

Solutions

DATE : (6th Oct- 12th Oct)

1) Answer:

- (a) Ministry of Mines

Explanation

1. Context and Objective

- The **National Critical Mineral Mission (NCMM)** is a strategic government initiative launched to secure India's access to **critical and strategic minerals** essential for clean energy, advanced technologies, and national security.
- These minerals — **Lithium, Cobalt, Nickel, Graphite, and Rare Earth Elements (REEs)** — are crucial for **Electric Vehicles (EVs), renewable energy, electronics, and defense.**

2. Institutional Framework

- The **Ministry of Mines** is the **nodal ministry** responsible for the implementation of the mission.
- It coordinates with other ministries like the **Ministry of External Affairs, Ministry of Science & Technology, and NITI Aayog** for policy coherence.

3. Policy Framework and Timeframe

- Timeframe:** FY 2024–25 to 2030–31.
- Objective:** Strengthen domestic exploration, develop processing capacity, and reduce import dependence.
- Coverage:** Domestic and international sourcing, recycling, and value chain development.

4. Key Features

- Exploration:** Over **1,200 domestic exploration projects.**
- Recycling:** Target to establish **400 kilo tonnes of recycling capacity.**
- Innovation:** **1,000 patent filings** and creation of **3 Centres of Excellence.**
- Sustainability:** Focus on circular economy and e-waste recycling.

5. Contemporary Relevance

- Aligns with **India's Net-Zero 2070 goal and energy transition objectives.**
- Reduces strategic vulnerabilities in mineral supply chains disrupted by **geopolitical tensions (e.g., China's dominance).**
- Supports **"Make in India," "Atmanirbhar Bharat," and Green Hydrogen Mission** initiatives.

6. Global Comparisons

Country	Initiative	Focus
USA	Inflation Reduction Act	Domestic critical minerals supply chain
EU	Critical Raw Materials Act	Reducing dependency on imports
India	National Critical Mineral Mission	Exploration, processing, and recycling

2) Answer:

- (a) Thailand

Explanation

1. Context

- The **Coral Triangle** is recognized as the **global epicenter of marine biodiversity**, often called the **"Amazon of the Seas."**
- It plays a critical role in **marine ecology, fisheries, and climate resilience.**

2. Geographic Extent

- The **Coral Triangle** covers **5.7 million sq. km** of ocean area.
- Includes:** *Indonesia, Malaysia, Papua New Guinea, the Philippines, Solomon Islands, and Timor-Leste.*
- Excludes:** *Thailand, India, Australia, and Maldives.*

3. Ecological Significance

- Home to **75% of global coral species** and **one-third of the world's reef fish species.**
- Supports livelihoods of over **120 million people** dependent on coastal ecosystems.
- Central to **global carbon sequestration and climate adaptation.**

4. Conservation Efforts

- Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF)** promotes regional collaboration.
- Emerging focus on **cryobanking coral larvae** to preserve biodiversity.

5. Contemporary Relevance

- Threatened by **climate change, coral bleaching, and unsustainable fishing.**
- India's **National Coral Reef Programme (NCRP)** draws lessons from the Coral Triangle for **marine ecosystem management.**

3) Answer:

- (a) United Kingdom

Explanation

1. Context and Objective

- Exercise KONKAN** is a **bilateral naval exercise** between **India and the United Kingdom**, aimed at **enhancing interoperability, maritime security, and joint operational readiness.**

2. Strategic Purpose

- Focused on **Anti-Submarine Warfare (ASW), Maritime Interdiction Operations (MIO), and Humanitarian Assistance and Disaster Relief (HADR).**
- Strengthens **defense cooperation and blue-water capabilities** in the **Indian Ocean Region (IOR).**

3. Implementation Details

- Conducted **annually**, alternating between **India and the UK.**
- KONKAN-25** included participation of:
 - UK's **HMS Prince of Wales** (aircraft carrier)
 - India's **INS Vikrant**
- Joint exercises included **carrier group operations, search and rescue, and maritime surveillance drills.**

4. Strategic Relevance

- Promotes **India–UK defence partnership**, part of the **India–UK 2030 Roadmap**.
- Reinforces the **Free and Open Indo-Pacific (FOIP)** vision.
- Complements India's other naval partnerships — **Varuna (France)**, **JIMEX (Japan)**, **AUSINDEX (Australia)**.

4) Answer:
(b) II only

Explanation

1. Context

- India is among the **most landslide-prone countries globally**, particularly across the **Himalayan and Western Ghats** regions.
- The **ISRO Landslide Atlas of India (2023)** offers the first comprehensive spatial mapping of landslide hazards in the country.

2. Policy and Institutional Framework

- Guided by **NDMA Guidelines on Landslide Hazard Zonation (2009)**.
- Implemented by **ISRO**, with support from **NRSC**, **Geological Survey of India (GSI)**, and **State Disaster Management Authorities (SDMAs)**.

3. Key Data and Findings

- **12.6%** of India's total land area is **landslide-prone**, not **25%** as sometimes misreported.
- About **75%** of this area lies in the **Himalayan region** — covering states like **Uttarakhand**, **Himachal Pradesh**, **Sikkim**, **Arunachal Pradesh**, and parts of **Jammu & Kashmir**.
- Other vulnerable regions: **Western Ghats**, **North-Eastern Hill States**, and **Nilgiris**.

4. Contemporary Relevance

- **Recent incidents:** **Joshimath (Uttarakhand, 2023)**, **Sikkim Glacial Lake Outburst (2023)**.
- **Causes:** **Unplanned construction**, **deforestation**, **hydropower tunneling**, and **seismic activity**.
- **Policy response:** **Early warning systems**, **hazard zonation mapping**, and **relocation planning**.

5. Analysis of Statements

- **Statement I:** Incorrect – India has **12.6%** landslide-prone area, not **>25%**.
- **Statement II:** Correct – Over three-quarters of such areas lie in the **Himalayas**.

5) Answer:
(b) II only

Explanation

1. Context

- **PM-SETU (Pradhan Mantri Skill Enhancement and Training for Upgradation)** is a **flagship skilling initiative** under the **Ministry of Skill Development and Entrepreneurship (MSDE)**.
- It seeks to **modernize vocational education** through upgraded **Government ITIs** aligned with **industry 4.0 needs**.

2. Objectives

- **Bridge the skill gap** between education and employment.
- **Modernize** vocational training infrastructure.
- Promote **innovation**, **entrepreneurship**, and **outcome-based learning**.

3. Implementation Framework

- **Hub-and-Spoke Model:**
 - **200 hubs:** Advanced ITIs with modern labs, incubation centers, and placement units.
 - **800 spokes:** Linked ITIs to expand access and uniform standards.
- Targets modernization of **1,000 Government ITIs**, not **10,000**.

4. Institutional Context

- Nodal Ministry: **Ministry of Skill Development and Entrepreneurship (MSDE)**.
- Aligned with **National Education Policy (NEP) 2020** and **Skill India Mission**.

5. Current Relevance

- Supports **Atmanirbhar Bharat** and **Make in India** by creating an **industry-ready workforce**.
- Focus on **emerging sectors:** **Green energy**, **robotics**, **artificial intelligence**, and **EV maintenance**.

