

Solutions

DATE : 14th July- 20th July

1) Correct Answer: (b) Developing encryption techniques resilient to quantum computer attacks while compatible with classical systems

Concept Overview:

- **Post-Quantum Cryptography (PQC)** refers to the development of cryptographic algorithms that can **withstand attacks from quantum computers**.
- These algorithms are designed to run on **classical computing infrastructure**, making them **practical and implementable today**.

Key Features:

- PQC safeguards against future threats like **"Harvest Now, Decrypt Later"** attacks.
- It differs from **quantum cryptography**, which is based on the laws of quantum mechanics (like **Quantum Key Distribution**).
- Focuses on maintaining **data confidentiality, integrity, and resilience** in the quantum era.

Importance:

- With advances in quantum computing, classical algorithms such as **RSA, ECC, and DSA** are becoming obsolete.
- PQC ensures **continuity and interoperability** between today's systems and future-proof security models.

Why other options are incorrect:

- (a) **Blockchain-based security** is not PQC.
- (c) **AI-based data protection** is unrelated.
- (d) Refers to **quantum cryptography**, not PQC.



2) Correct Answer: (b) Monazite

Context:

- India is pursuing a **thorium-based nuclear energy program** as part of its **three-stage nuclear development plan**.
- Monazite is the **primary source of thorium**, found abundantly in **Kerala and Odisha beach sands**.

Key Points:

- Monazite contains around **8-10% thorium oxide**.
- It is governed by the **Atomic Energy Act** and the **Offshore Areas Mineral (Development and Regulation) Act, 2002**.
- Other minerals like **ilmenite, rutile, and zircon** are also found in coastal sands but do **not significantly contribute to thorium reserves**.

Strategic Importance:

- India has **limited uranium** but **abundant thorium**, making monazite a vital component for **long-term nuclear energy security**.
- Supports **indigenous nuclear fuel cycle** and **energy independence**.

3) Correct Answer: (c) Capture attendance of MGNREGS workers using geo-tagged, time-stamped photographs

Background:

- Introduced by the **Ministry of Rural Development**, the **NMMS App** is a digital tool to enhance **transparency in MGNREGA implementation**.

Features:

- Captures **real-time attendance** through **geo-tagged and time-stamped photographs** of workers at job sites.
- Available in **multiple regional languages**.
- Aims to reduce **ghost workers, fake entries, and delays in wage disbursement**.

Governance Relevance:

- Part of India's **Digital Governance** efforts and aligns with the goal of **direct benefit transfers** and **real-time monitoring**.
- Helps ensure **public accountability** and **efficiency in rural employment schemes**.

Why other options are incorrect:

- (a) Not related to agricultural price monitoring.
- (b) Does not process wage disbursal via digital wallets.

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- (d) Not a direct financial assistance tool.

4) **Correct Answer: (a) I and III only**

Concept:

- INVICTUS is a European hypersonic aerospace project initiated by **ESA** and UK-based **Frazer-Nash**.
- It is a **fully reusable experimental platform** designed for **Mach 5 hypersonic flight**.

Technological Features:

- Powered by **hydrogen-fuelled, precooled air-breathing engines**.
- Designed for **horizontal take-off, reusability, and efficient space access**.
- Part of **ESA's General Support Technology Programme (GSTP) and Technology Development Element (TDE)**.

Strategic Importance:

- Enhances **European capabilities in hypersonics**.
- Dual-use potential: **defense and commercial applications**.
- Advances **reusable space launch systems**.

Correct Statements:

- **Statement I:** True – Fully reusable and Mach 5 capable.
- **Statement III:** True – Supported under ESA's GSTP and TDE.
- **Statement II:** False – Designed for **horizontal**, not vertical take-off.

5) **Correct Answer: (b) II only**

Background:

- **Netra MkII** is an advanced **Airborne Early Warning and Control System (AEW&CS)** developed by India.
- Mounted on **Airbus A321** aircraft, it functions as a **flying command center** for **real-time airspace surveillance and control**.

Key Features:

- Equipped with **radar, communication, and mission control systems**.
- Provides early detection of aerial threats, **coordination for air missions**, and battlefield awareness.

Strategic Role:

- Enhances **airspace security, surveillance, and command-and-control** capabilities.
- Boosts India's **self-reliance** in defense technologies under '**Aatmanirbhar Bharat**'.

Clarification:

- **Statement I:** Incorrect – AEW&CS systems worldwide are mounted on various aircraft platforms (e.g., Boeing, Ilyushin).
- **Statement II:** Correct – Netra MkII plays both surveillance and command roles.

6) **Correct Answer: (a) I, II and III only**

Topic in Focus:

Digital arrest scams are **emerging cybercrimes** involving **extortion through impersonation**, where victims are falsely told they're under investigation and coerced into transferring money. This issue demands a **multi-tiered response** from both central and state authorities.

Key Features and Framework:

- **Constitutional Backing:**
Police and Public Order are **State List subjects** under the Seventh Schedule of the Indian Constitution. However, cybercrime requires **central coordination** due to its cross-border nature.
- **Institutional Support:**
 - **Indian Cyber Crime Coordination Centre (I4C):** A **central nodal agency** for cybercrime response, capacity building, and intelligence sharing.
 - **Samanvaya Platform:** A **data repository** for interstate crime linkages, facilitating **real-time crime tracking** and information exchange between states.
 - **Suspect Registry:** Jointly developed by central agencies and **banks**, not solely by the **RBI**, to track suspected fraudsters.

