourages foreign direct investment (FDI) essential for globalization.

3. **Dispute Settlement Mechanism:** The WTO's Dispute Settlement Body (DSB), resolves trade conflicts between nations legally rather than through trade wars, maintaining global economic order.

4. **Intellectual Property Rights:** Through the TRIPS Agreement, the WTO standardized IP protection globally. While controversial, this facilitated the transfer of technology and the globalization of the pharmaceutical and software industries.

5. **Market Access for Developing Nations:** By providing "Special and Differential Treatment", the WTO aims to integrate developing countries into the global trading system, although issues like agricultural subsidies in developed nations remain a point of contention (e.g., Doha Development Agenda).

37. **Solution:**

The Fourth Industrial Revolution (Industry 4.0) refers to the current trend of automation and data exchange in manufacturing technologies.

- It is characterized by the fusion of the physical, digital, and biological worlds through Cyber-Physical Systems (CPS), the Internet of Things (IoT), Cloud Computing, Artificial Intelligence (AI), and Cognitive Computing. It represents a shift from automation to intelligent production.

Role in Economic Transformation of the Local Economy: Industry 4.0 is not limited to large factories; it deeply impacts local economies:

1. **MSME Competitiveness**: By adopting cost-effective digital tools (e.g., cloud-based inventory management), local Micro, Small, and Medium Enterprises (MSMEs) can improve efficiency, reduce waste, and integrate into global supply chains, boosting local exports.

2. **Precision Agriculture:** For rural local economies, Industry 4.0 brings "Smart Farming." IoT sensors and drones help farmers monitor soil health and crop stress, leading to higher yields and reduced input costs (fertilizers/water).

3. **Decentralized Manufacturing:** Technologies like 3D Printing allow production to happen locally near the consumer. This reduces logistics costs and enables local artisans to create customized products for global markets.

4. **Skill Shift and Employment:** It transforms the labour market by demanding new skills. While it threatens low-skill routine jobs, it creates high-value "Gig Economy" opportunities in local service sectors.

5. **Service Efficiency:** Local governance and utilities become more efficient (Smart Cities), improving the "Ease of Doing Business" and attracting investment to smaller towns.

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