6. Challenges

- **Infrastructure gaps**, **faculty training**, and **industry linkage** remain major hurdles.
- Requires strong coordination between **states and private industry**.

6) Answer:
(b) I and III only

Explanation

1. Context

- **Project Himank** is a flagship project of the **Border Roads Organisation (BRO)**, vital for **developing strategic road infrastructure** in the **Ladakh region**.
- It plays a crucial role in maintaining **border connectivity**, ensuring **military mobility**, and facilitating **civilian access** in one of the most difficult terrains of the world.

2. Policy Background

- **Launched in 1985** at **Leh, Ladakh**, under the **Ministry of Defence**.
- Objective: To construct and maintain **roads, bridges, and infrastructure** in **high-altitude, border regions** to enhance both **defence preparedness** and **local development**.

3. Key Achievements

- Constructed the **world's highest motorable road at Mig La Pass (19,024 ft)** on the **Changthang Plateau** near the **Line of Actual Control (LAC)**.
- Contributes to **logistics** in strategically sensitive zones and improves **socio-economic linkages** in remote Ladakh.

4. Strategic Relevance

- Ensures **rapid troop movement** and **military supply** during border contingencies with China.
- Complements other BRO projects like **Project Vijayak** in Kargil and **Project Dantak** in Bhutan.
- Supports **tourism**, **border trade**, and **local employment** in high-altitude regions.

5. Analysis of Statements

- **Statement (I): Correct** – The **Mig La Pass road** forms a **crucial link** near the **LAC**, improving connectivity to **Fukche and Likaru**.
- **Statement (II): Incorrect** – Project Himank was launched in **1985**, not in 2000; and it was meant for **Ladakh**, not the North-East region.

- **Statement (III): Correct** – The Mig La Pass road, built under **Project Himank**, lies on the **Changthang Plateau**.

7) **Answer:**
(d) I and III only

Explanation

1. Context

- The **National Level Pollution Response Exercise (NATPOLREX)** is a **biennial flagship exercise** of the **Indian Coast Guard (ICG)**.
- It aims to evaluate India's **preparedness for marine oil spills** and ensure effective coordination among multiple agencies during **marine pollution emergencies**.

2. Policy Background

- Initiated under the **National Oil Spill Disaster Contingency Plan (NOSDCP)**.
- Conducted every **two years (biennially)**, not annually.
- Ensures compliance with international conventions such as **MARPOL** and **OPRC (1990)**.

3. Key Features

- Involves simulation of **large-scale oil spill scenarios**.
- Tests **multi-agency coordination, equipment deployment, and response time efficiency**.
- Participating agencies: **ICG, Indian Navy, DG Shipping, ONGC, Ministry of Environment, and port authorities**.

4. Significance

- Helps maintain **maritime environmental safety** and supports India's **Blue Economy**.
- Strengthens **regional cooperation** with **SAARC and ASEAN** coastal nations on pollution response.
- Reduces ecological risks to marine biodiversity and coastal livelihoods.

5. Analysis of Statements

- **Statement (I): Correct** – NATPOLREX is indeed a **flagship ICG exercise**.
- **Statement (II): Incorrect** – It is held **biennially**, not annually.
- **Statement (III): Correct** – The **primary objective** is to assess **preparedness and response capacity** for oil spill incidents.

8) **Answer:**
(a) Both Statement I and Statement II are correct, and Statement II explains Statement I

Explanation

1. Context

- The **Himalayan region** is India's most **landslide-prone** zone due to its **geological youth, steep slopes, fragile rock formations, and intense rainfall**.
- Understanding its **vulnerability** is crucial for **disaster management, infrastructure planning, and environmental sustainability**.

2. Causes of Vulnerability

- **Geological Youth:** The Himalayas are still rising due to **tectonic collision** between the Indian and Eurasian plates.
- **Seismic Activity:** Frequent **earthquakes** weaken slopes.
- **Climatic Factors:** Heavy **monsoons, glacial melt, and deforestation** intensify slope instability.
- **Anthropogenic Factors:** Unplanned construction, hydropower tunneling, and road cutting worsen vulnerability.

3. Institutional Framework

- **NDMA** and **ISRO** have initiated **Landslide Hazard Zonation (LHZ)** and **real-time monitoring** using satellite data.
- **Himalayan States (Himachal Pradesh, Sikkim, Arunachal Pradesh, Uttarakhand)** remain the highest risk zones.

4. Analysis of Statements

- **Statement I:** Correct – Over **75% of India's landslide-prone area** lies in the **Himalayan region**.
- **Statement II:** Correct – The Himalayas' **geological youth and tectonic instability** cause inherent slope fragility, explaining Statement I.

9) **Answer:**
(d) Statement I is incorrect, but Statement II is correct

Explanation

1. Context

- The **Critical Mineral Recycling Incentive Scheme (CMRIS)** is part of the **National Critical Mineral Mission** under the **Ministry of Mines**.
- It focuses on **recycling valuable minerals** from **secondary sources**, contributing to **supply chain resilience** and **sustainable resource use**.

2. Policy Background

- Supports India's goal of reducing **import dependence** on strategic minerals.
- Encourages the creation of a **circular economy** for critical minerals used in **EV batteries, solar cells, and electronics**.

3. Key Components

- Incentives for:
 - **Capital expenditure (CapEx)** on recycling facilities.
 - **Operational expenditure (OpEx)** for recycling from **e-waste, spent batteries, and industrial scrap**.
- Applicable to **new, expanding, or modernizing** recycling units.

4. Contemporary Relevance

- Contributes to **energy transition, green economy, and reduction of greenhouse gas emissions**.
- Aligns with **Global Best Practices** in the **EU Critical Raw Materials Act (2023)** and **US Inflation Reduction Act (2022)**.

5. Analysis of Statements

- **Statement I:** Incorrect – The scheme focuses on **secondary sources** like **e-waste**, not on **primary extraction**.
- **Statement II:** Correct – The main objective is to **build recycling infrastructure** for critical minerals from **secondary sources**.

10) **Answer:**
(b) Only two

Explanation

1. Context

- This question tests knowledge of **Tamil Nadu's contribution** to India's freedom movement through figures like **Tiruppur Kumaran** and **Subramaniya Siva**.
- Both played key roles in **youth mobilization, nationalist writings, and revolutionary activities** during British rule.

2. Tiruppur Kumaran

- Born near **Erode, Tamil Nadu**.

- Founded the **Desa Bandhu Youth Association** to promote **Swadeshi and nationalist ideals**.
- Martyred during a **protest march** while holding the **banned Indian National Flag**, symbolizing **patriotic defiance**.

3. Subramaniya Siva

- Born in **Dindigul (Madurai district)**, Tamil Nadu.
- Prominent **freedom fighter, writer, and orator**.
- Authored nationalist works such as “**Ramanuja Vijayam**” and “**Madhva Vijayam**.”
- Actively participated in the **Non-Cooperation Movement** and faced imprisonment for sedition.