✓ **Conclusion:** The first three statements are correct and reflect India's **federal yet cooperative cyber law enforcement strategy**, whereas the fourth is factually inaccurate.

7) **Correct Answer: (c) I and III only**

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Topic in Focus:

The International Criminal Court (ICC) is a permanent international tribunal created under the **Rome Statute (1998, enforced in 2002)**, with jurisdiction over **grave international crimes**.

Core Jurisdiction Areas:

- **Genocide**
- **Crimes against Humanity**
- **War Crimes**
- **Crime of Aggression**

Key Clarifications:

- **Headquarters:** The ICC is based in **The Hague, Netherlands**, not **Geneva**.
- **Membership:** Over **125 countries** are parties, but **India is not** a signatory to the Rome Statute.
- **Legal Basis:** The Rome Statute provides the **legal foundation** for the ICC's functioning.

Conclusion: Only **statements I and III** are correct, while the rest are based on common misconceptions about ICC's **location** and **membership**.

8) Correct Answer: (c) I only

Topic in Focus: The Act governs the **exploration and mining of atomic minerals** (e.g., **uranium, thorium**) in **India's offshore areas**, balancing **national security** with **resource development**.

Regulatory Features:

- **Applicability:** Applies only when **atomic mineral concentration** exceeds a **minimum threshold**, as **notified by the central government**.
- **Licensing Norms:**
 - **Government-nominated agencies** are prioritized for mining activities.
 - **Foreign entities** may participate **only with government approval**, not through **exclusive rights**.

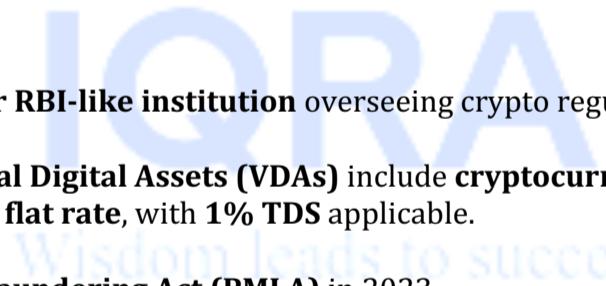
 **Conclusion:** Only **statement I** is correct. The Act is a **strategic legal instrument** ensuring **controlled and secure access** to offshore atomic resources.

9) Correct Answer: (c) II and III only

Topic in Focus: India's approach to cryptocurrencies is currently **regulatory-light but tax-heavy**, with **no central regulator** for crypto assets.

Regulatory Snapshot:

- **No Central Authority:** There is **no SEBI- or RBI-like institution** overseeing crypto regulation.
- **Legal Recognition via Taxation:**
 - Under the **Finance Act, 2022**, **Virtual Digital Assets (VDAs)** include **cryptocurrencies** and **NFTs**.
 - **Income from VDAs** is taxed at **30% flat rate**, with **1% TDS** applicable.
- **Money Laundering Norms:**
Brought under the **Prevention of Money Laundering Act (PMLA)** in 2023.

 **Conclusion:** Statements II and III are correct. While India hasn't formally regulated cryptocurrencies, it **recognizes and controls** them through a **stringent tax regime** and **AML compliance**.

10) Correct Answer: (b) I, II and III

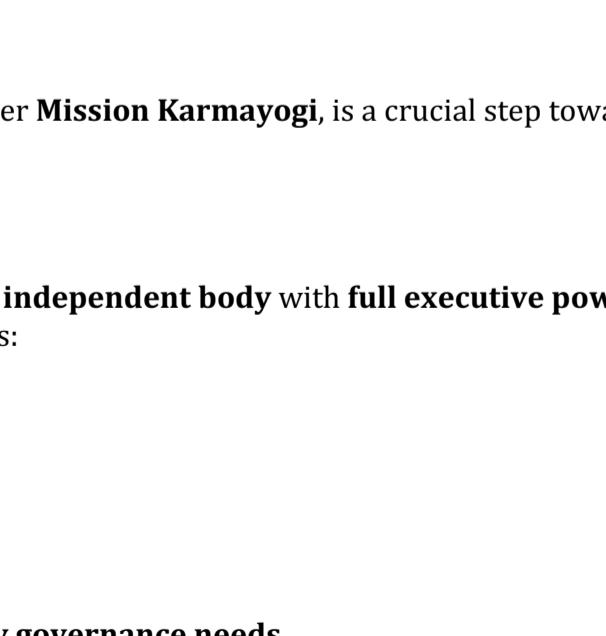
Topic in Focus: The **NSCSTI 2.0 Framework**, under **Mission Karmayogi**, is a crucial step towards building a **future-ready bureaucracy** through modern training standards.

Institutional Anchoring:

- **Capacity Building Commission (CBC):** An **independent body with full executive powers**, tasked with reforming civil service training.
- **Training Standards:** NSCSTI 2.0 introduces:
 - **Outcome-based learning**
 - **Digital learning platforms**
 - **Periodic evaluation**
 - **Inclusive training models**

Relevance:

- Aligns training institutes with **21st-century governance needs**.
- Strengthens India's commitment to **efficient, ethical, and citizen-centric administration**.

 **Conclusion:** All three statements are correct. The framework is a **transformative public administration reform** with long-term governance implications.

11) Correct Answer: (b) Only two

Topic in Focus:

Understanding the **correct administrative responsibility** for major government schemes is essential for evaluating **governance accountability** and **inter-ministerial coordination**.

Scheme-wise Analysis:

- **PM VIKAS (Pradhan Mantri Virasat Ka Samvardhan):**
 - Implemented by the **Ministry of Minority Affairs**.
 - Aims to empower **six notified minority communities** through **skill development, entrepreneurship, and education**.
 - Converges previous schemes like **USTTAD, Nai Manzil, Nai Roshni**, etc.
- **Swachh Survekshan:**
 - Annual **urban cleanliness survey** under **Swachh Bharat Mission (Urban)**.
 - Conducted by the **Ministry of Housing and Urban Affairs (MoHUA)**.
 - Focuses on **citizen participation, sanitation ranking, and waste management performance**.
- **Economic Census:**
 - Conducted by the **Ministry of Statistics and Programme Implementation (MoSPI)**.
 - Not under **Ministry of Finance** as often misunderstood.
 - Captures comprehensive data on **entrepreneurial units and economic establishments**.

✓Conclusion: Only two pairs (Swachh Survekshan and PM VIKAS) are correctly matched, hence the answer is **(b)**.

12) Correct Answer: (a) Genetic resources

Topic in Focus: Wetlands provide **multifunctional ecosystem services** categorized as **provisioning, regulating, and supporting services**, and are integral to **biodiversity conservation and climate regulation**.

Provisioning Services Include:

- **Genetic resources, food, freshwater, fiber, medicinal plants.**

Regulating Services Include:

- **Moderation of extreme events** (like floods and droughts).
- **Erosion prevention, biological pest control, climate regulation, water purification.**

Supporting Services Include:

- **Nutrient cycling, soil formation, habitat provision.**

✓Conclusion: Among the options, only **genetic resources** is a **provisioning service**, making **option (a)** correct.

13) Correct Answer: (b) Ministry of Minority Affairs

Topic in Focus: PM VIKAS is a **central sector scheme** focused on the **socio-economic empowerment of minority communities**, aligned with **Skill India Mission**.

Key Features:

- Merges five earlier schemes into one unified umbrella for better **implementation efficiency**.
- Promotes **entrepreneurship, traditional skills, and minority women leadership**.
- Not implemented by the Ministry of Skill Development or Social Justice, though **convergence is ensured**.

✓Conclusion: The nodal implementing agency is the **Ministry of Minority Affairs**, hence option **(b)** is correct.

14) Correct Answer: (b) II only

Topic in Focus: Examines **unique urban air quality dynamics**, especially in the **Indo-Gangetic Plain**, where **urbanization** interacts with **wind patterns and aerosol concentrations**.

Key Concepts:

- **Urban Wind Stilling Effect:**
 - Caused by **weakened wind speeds** due to **urban structures** obstructing airflow.
 - Leads to **accumulation of pollutants**, not enhancement of wind flow.
- **Urban Aerosol Clean Islands:**
 - Phenomenon where urban areas may have **lower aerosol levels** compared to nearby **rural zones**.
 - Linked to **urban sinks, boundary-layer dynamics, and pollution control policies**.

✓Conclusion: Only **statement II** is correct; statement I is factually wrong. Hence, the answer is **(b)**.

15) Correct Answer: (c) I and II only

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Topic in Focus: SIMBEX (Singapore-India Maritime Bilateral Exercise) is among the **oldest naval exercises** of India, initiated in **1994** as **Exercise Lion King**, later renamed.

Key Points:

- It enhances **bilateral maritime security cooperation** between the **Indian Navy** and the **Republic of Singapore Navy**.
- Held **annually**, involving **surface, sub-surface, and air operations**.
- Aligns with **India's SAGAR vision** and **Act East Policy**.

Strategic Relevance: Boosts **interoperability, regional stability, and defense diplomacy** in the Indo-Pacific.

✓ **Conclusion:** Both statements are correct regarding SIMBEX's origin and continuity. Hence, the correct answer is **(c)**.

16) Correct Answer: (d) I and II only**Topic in Focus:**

Matter-antimatter asymmetry is a fundamental mystery in **cosmology and particle physics**. The universe is dominated by matter, although **equal amounts of matter and antimatter** should have formed during the **Big Bang**.

Scientific Background:

- Theoretical models predict **symmetry in creation** of matter and antimatter.
- The observable universe, however, contains **almost no antimatter**, indicating an unknown **asymmetry-generating process**, possibly **CP violation** (charge-parity violation).

Statement Analysis:

- **Statement I – Correct:** Modern physics predicts the **equal creation** of matter and antimatter.
- **Statement II – Correct:** The term **asymmetry** refers precisely to the **dominance of matter** in the universe.
- **Statement III – Incorrect:** The universe is **not made of antimatter**; it's overwhelmingly **matter-dominated**.

✓ **Conclusion:** Only statements **I and II are correct**, making **option (d)** the right answer.

17) Correct Answer: (b) I and II only

Topic in Focus: This question pertains to **aerosol science**, which is critical for **climate studies, urban planning, and public health**, especially in regions like the **Indo-Gangetic Plain**.