4. Analysis of Pairs

- **Pair (1): Incorrect** – Tiruppur Kumaran was born near **Erode**, not **Dindigul**.
- **Pair (2): Correct** – He founded the **Desa Bandhu Youth Association**.
- **Pair (3): Correct** – Subramaniya Siva is credited with writing “**Ramanuja Vijayam**.”

Hence, the correct answer is (b) Only two.

11) Answer:

- (d) The mechanism of peripheral immune tolerance

Explanation

1. Context

- The **2025 Nobel Prize in Physiology or Medicine** was awarded to **Mary E. Brunkow, Fred Ramsdell, and Shimon Sakaguchi** for their **discoveries on immune system regulation**, particularly in the context of **autoimmunity and immune tolerance**.
- Their pioneering work identified how the body prevents the immune system from **attacking its own tissues** — a fundamental process termed **peripheral immune tolerance**.

2. Key Discoveries

- **Regulatory T Cells (Tregs):**
 - Discovered by **Shimon Sakaguchi (1995)**.
 - These cells suppress immune responses and maintain **immune homeostasis**.
- **FOXP3 Gene:**
 - Identified by **Mary Brunkow and Fred Ramsdell** as a key gene regulating Treg function.
 - Mutation in this gene causes severe autoimmune diseases (e.g., IPEX syndrome).

3. Broader Medical Significance

- Revolutionized understanding of **autoimmune diseases, transplant rejection, and cancer immunology**.
- Paved the way for **Treg-based therapies and targeted immunomodulation** strategies.

4. Practical Applications

- Development of **immune checkpoint inhibitors** and **Treg cell therapies** in cancer and autoimmunity.
- Enhanced research into **tissue-specific immune tolerance** and **transplant acceptance**.

5. Analysis of Options

- (a) Incorrect – Not related to antibiotic resistance.
- (b) Incorrect – Unrelated to mRNA vaccine development.
- (c) Incorrect – Not linked to hereditary cancers.
- (d) Correct – Their discovery clarified the **mechanism of peripheral immune tolerance**.

12) Answer:

- (b) Gujarat

Explanation

1. Context

- India is the **second-largest producer and exporter of tobacco** globally.
- Tobacco cultivation plays a dual role — **economic importance** (exports, employment) and **public health concern** (disease burden).

2. Production Pattern

- **Major Producing States:**
 - **Gujarat (~30%)** — Largest producer.
 - **Andhra Pradesh, Karnataka, Uttar Pradesh, Bihar** follow in production share.
- Cultivated varieties: **Flue-Cured Virginia (FCV)** and **Non-FCV tobacco**.

3. Policy Framework

- Governed by **COTPA Act (2003)** and **National Tobacco Control Programme (NTCP)**.
- Production regulated by **Tobacco Board (Ministry of Commerce)** under **Tobacco Board Act, 1975**.
- Emphasis on **diversification** away from tobacco to alternative crops.

4. Economic and Health Dimensions

- Generates **foreign exchange** through exports.
- Major **public health issue** — tobacco-related diseases account for **1.35 million deaths/year in India** (WHO).

5. Analysis of Options

- (a) Incorrect – Uttar Pradesh is major but not top producer.
- (b) Correct – Gujarat leads with ~30% of total production.
- (c) Incorrect – Bihar contributes marginally.
- (d) Incorrect – Karnataka ranks below Gujarat and Andhra Pradesh.

13) Answer:

- (c) I, II, and IV only

Explanation

1. Context

- **Qatar**, a small but resource-rich Gulf nation, plays a pivotal role in **global energy markets** and **West Asian geopolitics**.
- It is known for its **liquefied natural gas (LNG)** exports and **strategic regional diplomacy**.

2. Geographic and Economic Facts

- **Location:** Northeastern coast of the **Arabian Peninsula**.
- **Border:** Shares **land boundary with Saudi Arabia**.
- **Capital:** **Doha** (not Manama).
- **Resource Wealth:** World’s **third-largest natural gas reserves** (after Russia and Iran).

3. Strategic Importance

- Member of **Gulf Cooperation Council (GCC)** and **OPEC+**.
- Hosts **Al Udeid Air Base** (U.S. Central Command HQ).
- Important mediator in **regional conflicts** (Afghanistan peace process, Gaza ceasefire efforts).

4. Analysis of Statements

- **Statement I:** Correct – Land border with Saudi Arabia.
- **Statement II:** Correct – Third-largest natural gas reserves globally.

- **Statement III:** Incorrect – Capital is Doha, not Manama.
- **Statement IV:** Correct – Lies on northeastern Arabian Peninsula.

14) Answer:
(c) II only

Explanation

1. Context

- **Typhoons** are intense **tropical cyclones** that develop over the **western Pacific Ocean**.
- Their study is key to understanding **regional climatology** and **disaster management** in East and Southeast Asia.

2. Key Characteristics

- **Type:** Non-frontal, rotating low-pressure systems.
- **Sea Temperature:** Require **sea surface temperature above 27°C** for formation.
- **Energy Source:** Warm ocean water → latent heat release → convection and cyclonic motion.
- **Wind Speed:** Sustained winds ≥ 119 km/h.

3. Global Nomenclature

Region	Name Used
Western Pacific	Typhoon
Atlantic & Eastern Pacific	Hurricane
Indian Ocean	Cyclone

4. Impacts

- Cause severe **storm surges, flooding, and wind damage** in countries like the Philippines, Japan, and Taiwan.
- Increasingly intense due to **climate change and warming oceans** (IPCC AR6 Report).

5. Analysis of Statements

- **Statement I:** Incorrect – Typhoons form above **27°C**, not below 20°C.
- **Statement II:** Correct – Occur in the **western Pacific Ocean**.
- **Statement III:** Incorrect – Typhoons are **non-frontal** systems.

15) Answer:
(c) I and II only

Explanation

1. Context

- **UNESCO (United Nations Educational, Scientific and Cultural Organization)** was founded in **1946**, headquartered in **Paris, France**.
- It promotes global collaboration in **education, science, culture, and communication** to foster **peace and sustainable development**.

2. Organizational Structure

- **General Conference:** Main decision-making body.
- **Executive Board:** Nominates the **Director-General**.
- **Director-General:** Appointed by the General Conference for a **four-year term**, renewable once.

3. Major Publications

- **Global Education Monitoring Report (GEMR)** – Tracks SDG 4 progress on quality education.
- **World Water Development Report (WWDR)** – Addresses global water challenges.
- **Science Report** – Monitors scientific research and innovation trends.

4. Global Role

- Promotes **heritage conservation** (World Heritage Sites).
- Supports **literacy, teacher training, open science, and gender equality**.
- Has **194 member states**, making it one of the largest UN agencies.

5. Analysis of Statements

- **Statement I:** Correct – Established in **1946**, HQ in **Paris**.
- **Statement II:** Correct – Publishes GEMR and WWDR.
- **Statement III:** Incorrect – DG is **nominated by Executive Board** and **appointed by General Conference**, not the other way around.

16) Answer:
(c) I and III only

Explanation

1. Context

- The **World Para Athletics Championships** are one of the most prestigious global sporting events for **athletes with disabilities**, organized under the **International Paralympic Committee (IPC)**.
- These championships advance **inclusivity, equal representation, and global recognition of para-athletes**.