Key Concepts:

- **Aerosols** are **colloidal suspensions** where **solid or liquid particles** are dispersed in a **gas medium** (air).
- **Examples** include **fog, cloud, smoke, haze, and dust**.
- Some cities demonstrate **lower aerosol levels** than nearby rural areas due to **urban meteorological phenomena**, termed as **Urban Aerosol Clean Islands**.

Statement Analysis:

- **Statement I – Correct:** This is the **scientific definition** of aerosols.
- **Statement II – Correct:** All mentioned examples are **classic types** of aerosols.
- **Statement III – Incorrect:** Not all cities have higher aerosol levels; studies show that **43% of cities** in the Indo-Gangetic Plain act as **clean islands**.

✓ **Conclusion:** Only statements **I and II** are correct. Hence, the answer is **(b)**.

18) Correct Answer: (a) I, II and III only

Topic in Focus: Wetlands are vital for **biodiversity, climate resilience, and sustainable livelihoods**. Their conservation is driven by international treaties like the **Ramsar Convention** and newer frameworks like the **Kunming-Montreal Global Biodiversity Framework (KM-GBF)**.

Key Aspects:

- **Ramsar Convention (1971):** The leading international treaty to promote the **wise use** of wetlands.
- **KM-GBF (2022):** Reinforces conservation targets, including for wetlands and water ecosystems.
- **Africa's wetlands:** Among the **most degraded** globally, facing threats from desertification, urbanization, and lack of effective policy.

Statement Analysis:

- **Statement I – Correct:** Africa's wetlands are indeed among the **most degraded**.
- **Statement II – Correct:** Ramsar goals are **aligned** with KM-GBF's global biodiversity targets.
- **Statement III – Correct:** Wetlands provide key services like **food, water, and climate regulation**.

✓ **Conclusion:** All three statements are correct. Thus, the correct answer is **(a)**.

19) Correct Answer: (a) I only

Topic in Focus: Akash Prime is an **indigenously developed** surface-to-air missile system by **DRDO**, optimized for **high-altitude** and **low-oxygen environments**, such as **Ladakh**.

Features:

- An **upgraded variant** of the original Akash missile.
- Tested in **extreme weather conditions** and **border areas**.
- Demonstrates India's emphasis on **self-reliant defense capabilities**.

Statement Analysis:

- **Statement I – Correct:** Akash Prime is indeed a **surface-to-air missile** developed **indigenously**.
- **Statement II – Incorrect:** It was developed by **DRDO**, **not ISRO**. ISRO deals with **space exploration**, not missile systems.

 **Conclusion:** Only **statement I** is correct. Hence, the right answer is **(a)**.

20) Correct Answer: (d) II and III only

Topic in Focus: NFRA is India's **independent accounting and auditing regulator**, constituted under the **Companies Act, 2013** to ensure **transparency and compliance** in corporate financial reporting.

Key Functions:

- **Recommends and enforces** accounting and auditing standards.
- **Monitors audit quality** of listed and large unlisted companies.
- Ensures **public confidence** and **investor protection** through oversight.

Statement Analysis:

- **Statement I – Incorrect:** NFRA **monitors compliance**, but **does not formulate or review compliance independently** like SEBI or RBI.
- **Statement II – Correct:** It has powers to **recommend** standards for accounting and auditing.
- **Statement III – Correct:** Constituted by the **Government of India** under the **Companies Act, 2013**.

 **Conclusion:** Statements **II and III** are correct. Hence, the answer is **(d)**.

21) Correct Answer: (b) Expulsions of plasma and magnetic field from the Sun's corona that can disrupt Earth's satellites and power grids

Topic in Focus: CMEs are **large expulsions** of plasma and **magnetic fields** from the **Sun's corona**. They are a critical component of **space weather**, capable of triggering severe **geomagnetic storms** on Earth.

Key Aspects:

- **Scientific Importance:** CMEs are monitored to safeguard **communication systems**, **navigation satellites**, and **power grids**.
- **Travel Speed:** CMEs can reach Earth within **15-18 hours**.
- **Space Weather Monitoring:** Agencies like **ISRO**, **NASA**, and **NOAA** monitor CMEs for early warnings.

Incorrect Options Explained:

- (a): Refers to solar flares which are more localized.
- (c): CMEs are not about temperature changes.
- (d): Solar wind is continuous, not explosive like CMEs.

 **Conclusion:** Option **(b)** correctly describes the impact and nature of CMEs.

22) Correct Answer: (a) It is the largest tropical grassland in Asia, located in Kutch district, Gujarat

Topic in Focus: The **Banni Grassland** is a unique **tropical grassland ecosystem** in Gujarat's Kutch district and is **Asia's largest** of its kind.

Key Features:

- **Salt-Tolerant Species:** Adapted to saline and arid conditions.
- **Pastoralism:** Home to **Maldharis**, **Rabaris**, and other pastoral communities.
- **Conservation Relevance:** Identified as a potential site for **cheetah reintroduction** and grassland restoration.

Incorrect Options Explained:

- (b): Assam's wetlands like **Deepor Beel** are different ecosystems.
- (c): Sundarbans are **mangrove forests**, not grasslands.
- (d): **Bugyalas** are Himalayan meadows, not located in Gujarat.