2. Governance and Framework

- **Organizing Body:** International Paralympic Committee (IPC).
- **Frequency:** Held **biennially** (every two years).
- **Associated Event:** The **World Para Athletics Grand Prix**—held **annually since 2013** across various host cities.

3. India's Role and Achievements

- **India hosted the Championships for the first time in 2025**, marking a major milestone in its para-sport journey.
- The event strengthened India's international sports diplomacy and **reflected rising investment in disability sports infrastructure**.
- Indian athletes won multiple medals, symbolizing growing support for **inclusive sporting excellence**.

4. Significance

- Promotes **awareness and empowerment** of persons with disabilities.
- Enhances **global visibility of para-sports** and encourages policy support for accessibility and adaptive training.
- Aligns with the **UN Convention on the Rights of Persons with Disabilities (UNCRPD)** and India's **Rights of Persons with Disabilities Act, 2016**.

5. Analysis of Statements

- **Statement I:** Correct – The Championships are governed by the **International Paralympic Committee (IPC)**.
- **Statement II:** Incorrect – The **Grand Prix** is **annual**, not biennial, since 2013.
- **Statement III:** Correct – **India hosted** the Championships for the **first time in 2025**.

17) Answer:
(d) I and III only

Explanation

1. Context

- The **Securities Transaction Tax (STT)** is a **direct tax** levied on the value of **taxable securities transactions** made through recognized stock exchanges in India.

- It promotes **transparency, accountability, and efficient tax compliance** in capital markets.

2. Policy Framework

- **Introduced:** Through the **Finance Act, 2004**.
- **Administered by:** Central Board of Direct Taxes (CBDT) under the **Ministry of Finance**.
- Applies to transactions involving **equity shares, derivatives, units of equity-oriented mutual funds**, etc.

3. Implementation Mechanism

- **Tax Payers:** Both **buyers and sellers**, depending on the transaction type.
- **Collection Point:** Automatically deducted at the time of transaction by stock exchanges.
- Helps in **tracking capital gains** and reducing **tax evasion in securities trading**.

4. Contemporary Relevance

- STT contributes significantly to **government revenue** and **market transparency**.
- Enhances **compliance** by integrating taxation within the exchange system.
- Has been a key tool in **curbing speculative trading and unreported transactions**.

5. Analysis of Statements

- **Statement I:** Correct – Introduced under the **Finance Act, 2004**.
- **Statement II:** Incorrect – STT is a **direct tax**, not an indirect tax.
- **Statement III:** Correct – The main goal is to **curb tax evasion** in securities markets.

18) Answer:

- (d) Neither I nor II

Explanation

1. Context

- The **Al Hol refugee camp**, located in **Northeast Syria**, is one of the largest and most complex humanitarian sites in the world.
- It houses **Syrians, Iraqis, and third-country nationals**, including families of ISIS members, creating significant **security and humanitarian challenges**.

2. Humanitarian and Security Framework

- Managed under **post-conflict stabilization programs** in Syria.
- Supported by the **United Nations Office of Counter-Terrorism (UNOCT)**, **UNHCR**, and **International Red Cross**.
- Focuses on **safe repatriation, deradicalization, and rehabilitation** of residents.

3. Global Significance

- Symbolizes the **intersection of humanitarian aid and counterterrorism policy**.
- Affects regional stability, refugee management, and international cooperation.
- UNOCT provides **technical and logistical support** for repatriation operations.

4. Analysis of Statements

- **Statement I:** Incorrect – The camp houses **Syrians, Iraqis, and third-country nationals**, not just local Syrians.
- **Statement II:** Incorrect – The camp is located in **Northeast Syria**, not Northwest.

19) Answer:

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

Explanation

1. Context

- **E-Governance** and **Digital Financial Inclusion** represent twin pillars of India's **Digital India** initiative.
- They aim to make governance **efficient, transparent, and citizen-centric**, while ensuring that financial systems are **inclusive and accessible** to all.

2. E-Governance Initiatives

- **Origins:** Began with **NIC (1976)** and later institutionalized under the **National e-Governance Plan (NeGP)**.
- **Key Platforms:**
 - **e-Seva** – Simplifies public service delivery through digital interfaces.
 - **DigiLocker** – Enables citizens to store and access official documents online.

3. Digital Financial Inclusion

- **Driven by:** The **JAM Trinity (Jan Dhan-Aadhaar-Mobile)** and **Unified Payments Interface (UPI)**.
- Ensures **direct benefit transfers (DBT)** and promotes **cashless transactions**.
- Over **500 million Jan Dhan accounts** and record **UPI transactions (over ₹20 trillion/month in 2024)** mark its success.

4. Broader Impact

- Enhances **governance transparency, reduces leakages, and empowers rural and marginalized citizens**.
- However, challenges include the **digital divide, data security concerns, and infrastructure gaps**.

5. Analysis of Statements

- **Statement I:** Correct – e-Seva and DigiLocker have improved **accessibility, transparency, and efficiency** in governance.
- **Statement II:** Correct – JAM Trinity and UPI have expanded **formal financial inclusion and digital payments**.
- Both are **independent but complementary initiatives**; Statement II does not explain Statement I.

20) Answer:

- (a) Both Statement I and Statement II are correct and Statement II explains Statement I

Explanation

1. Context

- India has achieved major progress in **reducing tobacco consumption**, aligned with the **WHO Global NCD (Non-Communicable Disease) target of 30% reduction by 2025**.
- The **National Tobacco Control Programme (NTCP)** plays a key role in this achievement.

2. Policy and Legislative Framework

- **Key Acts and Policies:**
 - **Cigarettes and Other Tobacco Products Act (COTPA), 2003**
 - **NTCP (2007–08)** – Awareness, enforcement, cessation, and monitoring.
 - **WHO Framework Convention on Tobacco Control (FCTC)** – India is a signatory.

3. Implementation Mechanism

- Focus on **public education, enforcement of smoke-free laws, pictorial health warnings, and youth-targeted awareness campaigns.**
- Involves coordination between **Ministry of Health, State Tobacco Control Cells, and NGOs.**

4. Achievements

- India is **projected to achieve a 43% reduction** in tobacco use from 2010 to 2025 — exceeding WHO's 30% target.
- Reflects success of **multi-sectoral health policies, taxation measures, and public campaigns.**

5. Analysis of Statements

- **Statement I:** Correct – India is on track to surpass the WHO NCD reduction target.
- **Statement II:** Correct – NTCP's strategies include awareness, regulation, and supply-demand control.
- Statement II **explains** Statement I as the NTCP is the key mechanism achieving this progress.

21) Answer:

- (c) To promote peace, stability and facilitate national reconciliation in Afghanistan

Explanation

1. Context

- The **Moscow Format** is a **regional consultative platform** established in **2017** to coordinate responses and promote **peace, security, and stability in Afghanistan.**
- It includes **Afghanistan's neighboring states** and key regional powers to discuss solutions for **conflict resolution and reconstruction.**

2. Composition and Participants

- Includes **Russia, India, China, Iran, Pakistan, and Central Asian republics** (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan).
- The platform also engages **Afghan stakeholders, including the Taliban post-2021.**

3. Objectives

- Promote **Afghan-led, Afghan-owned peace process.**
- Coordinate regional **counterterrorism and counter-narcotics** efforts.
- Prevent **spillover of extremism** into neighboring regions.
- Foster **humanitarian and economic cooperation** for reconstruction.