 **Conclusion:** Only option **(a)** accurately describes the Banni Grassland.

23) Correct Answer: (d) Promotion of accountability for violence against UN peacekeepers

Topic in Focus: The **Group of Friends (GOF)** was launched by **India** in **2022** to strengthen **accountability mechanisms** for crimes committed against **UN peacekeepers**.

Key Aspects:

- **UN Platform:** Functions within the UN structure.
- **India's Leadership:** Reflects India's role as a **leading troop-contributing country**.
- **Mission Focus:** Advocates for **justice, strategic planning, and legal redressal mechanisms** for affected peacekeepers.

Incorrect Options Explained:

- (a): Climate negotiations fall under different multilateral groups.
- (b): Educational exchanges are not within GOF's scope.
- (c): Global trade is outside its mandate.

 **Conclusion:** Option (d) is correct and aligns with the stated mandate of the GOF.

24) Correct Answer: (a) Both Statement-I and Statement-II are correct and Statement-II explains Statement-I

Topic in Focus: India is poised to become the **largest cotton producer**, but **post-harvest losses** due to poor infrastructure and market fragmentation impede its potential.

Key Aspects:

- **Production Leadership:** India ranks second after China (as of 2023), with potential to become **No. 1**.
- **Post-Harvest Challenges:** Lack of **cold chains, transport, and market integration** via APMCs and e-NAM.
- **Policy Instruments:** Schemes like **PM Formalisation of Micro Food Enterprises (PM-FME)**, **FPO promotion**, and **Infrastructure Development Fund**.

 **Conclusion:** Both statements are **factually correct**, and **statement-II explains the cause of statement-I**, hence option (a) is valid.

25) Correct Answer: (d) Neither I nor II

Topic in Focus: Rehabilitation, in the context of **land acquisition**, is **not a fundamental right** under the Indian Constitution, although **compensation** is legally mandated.

Key Aspects:

- **Legal Interpretation:** The **Supreme Court** has clarified that there is **no constitutional obligation** for universal alternative accommodation.
- **Policy Framework:** Provisions for rehabilitation exist under specific laws like **LARR Act, 2013**, but not as a **justiciable right**.
- **Impact:** Raises debates about **social justice, equity**, and the **state's duty** toward displaced persons.

Statement Analysis:

- **Statement I – Incorrect:** No universal constitutional right to housing post-displacement.
- **Statement II – Incorrect:** Rehabilitation is **not a fundamental right**, though it may be **statutorily provided**.

 **Conclusion:** Since **neither statement is correct**, the answer is **(d)**.

26) Correct Answer: (b) 2 and 3 only

Topic in Focus: The **Pacific Ring of Fire** is a **horseshoe-shaped belt** of high **seismic and volcanic activity** encircling the Pacific Ocean. It is one of the most **geologically active regions** in the world.

Key Aspects:

- **Tectonic Plate Boundaries:** Formed by the movement and interaction of multiple **tectonic plates**, including **subduction zones**.
- **Global Significance:** Countries across **Asia, the Americas, Oceania**, and even **Antarctica** are affected—not just Asia.
- **Natural Hazards:** Responsible for **frequent earthquakes, tsunamis, and volcanic eruptions**.

Statement Analysis:

- **Statement I – Incorrect:** The Ring of Fire includes **non-Asian countries** such as the **U.S., Chile, New Zealand**, etc.
- **Statement II – Correct:** The **Mariana Trench**, the deepest oceanic trench, is formed due to subduction in this region.
- **Statement III – Correct:** The region is indeed a **zone of intense tectonic activity**.

 **Conclusion:** Only **statements II and III** are correct. Hence, the correct answer is **(b)**.

27) Correct Answer: (d) II and III only

Topic in Focus: This is India's **first state-level tribal genome sequencing initiative**, aimed at improving **precision healthcare** for tribal populations in Gujarat.

Key Aspects:

- **Implementing Agency:** Gujarat Biotechnology Research Centre (GBRC) is spearheading the project.
- **Scope:** Covers 2,000 individuals from 17 tribal-dominated districts.
- **Health Focus:** Targets **genetic disorders** such as **sickle cell anemia, thalassemia, and cancers**, prevalent among tribal communities.

Statement Analysis:

- **Statement I – Incorrect:** The project's focus is **public health**, not **agricultural biotechnology**.
- **Statement II – Correct:** It covers **17 tribal districts** in Gujarat.
- **Statement III – Correct:** GBRC is indeed the nodal implementing body.

✓ **Conclusion:** Correct answer is **(d) II and III only**.

28) Correct Answer: (c) I and IV only

Topic in Focus: MRT is a **genetic technique** to prevent **mitochondrial diseases** by replacing **defective mitochondria** in the mother's egg with healthy mitochondria from a **donor**.

Key Aspects:

- **Three-Parent Baby:** Child has **nuclear DNA** from both parents and **mitochondrial DNA** from a third female donor.
- **Techniques Used:**
 - **Maternal Spindle Transfer (MST):** Done **before fertilization**.
 - **Pronuclear Transfer (PNT):** Done **after fertilization**.

Statement Analysis:

- **Statement I – Correct:** MRT results in a child with **three genetic contributors**.
- **Statement II – Incorrect:** MST is done **pre-fertilization**, not post.
- **Statement III – Incorrect:** Mitochondrial DNA affects **cell energy metabolism**, not **physical traits** like height or eye color.
- **Statement IV – Correct:** MST has a **lower risk** of transferring defective mitochondria.