4. Relevance Post-U.S. Withdrawal

- After the **U.S. exit (2021)** and **Taliban takeover**, the format has become one of the few active **regional dialogues on Afghanistan.**
- The 2023 and 2024 rounds emphasized **inclusive governance, women's rights, and preventing humanitarian crises.**

5. Analysis of Options

- (a) Incorrect – Not about Russia-China border disputes.
- (b) Incorrect – Not a trade or economic union.
- (c) Correct – Main goal: **Afghan peace, stability, and reconciliation.**
- (d) Incorrect – Not a military mechanism.

22) Answer:

- (d) Various forms of transnational cyber-enabled financial crimes

Explanation

1. Context

- **Operation HAECHI-VI** is the **sixth phase** of a **global INTERPOL initiative** (supported by **South Korea**) to combat **cyber-enabled financial frauds and online scams.**
- The operation involves **law enforcement coordination** across **Asia, Europe, and Africa.**

2. Focus Areas

Targets **five major categories** of online financial crimes:

- **Investment frauds** (e.g., crypto and stock scams)
- **Romance scams**
- **Illegal online gambling-related money laundering**
- **Sextortion and digital blackmail**
- **Voice phishing (vishing)**

3. Implementation

- Carried out through **intelligence exchange, fund recovery, and joint arrests.**
- India's **CBI and Cyber Crime Coordination Centre (I4C)** were active participants in HAECHI-VI.

4. Outcomes

- Recovery of **USD 257 million** globally from illegal transactions (INTERPOL, 2024).
- Strengthened **cross-border cyber policing** and digital forensic capabilities.

5. Analysis of Options

- (a) Incorrect – Not focused on wildlife/environment crimes.
- (b) Incorrect – Unrelated to drug trafficking.
- (c) Incorrect – Not aimed at maritime piracy.
- (d) Correct – Targets **cyber-enabled financial crimes** globally.

23) Answer:

- (d) Ministry of New and Renewable Energy

Explanation

1. Context

- **PM Surya Ghar Muft Bijli Yojana** is a flagship **rooftop solar program** launched in **2024** by the Government of India.
- It aims to make **solar energy accessible and affordable** for households across the country.

2. Objectives

- Provide **up to 300 units of free electricity per month** to **1 crore households.**
- Promote **rooftop solar adoption** under the **Residential Solar Programme.**
- Reduce dependence on **fossil fuels** and promote **green energy self-reliance.**

3. Implementation

- **Nodal Ministry:** Ministry of New and Renewable Energy (MNRE).
- **Financial Model:**
 - **Subsidy structure:** 60% subsidy for up to 2 kW; 40% for additional 1 kW.
 - **Direct Benefit Transfer (DBT)** mechanism for consumers.
- **Agencies involved:** SECI, DISCOMs, and State Renewable Energy Departments.

4. Contemporary Significance

- Supports **India's Net-Zero Target (2070)** and **National Solar Mission goals**.
- Encourages **decentralized energy generation** and **citizen participation** in clean energy transition.

5. Analysis of Options

- (a) Incorrect – Rural Development not involved.
- (b) Incorrect – Finance Ministry only provides fiscal support.
- (c) Incorrect – Ministry of Power focuses on transmission, not rooftop solar.
- (d) Correct – **MNRE** implements the scheme.

24) Answer:

- (d) Provides evidence that gaps in protoplanetary disks are carved by developing planets

Explanation

1. Context

- The **direct imaging of WISPIT 2b**, a forming planet, is a **landmark discovery** in **planetary science**.
- It validates theories on how **planets form from protoplanetary disks** around young stars.

2. Scientific Background

- **Protoplanetary disks:** Rings of **gas and dust** surrounding young stars.
- Earlier, gaps observed in such disks were **assumed to be caused by forming planets**, but not directly confirmed — until WISPIT 2b.

3. Key Findings

- **WISPIT 2b** is a **young gas giant** detected within its **natal disk**.
- Confirms that **gravitational influence** of emerging planets carves **distinct gaps** in the disk.
- Data obtained using **high-resolution direct imaging** and **infrared telescopes**.

4. Importance

- Provides **first direct visual evidence** supporting **planet formation models**.
- Enhances understanding of how **solar systems evolve** and how **Earth-like planets may form**.

5. Analysis of Options

- (a) Incorrect – Not about comets.
- (b) Incorrect – Does not show water presence.
- (c) Incorrect – Not linked to extraterrestrial life.
- (d) Correct – Demonstrates **planets carve disk gaps**.

25) Answer:

- (d) Hump-headed mahseer fish

Explanation

1. Context

- The **Hump-headed mahseer (Tor remadevii)** is a **freshwater fish** found in **southern India**.
- It is recognized as **Critically Endangered (CR)** on the **IUCN Red List**, making it one of India's most threatened fish species.

2. Habitat and Range

- Found in **river systems of Tamil Nadu, Kerala, and Karnataka** — primarily **Cauvery, Kabini, and Bhavani rivers**.
- Prefers **clear, fast-flowing rivers** of the **Western Ghats** region.

3. Threats

- **Habitat fragmentation** due to **dam construction**.
- **Overfishing** and use of **destructive fishing techniques**.
- **Invasive species** and **pollution** degrading habitats.

4. Conservation Context

- Known as the **"Tiger of Kaveri"** for its size and sporting value.
- Not explicitly listed under the **Wildlife Protection Act (1972)** or **CITES Appendices**.
- Conservation depends on **habitat protection, community awareness, and sustainable fishing regulations**.

5. Analysis of Options

- (a) Incorrect – Striped hyena is *Near Threatened*.
- (b) Incorrect – Madras hedgehog is *Least Concern*.
- (c) Incorrect – Lion-tailed macaque is *Endangered*, not *Critically Endangered*.
- (d) Correct – **Hump-headed mahseer** is *Critically Endangered* and endemic to **southern Indian rivers**.

26) Answer:

- (a) I only

Explanation

1. Context

- The **Moscow Format** is a **regional consultative platform** established to promote **peace, stability, and national reconciliation** in **Afghanistan**.
- It provides a diplomatic mechanism for Afghanistan's neighbors and key regional powers to coordinate approaches to Afghan peace efforts.

2. Origin and Framework

- **Established:** In **2017** by **Russia**.
- **Objective:** Facilitate a **regional response** to the Afghan conflict through inclusive dialogue.
- **Participating countries:** *India, China, Iran, Pakistan, Russia, and Central Asian nations (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan)*.

3. Significance

- Post the **U.S. withdrawal (2021)** and **Taliban takeover**, it remains one of the **few active regional forums** for discussing Afghan issues.
- Addresses **terrorism, narcotics trafficking, humanitarian aid, and inclusive governance**.

4. Analysis of Statements

- **Statement I:** Correct – The Moscow Format was indeed **established in 2017** as a diplomatic forum for Afghan reconciliation.
- **Statement II:** Incorrect – **Mongolia is not a member**; the platform is limited to Afghanistan's immediate neighbors and major regional powers.

27) Answer:

- (b) II only

Explanation

1. Context

- The question tests understanding of the **difference between IFSC and SWIFT codes**, both vital for financial transactions in domestic and international banking systems.

2. Key Concepts

- **IFSC (Indian Financial System Code):**

- Developed by the **Reserve Bank of India (RBI)**.
- Used for **domestic electronic transfers** like **NEFT, RTGS, and IMPS**.
- **Structure:** 11-character alphanumeric code (e.g., SBIN0000458).
- **SWIFT Code (Society for Worldwide Interbank Financial Telecommunication):**
 - Used for **international transfers** between banks across countries.
 - Facilitates **secure messaging and fund transfer verification**.

3. Analysis of Statements

- **Statement I:** ✗ Incorrect – The **SWIFT code** is for **international**, not **domestic**, transactions.
- **Statement II:** ✓ Correct – The **IFSC code** is an **11-digit alphanumeric identifier** assigned by **RBI** to each Indian bank branch.

28) Answer:

- (a) I and III only

Explanation

1. Context

- The **Central Board of Indirect Taxes and Customs (CBIC)** is India's apex agency for **policy formulation and administration of indirect taxes**, including **GST, Customs, and Excise**.

2. Historical Background

- **Established:** As the **Central Board of Excise & Customs (CBEC)** in **1964**.
- **Renamed:** To **CBIC** in **2018**, following the introduction of **Goods and Services Tax (GST)**.

3. Key Functions

- Formulates **policy** for Customs, GST, and Central Excise.
- Prevents **smuggling and tax evasion**.
- Facilitates **trade and revenue collection**.
- Operates under the **Department of Revenue, Ministry of Finance**.

4. Analysis of Statements

- **Statement I:** ✓ Correct – CBIC was renamed from CBEC in **2018** after GST implementation.
- **Statement II:** ✗ Incorrect – CBIC handles **indirect taxes**, not **direct taxes** (which are managed by CBDT).
- **Statement III:** ✓ Correct – CBIC functions under the **Department of Revenue, Ministry of Finance**.

29) Answer:

- (b) I, II and IV only

Explanation

1. Context

- The **Polar Silk Road** is part of China's **Belt and Road Initiative (BRI)** strategy, focusing on **Arctic sea routes** for trade, energy, and research cooperation.
- It leverages new **navigable Arctic passages** emerging due to **melting ice and climate change**.

2. Framework

- Announced in China's **2018 Arctic Policy White Paper**.
- Objective: Create **Arctic shipping routes** linking **Asia, North America, and Europe**, promoting **economic connectivity and environmental cooperation**.

3. Features

- Promotes **clean energy, research, and sustainable infrastructure** in Arctic regions.
- Strengthens China's role as a **stakeholder in Arctic governance** through cooperation with Arctic nations like Russia, Norway, and Finland.

4. Analysis of Statements

- **Statement I:** ✓ Correct – Seeks to connect **global economic centers** through Arctic sea routes.
- **Statement II:** ✓ Correct – Emphasizes **environmental protection and clean energy cooperation**.
- **Statement III:** ✗ Incorrect – Not related to **African corridors**.
- **Statement IV:** ✓ Correct – Officially introduced in **China's 2018 Arctic Policy White Paper**.

30) Answer:

- (a) Both Statement-I and Statement-II are correct and Statement-II explains Statement-I

Explanation

1. Context

- The **Lion-tailed macaque (Macaca silenus)** is a **Western Ghats endemic primate** and one of India's most iconic **endangered species**.
- Its status reflects the **ecological degradation** of India's biodiversity hotspots.

2. Habitat and Range

- Restricted to **evergreen rainforests** of the **Western Ghats** — in **Kerala, Tamil Nadu, and Karnataka**.
- Prefers **dense canopy forests** above 600 meters elevation.

3. Conservation Status

- **IUCN Red List:** *Endangered*.
- **Indian Wildlife (Protection) Act, 1972:** *Schedule I*, ensuring highest legal protection.
- Threats: **Deforestation, habitat fragmentation, agricultural expansion, mining, and road construction**.

4. Conservation Efforts

- **Nilgiri Biosphere Reserve, Silent Valley National Park, and Anamalai Tiger Reserve** serve as key habitats.
- Efforts include **eco-bridges, wildlife corridors, and species-specific management plans**.

5. Analysis of Statements

- **Statement I:** ✓ Correct – Classified as *Endangered* under IUCN Red List.
- **Statement II:** ✓ Correct – Major threats include **habitat destruction and human encroachment**.
- **Statement II** provides **scientific justification** for the conservation status mentioned in **Statement I**.

31) Answer:

- (c) Three-dimensional networks of metal ions and organic molecules with large porous cavities

Explanation

1. Context

- **Metal–Organic Frameworks (MOFs)** represent a groundbreaking class of **crystalline materials** that combine **inorganic metal nodes** with **organic linkers**.

- Their exceptional **porosity, modular design, and surface tunability** make them one of the most researched materials in **chemistry, energy, and nanotechnology** today.

2. Scientific Basis

- **Composition:** Metal ions or clusters act as **coordination centers**, linked by organic molecules (ligands) to form **highly ordered 3D networks**.
- **Structure:** Possess **ultra-large internal surface areas** (up to 7,000 m²/g) with **tunable cavities**, allowing specific molecular interactions.

3. Key Features

- **Porosity and Flexibility:** MOFs can absorb and store gases in vast amounts due to their **nanoporous architecture**.
- **Customizability:** Their framework can be **tailored chemically** to target specific molecules.
- **High Thermal and Chemical Stability:** Many MOFs retain their structure under varying environmental conditions.

4. Applications

- **Clean Energy:** Hydrogen and methane storage; carbon capture and sequestration (CCS).
- **Environment:** Air purification, pollutant adsorption, and water harvesting from air.
- **Healthcare:** Drug delivery systems and biomedical imaging.
- **Industry:** Catalysts and sensors for industrial chemical processes.

5. Key Contributors

- Pioneers: **Susumu Kitagawa, Richard Robson, and Omar M. Yaghi** (known as the “Father of MOFs”).
- Their work established **reticular chemistry**, enabling predictable design of complex materials at the molecular level.

6. Analysis of Options

- (a) Incorrect – Alloys of rare-earth metals have different chemical compositions and lack organic linkers.
- (b) Incorrect – Describes traditional semiconductor materials, not MOFs.
- (c) Correct – MOFs are **3D networks of metal ions and organic molecules** forming **porous crystalline structures**.
- (d) Incorrect – Solid-state catalysts differ fundamentally from MOFs, which have broader multifunctional applications.

32) Answer:

- (a) Research and development of agricultural technologies

Explanation

1. Context

- The **AgriGenics Programme** is a flagship initiative by the **Ministry of Electronics and Information Technology (MeitY)** aimed at integrating **digital technologies** into **agriculture and environmental management**.
- It underscores India’s shift toward **smart and sustainable agriculture** through **innovation and R&D**.