✓ **Conclusion:** Only I and IV are correct. Hence, the answer is **(c)**.

29) Correct Answer: (c) II, III and IV only

Topic in Focus: PMDDKY (Prime Minister's Development of Districts for Krishi Yojana) aims to transform **agriculture and allied sectors** in **100 underperforming districts**, modeled after the **Aspirational Districts Programme**.

Key Aspects:

- **Launch Period:** Scheduled for **six years** from **2025–26**, not eight.
- **Selection Criteria:** Based on **net cropped area, operational holdings, and representation across all states**.
- **Implementation:** District, state, and central-level committees will ensure **convergence and monitoring**.

Statement Analysis:

- **Statement I – Incorrect:** Scheme duration is **six years starting 2025–26**, not eight years from 2024–25.
- **Statement II – Correct:** First scheme exclusively for agriculture in 100 districts.
- **Statement III – Correct:** Selection criteria are data-driven.
- **Statement IV – Correct:** Committees will oversee implementation and outcomes.

✓ **Conclusion:** Correct answer is **(c) II, III and IV only**.

30) Correct Answer: (a) I and IV only

Topic in Focus: Earthquake swarms are sequences of multiple **small-to-moderate earthquakes** occurring in a region **without a clear main shock**, often in **volcanic or tectonic settings**.

Key Aspects:

- **Distinction from Earthquake Sequences:** Unlike mainshock-aftershock patterns, swarms have **no dominant event**.
- **Duration:** Can last **weeks** and involve **thousands of tremors**.
- **Common Locations:** Found in **volcanic, hydrothermal, and tectonically active regions**.

Statement Analysis:

- **Statement I – Correct:** Defining feature of earthquake swarms is **absence of a main shock**.
- **Statement II – Incorrect:** Not limited to **volcanic areas**; also occur in **geothermal and tectonic zones**.

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- **Statement III – Incorrect:** Not exclusive to **tectonic ridges**.
- **Statement IV – Correct:** Can last weeks and consist of **many thousands of quakes**.

✓Conclusion: Only **statements I and IV** are correct. Hence, answer is **(a)**.

31) Correct Answer: **(b) II only**

Topic in Focus: The **PATRIOT Missile System**, developed by **Raytheon Technologies**, is a **mobile, long-range surface-to-air missile (SAM)** system designed for air and missile defense.

Key Features:

- **Track-Via-Missile (TVM) guidance** allows the missile to receive **midcourse corrections** from a mobile command center.
- Equipped with a **phased array radar** and advanced tracking capabilities.
- Can intercept aircraft, cruise missiles, and **short-range ballistic missiles**.

Statement Analysis:

- **Statement I – Incorrect:** The system can engage **multiple types of threats**, not only ballistic missiles.
- **Statement II – Correct:** It uses **midcourse guidance corrections** from a central control system.

✓Conclusion: Only **statement II** is correct, making **option (b)** the right answer.

32) Correct Answer: **(c) Lower CO₂ emissions by reducing fuel consumption**

Topic in Focus: **CAFE norms** are regulatory measures under the **Energy Conservation Act, 2001**, introduced to reduce **vehicular emissions** and **improve fleet-wide fuel efficiency** of passenger vehicles in India.

Key Features:

- Applies to all passenger cars with **Gross Vehicle Weight < 3,500 kg**.
- Encourages **automobile manufacturers** to maintain an average **corporate-level fuel efficiency** target.
- **CAFE-III norms (2027-2032)** introduce **more stringent CO₂ emission targets**.

Incorrect Options Explained:

- (a): CAFE doesn't promote **renewable fuel use** directly.
- (b): No **minimum quota** for electric vehicles is set.
- (d): Not related to **road speed limits**.

✓Conclusion: The main objective is to **reduce CO₂ emissions via improved fuel efficiency**, hence **option (c)** is correct.

33) Correct Answer: **(c) Indonesia**

Topic in Focus: **BIMSTEC (Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation)** is a regional grouping established in **1997 (Bangkok Declaration)**.

Member Countries:

- **Bangladesh, Bhutan, India, Nepal, Sri Lanka, Myanmar, Thailand**
- **Secretariat:** Located in **Dhaka, Bangladesh**

Statement Analysis:

- (a) Sri Lanka – **Member**
- (b) Thailand – **Member**
- (c) **Indonesia – Not a member**
- (d) Bangladesh – **Founding member**

✓Conclusion: **Indonesia** is not a BIMSTEC member, hence the correct answer is **(c)**.

34) Correct Answer: **(d) Ministry of Power**

Topic in Focus: **ADEETIE (Accelerating Deployment of Energy Efficient Technologies in MSMEs)** is a scheme aimed at promoting **energy efficiency** in **Micro, Small & Medium Enterprises (MSMEs)**.

Key Features:

- Launched by the **Ministry of Power**, implemented by **Bureau of Energy Efficiency (BEE)**.
- Aims for at least **10% energy savings** in MSMEs using **Udyam ID**.
- Covers **14 energy-intensive sectors**, and offers **technical assistance, interest subvention, and energy audits**.

Incorrect Options:

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- (a), (b), (c): Not related ministries or implementing agencies.