2. Institutional Framework

- **Nodal Implementing Agency:** Centre for Development of Advanced Computing (C-DAC), Kolkata.
- Operates under MeitY’s mandate to enhance **ICT applications** across critical sectors like **agriculture, environment, and climate resilience**.

3. Objectives

- To **develop, demonstrate, and deploy** advanced technologies such as **AI, IoT, remote sensing, and big data** for agricultural applications.
- To ensure **effective technology transfer** from laboratory to field.

4. Areas of Focus

- **Precision agriculture:** Using data analytics and sensors for resource-efficient farming.
- **Environmental monitoring:** Real-time assessment of soil, air, and water quality.
- **Climate adaptation:** Predictive modeling for weather and crop resilience.

5. Significance

- Supports **Digital India** and **Atmanirbhar Krishi** visions.
- Enhances **productivity, sustainability, and farmers’ incomes**.

6. Analysis of Options

- (a) Correct – Focused on **R&D of agricultural technologies** and digital innovation.
- (b) Incorrect – Does not relate to livestock conservation.
- (c) Incorrect – Organic certification is outside its purview.
- (d) Incorrect – Not an export promotion program.

33) Answer:

- (d) Serving as a legal repository for debts and claims

Explanation

1. Context

- The **National E-Governance Services Limited (NeSL)** is India’s **first Information Utility (IU)** under the **Insolvency and Bankruptcy Code (IBC), 2016**.
- It plays a crucial role in ensuring **accuracy, transparency, and reliability** of debt-related data in the insolvency ecosystem.

2. Purpose and Role

- **Objective:** To store, authenticate, and verify information on **financial obligations and security interests** of borrowers and lenders.
- Functions as a **trusted digital evidence platform** for insolvency proceedings.

3. Institutional Framework

- Regulated by the **Insolvency and Bankruptcy Board of India (IBBI)**.
- Works with **banks, financial institutions, and courts** to provide real-time, verified data for dispute resolution.

4. Functions

- **Digitally stores** details of debts, guarantees, and defaults.
- **Authenticates and timestamps** financial information to prevent manipulation.
- Enhances **speed and accuracy** in insolvency adjudication by providing legally admissible records.

5. Importance

- Promotes **financial transparency** and **reduces litigation** in insolvency cases.
- Strengthens India’s global image as a **digitally governed financial system**.

6. Analysis of Options

- (a) Incorrect – Not involved in banking licenses.
- (b) Incorrect – Does not supervise mergers.

- (c) Incorrect – Unrelated to monetary policy.
- (d) Correct – Serves as a digital legal repository for debt and claim information.

34) Answer:

- (a) I only

Explanation

1. Context

- **In Vitro Gametogenesis (IVG)** is a cutting-edge biotechnology that enables the creation of egg or sperm cells outside the human body using somatic cells.
- It has transformative implications for infertility treatment, genetic research, and reproductive medicine.

2. Mechanism

- Begins with somatic cells (e.g., skin cells) reprogrammed into induced pluripotent stem cells (iPSCs).
- These are then guided to differentiate into gametes (sperm or ova) through processes like somatic cell nuclear transfer (SCNT) and chromosome adjustment (mitomeiosis).

3. Applications

- Offers potential for individuals unable to produce gametes to have genetically related offspring.
- Enables study of genetic diseases, embryo development, and reproductive cloning ethics.

4. Challenges

- Maintaining correct chromosome number (haploid 23) in human gametes is a major technical hurdle.
- Raises ethical concerns around artificial reproduction and genetic manipulation.

5. Analysis of Statements

- **Statement I:** Correct – DNA from skin cells can be used to generate egg-like cells in laboratory conditions.
- **Statement II:** Incorrect – Mitomeiosis ensures haploid (23) chromosome count, not diploid (46) as in somatic cells.

35) Answer:

- (a) I and III only

Explanation

1. Context

- Myanmar is a strategically located country in Southeast Asia, serving as a bridge between South Asia and East Asia.
- Its geography influences regional trade, connectivity, and security, particularly within India's Act East Policy and ASEAN framework.

2. Key Geographic Features

- **Capital:** Nay Pyi Taw (since 2005, replacing Yangon).
- **Mountains:** Tenasserim Range extends along the southeast near the Thai border.
- **Water bodies:** Bay of Bengal lies to the southwest, not northwest.
- **Borders:** Shares frontiers with India, China, Bangladesh, Laos, and Thailand.

3. Significance

- Acts as India's gateway to ASEAN via the Kaladan Multi-Modal Transit Project and India–Myanmar–Thailand Trilateral Highway.

- Plays a central role in Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC).

4. Analysis of Statements

- **Statement I:** Correct – Nay Pyi Taw is the capital city.
- **Statement II:** Incorrect – The Bay of Bengal lies to the southwest, not northwest.
- **Statement III:** Correct – Tenasserim Mountains are indeed part of Myanmar's geography.
- **Statement IV:** Incorrect – Borders China to

36) Answer:

- (b) I and II only

Explanation

Context

- **Plutonium Management and Disposition Agreement (PMDA)** — bilateral U.S.–Russia pact (2000) on disposition of weapons-grade plutonium.

Statement Analysis

- **Statement I — Correct:** Russia suspended various aspects of cooperation citing sanctions and geopolitical tensions (suspension noted in mid-2010s).
- **Statement II — Correct:** Each side committed to dispose ~34 metric tonnes of weapons-grade plutonium via MOX or irradiation—rendering it unusable for weapons.
- **Statement III — Incorrect:** Objective is reduction, not increase, of stockpiles.

Implication

- Highlights arms control fragility amid geopolitical disputes.

37) Answer:

- (a) I and III only

Explanation

Context

- **PM-KUSUM:** Scheme to solarise agricultural pumps, deploy decentralized solar plants, improve farmer incomes and reduce diesel dependence.

Statement Analysis

- **Statement I — Correct:** Solarisation of grid-connected pumps is a core component.
- **Statement II — Incorrect:** Implemented by MNRE, not Ministry of Rural Development.
- **Statement III — Correct:** Targets 34,800 MW by March 2026 (programme target).

Implementation

- Mix of solar pumps, rooftop, and ground mounted plants; financial support, subsidies, and DISCOM/state agency coordination.

38) Answer:

- (a) II only

Explanation

Context

- **Great Green Wall (GGW):** African Union initiative to restore degraded land across the Sahel (Senegal → Djibouti).

Statement Analysis

- **Statement I — Incorrect:** GGW spans **Senegal to Djibouti** (Sahel), not Morocco to Madagascar.
- **Statement II — Correct:** Goal to restore **100 million hectares by 2030**.
- **Statement III — Incorrect:** Focus is **semi-arid Sahel**, not humid central forests.

Significance

- GGW links **land restoration, climate adaptation, livelihoods**, but faces **funding/coordination/political** challenges.

39) Answer:

- (a) Both Statement-I and Statement-II are correct and Statement-II explains Statement-I

Explanation

Context

- **Solar dimming:** observed decline in surface solar radiation (decades), largely attributed to **aerosols** and their effects on clouds.