✓ Conclusion: Implemented by **Ministry of Power**, hence **option (d)** is correct.

35) Correct Answer: (c) Leading the Kamaraj Plan to rebuild the Congress party

Topic in Focus: K. Kamaraj was a senior Congress leader and former **Chief Minister of Madras**. His most notable contribution was the **Kamaraj Plan (1963)**.

Key Aspects:

- Urged Congress leaders to **resign from ministerial posts** to focus on **reviving the party structure**.
- Aimed at **organizational rejuvenation** after the **1962 Indo-China war**.
- Played a crucial role in **post-independence political reforms**.

Incorrect Options:

- (a): Dr. Rajendra Prasad was India's first President.
- (b): DMK was founded by **C.N. Annadurai**.
- (d): Bardoli Satyagraha was led by **Sardar Patel**.

✓ Conclusion: Kamaraj Plan was his most historic contribution, making **option (c)** correct.

36) Correct Answer: (b) Japanese Encephalitis

Explanation:

- Under **UIP**, **9 diseases** are covered **nationwide**, and **3 diseases** are **region-specific**:
 - **Rotavirus diarrhoea**,
 - **Pneumococcal Pneumonia**,
 - **Japanese Encephalitis**
- **Japanese Encephalitis** is administered only in **endemic districts** due to localized occurrence.



Incorrect Options:

- (a) **Tetanus** – Covered nationwide.
- (c) **Hepatitis B** – Covered nationwide.
- (d) **Measles** – Covered nationwide.

37) Correct Answer: (a) 'Ripples' in space-time caused by violent processes in the Universe

Explanation:

- **Gravitational waves** are distortions in the **fabric of space-time**, predicted by **Einstein** in 1916 and confirmed in 2015.
- Caused by **cataclysmic events** like **black hole mergers, neutron star collisions**.
- Detected by **LIGO, Virgo, KAGRA** using **laser interferometry**.

Incorrect Options:

- (b) Related to **magnetic fields**, not gravitational waves.
- (c) Refers to **seismic activity**, not astrophysics.
- (d) **Cosmic rays** are high-energy particles, not space-time distortions.

38) Correct Answer: (b) Both Statement-I and Statement-II are correct, but Statement-II does not explain Statement-I

Explanation:

- **Statement I – Correct:**
CAFE norms aim to reduce **vehicular fuel consumption**, thereby reducing **emissions** and **oil import dependency**.
- **Statement II – Correct but doesn't explain I:**
It correctly describes **applicability** (petrol, diesel, LPG, CNG, hybrids, EVs), but doesn't explain how this leads to lower oil imports.

✓ Conclusion: Both statements are true, but II doesn't explain I.

39) Correct Answer: (a) Both Statement-I and Statement-II are correct and Statement-II explains Statement-I

Explanation:

- Enacted to enforce **Article 17** of the Constitution – **Abolition of untouchability**.
- **Statement I – Correct:**
The Act enforces the constitutional mandate.
- **Statement II – Correct and explains I:**
It provides the **legal mechanism** – defines offences and prescribes penalties.

40) Correct Answer: (d) None

Explanation:

| Detector | Actual Location |
|----------|-----------------|
| KAGRA | Japan |
| LIGO | USA |
| Virgo | Italy |

Analysis of Pairs:

- **Pair 1:** Incorrect – KAGRA is in **Japan**, not the USA.
- **Pair 2:** Incorrect – LIGO is in **USA**, not France.
- **Pair 3:** Incorrect – Virgo is in **Italy**, not Japan.

41) Correct Answer: (c) Both I and II

Topic in Focus: NPPA is a **statutory regulatory authority** to ensure **affordable pricing** of essential medicines in India.

Key Aspects:

- **Statement I – Correct:** NPPA functions as an **independent regulator** for controlling and revising **drug prices**.
- **Statement II – Correct:** Established in **1997** as an **attached office** under the **Ministry of Chemicals & Fertilizers**.

✓ Conclusion: Both statements are correct. Hence, **(c) Both I and II** is the correct answer.

42) Correct Answer: (c) I and II only

Topic in Focus: PMKVY 4.0 is India's flagship **Central Sector Scheme** under the **Skill India Mission**, offering skill training and certification.

Key Aspects:

- **Statement I – Correct:** PMKVY 4.0 is implemented as a **Central Sector Scheme**, offering flexibility in design and funding.
- **Statement II – Correct:** **Recognition of Prior Learning (RPL)** certifies existing skills without formal training.

✓ Conclusion: Both statements are correct. Hence, the answer is **(c) I and II only**.

43) Correct Answer: (b) I, II and III only

Topic in Focus: CPI measures **household inflation**, guides **monetary policy**, and affects **DA revisions** and **fiscal decisions**.

Key Aspects:

- **Statement I – Correct:** Released by **CSO (under MoSPI)**.
- **Statement II – Correct:** Used for **inflation tracking** and **dearness allowance** calculation.
- **Statement III – Correct:** Measures the price change in **goods and services for household consumption**.
- **Statement IV – Incorrect:** The **current base year is 2012**, not 2020.

✓ Conclusion: Only I, II, and III are correct. Hence, the correct answer is **(b)**.

44) Correct Answer: (b) Offshore service units set up by multinational companies to deliver global business functions

Topic in Focus:

GCCs are **offshore units of multinational corporations**, leveraging India's **talent pool** for **IT, R&D, finance, customer support**, etc.

Key Aspects:

- India hosts over **1,800 GCCs**, contributing **~1.6% of GDP**.
- Provide **global business support** from India.
- Contribute to **employment, innovation, and digital transformation**.

✓ Conclusion: Correct definition is **option (b) – offshore service units** by MNCs.

45) Correct Answer: (c) Freedom to own property

Topic in Focus:

Article 19 of the Indian Constitution guarantees certain **civil liberties** to citizens. These rights were traditionally enforceable **only against the State (vertical application)**. However, recent judicial interpretation (e.g., *Kaushal Kishor v. State of Uttar Pradesh*, 2023) recognizes **horizontal application**—i.e., enforcement of rights against private individuals in specific contexts.

Key Points:

- Article 19(1) provides six freedoms:
 - Speech and expression
 - Assembly
 - Association
 - Movement
 - Residence
 - Profession
- Right to property** is not a part of Article 19. It was removed as a **fundamental right** by the **44th Constitutional Amendment Act (1978)** and is now a **legal right under Article 300A**.

 **Conclusion:** The correct answer is (c) because **freedom to own property** is not part of Article 19.

46) Correct Answer: (c) II and III only

Topic in Focus: Eco-Sensitive Zones (ESZs) act as **buffer zones** around **Protected Areas** like national parks and wildlife sanctuaries. These are created to regulate and minimize human activities that might threaten the ecosystem.

Key Points:

- Statement I – Incorrect:** The ESZ concept was introduced in the **Wildlife Conservation Strategy, 2002**, not the **1992 Plan**.
- Statement II – Correct:** In **2023**, the **Supreme Court allowed states** to propose changes to ESZ boundaries based on regional needs.
- Statement III – Correct:** MoEFCC notifies ESZs after **receiving proposals from State Governments**.
- Statement IV – Incorrect:** **Commercial mining** is not uniformly prohibited in all ESZs; regulations differ by zone.

 **Conclusion:** Only Statements II and III are correct.

47) Correct Answer: (d) I and IV only

Topic in Focus: FGD systems are **pollution control technologies** used in **thermal power plants** to reduce **sulphur dioxide (SO₂)** emissions, which contribute to acid rain and respiratory illnesses.

Key Points:

- Statement I – Correct:** FGDs use **alkaline reagents** like limestone or lime to absorb SO₂ from flue gases.
- Statement II – Incorrect:** FGD installation is **not mandatory** for all plants by 2027. It applies **only to select plants**.
- Statement III – Incorrect:** Sulphates formed by SO₂ do **not cause warming**; instead, they **reflect sunlight**, contributing to **cooling**.
- Statement IV – Correct:** Ambient SO₂ levels in India are mostly **below the national standard** of 80 µg/m³.

 **Conclusion:** Only Statements I and IV are correct.

48) Correct Answer: (d) II and III only

Topic in Focus: Under Article 80(3) of the Constitution, the **President of India** can **nominate up to 12 members** to the **Rajya Sabha** for their expertise in **literature, science, art, and social service**.

Key Points:

- Statement I – Incorrect:** The eligibility is **not limited to literature**. It includes **science, art, and social service** as well.
- Statement II – Correct:** Article 80(3) explicitly mentions **all four fields**.
- Statement III – Correct:** Appointments are notified by the **Ministry of Home Affairs** under the **Allocation of Business Rules, 1961**.

 **Conclusion:** Only Statements II and III are correct.

49) Correct Answer: (a) I and III only

Topic in Focus: Super-Earths are a class of **exoplanets** (planets outside the Solar System) defined by their **mass and size**, which is **larger than Earth but smaller than Neptune**.

Key Points:

- Statement I – Correct:** The term "Super-Earth" refers **only to size and mass**, not to Earth-like composition or habitability.
- Statement II – Incorrect:** Super-Earths are **not always rocky**. Some may have **gaseous** or **icy** compositions.
- Statement III – Correct:** Larger Super-Earths are often called **sub-Neptunes** or **mini-Neptunes** due to their similarity in atmosphere or size.

 **Conclusion:** Only Statements I and III are correct.

50) Correct Answer: (a) Encapsulation of nutrients within nanomaterials of 100 nanometres or less

Topic in Focus: Nano-fertilizers are advanced fertilizers where nutrients are **encapsulated within nanomaterials (≤100 nm)** to allow **slow, controlled, and targeted release**.

Key Points:

- **Improves nutrient use efficiency and reduces environmental losses.**
- Helps in **reducing fertilizer consumption** and **enhancing crop productivity**.
- **Not** based on GMOs or biostimulants.
- Promoted under India's push for **sustainable agriculture** and **precision farming** (e.g., IFFCO's nano-urea).

Analysis of Options:

- **(a) Correct:** Nano-fertilizers involve nutrient encapsulation within nanomaterials.
- **(b) Incorrect:** Not limited to phosphorus.
- **(c) Incorrect:** Not GMO-based.
- **(d) Incorrect:** Not biostimulants; do not alter DNA.

✓ **Conclusion:** Nano-fertilizers are defined by their **nano-size formulation** and **efficient nutrient delivery**, making **option (a)** the correct choice.



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