Statement Analysis

- **Statement I — Correct:** Increased **anthropogenic aerosols** (industry, biomass burning, vehicles) reduce surface insolation.
- **Statement II — Correct & Explanatory:** **Aerosols alter cloud microphysics** (Twomey effect — brighter, longer-lived clouds), increasing albedo and reducing surface sunlight—this mechanism **explains** observed dimming.

Impacts

- Affects **agriculture, solar power yield, regional climate patterns**; trade-off between aerosol cooling and **health/environmental harm** necessitates emission controls.

40) Answer:

- (a) Both Statement-I and Statement-II are correct and Statement-II explains Statement-I

Explanation

Context

- Follow-up on **MOFs** (reiterated statements about capabilities).

Statement Analysis

- **Statement I — Correct:** **MOFs' tunability** (choice of metal/linker) enables **selective capture and storage** of gases, water, and pollutants.
- **Statement II — Correct & Explanatory:** The **3D porous structure** is the reason for **high porosity and tunability**—this structural trait **explains** the selective capture capability.

Implication

- Structural/design principles underpin **applications in carbon capture, water harvesting, and separation technologies**.

41) Answer:

- (d) They are a group of 17 elements, including 15 lanthanides plus scandium and yttrium, moderately abundant in nature and critical for high-tech applications.

Explanation

1. Context

- **Rare Earth Elements (REEs)** are a group of **17 chemically similar elements** vital for **advanced technologies** like renewable energy systems, electronics, and defense equipment.
- Despite the name “rare,” these elements are **moderately abundant**, but **rarely found in concentrated deposits**, making their extraction complex and expensive.

2. Composition

- **15 lanthanides:** from **Lanthanum (La)** to **Lutetium (Lu)**.
- Plus **Scandium (Sc)** and **Yttrium (Y)** due to similar **chemical and physical properties**.

3. Properties

- Exhibit **magnetic, luminescent, and electrochemical properties**, crucial for:
 - **Permanent magnets** in electric vehicles and wind turbines.
 - **Phosphors** in LEDs and displays.
 - **Catalysts** in petroleum refining and emission control.
 - **Alloys** for defense and aerospace.

4. Global Supply Chain & Policy Relevance

- **China** controls **~70%** of global REE production and processing.
- **India:** holds **5th largest reserves** globally, with projects under the **National Critical Mineral Mission** to ensure **supply security**.
- REEs are integral to **energy transition, digitalization, and national security**.

5. Analysis of Options

- (a) Incorrect – REEs are not extremely scarce or radioactive.
- (b) Incorrect – Their use extends far beyond traditional metallurgy.
- (c) Incorrect – Found in igneous and sedimentary deposits; critical for electronics.
- (d) Correct – Describes their **composition, abundance, and technological importance** accurately.

42) Answer:

- (c) Union Government, except for species in Schedule I and Part II of Schedule II

Explanation

1. Context

- Under the **Wildlife (Protection) Act, 1972**, certain wild animals may be declared as ‘**vermin**’ if they pose a **threat to crops, livestock, or human life**.
- The power to declare species as vermin is a **central authority**, ensuring balance between **conservation and conflict mitigation**.

2. Legal Provision

- **Section 62** of the Act empowers the **Union Government** to declare species as ‘**vermin**’ (for a specified area and time).
- **Exclusion:** Species listed in **Schedule I** and **Part II of Schedule II** cannot be declared vermin due to their protected status.

3. Implementation Context

- The Act places ‘**Protection of Wild Animals and Birds**’ in the **Concurrent List**, allowing **Centre–State cooperation**.
- **States** can recommend species to be declared vermin, but the **final authority lies with the Union Government**.

4. Contemporary Relevance

- **Kerala, Bihar, Uttarakhand, Himachal Pradesh** have recently sought permission to manage wild boar and monkey populations due to crop damage.
- Reflects the need for **context-specific wildlife management** under central oversight.

5. Analysis of Options

- (a) Incorrect – The National Board for Wildlife cannot independently declare vermin.
- (b) Incorrect – State Departments cannot declare species without central notification.
- (c) Correct – **Union Government** holds this power under **Section 62** of the Act.
- (d) Incorrect – Chief Wildlife Warden can act against specific dangerous animals but not declare them vermin.

43) Answer:

- (a) Detecting and neutralising hostile drones and unmanned aerial systems in tactical battlefield space

Explanation

1. Context

- **SAKSHAM (Situational Awareness for Kinetic Soft and Hard Kill Assets Management)** is an **indigenous counter-drone system** developed by the **Indian Army** in collaboration with **Bharat Electronics Limited (BEL)**.
- It represents a leap in India's **defense modernization** and **airspace security**.

2. Purpose

- To **detect, track, and neutralise hostile drones and UAS** in the **Tactical Battlefield Space (TBS)**.
- Ensures protection of **troops, bases, and strategic assets** from low-altitude aerial threats.

3. Features

- **Integrated command and control grid system.**
- Operates on **Army Data Network (ADN)** for secure communication.
- Covers **airspace up to 3,000 m** above ground level.
- Enables both **soft-kill (jamming)** and **hard-kill (kinetic destruction)** responses.

4. Significance

- Responds to the rise in **drone warfare**—as seen in conflicts like Ukraine and West Asia.
- Promotes **Atmanirbhar Bharat** through indigenous defense technology.

5. Analysis of Options

- (a) Correct – Primary function: countering drones/UAS.
- (b) Incorrect – Not designed for artillery coordination.
- (c) Incorrect – Not a communication system.
- (d) Incorrect – Not related to medical logistics.

44) Answer:

- (d) Botanical Survey of India and Zoological Survey of India

Explanation

1. Context

- The **National Red List Assessment (Vision 2025–2030)** is India's comprehensive effort to assess the **extinction risk of flora and fauna** using **IUCN Red List criteria**.

2. Objective

- To evaluate **11,000 species** (7,000 flora + 4,000 fauna) within five years.
- Provides baseline data for conservation planning, biodiversity targets, and policy interventions.

3. Nodal Agencies

- **Botanical Survey of India (BSI)** → Assessment of **flora**.
- **Zoological Survey of India (ZSI)** → Assessment of **fauna**.
- Both under the **Ministry of Environment, Forest and Climate Change (MoEFCC)**.

4. Significance

- Aligns with **Global Biodiversity Framework (GBF)** and **Convention on Biological Diversity (CBD)** commitments.
- Enhances India's role in **global conservation assessments** and data sharing.

5. Analysis of Options

- (a) Incorrect – ICFRE handles forestry research, not red list assessments.
- (b) Incorrect – WII & ICAR are not nodal agencies for the program.
- (c) Incorrect – Incorrect pairing of institutions.
- (d) Correct – **BSI** and **ZSI** are responsible for flora and fauna assessments respectively.

45) Answer:

- (a) Utilizes **Crassulacean Acid Metabolism (CAM)** to take in carbon dioxide at night and store it as malic acid

Explanation

1. Context

- **Cistanthe longiscapa**, native to Chile's **Atacama Desert**, is an example of **extreme xerophytic adaptation** in plants that survive under **intense aridity and heat**.

2. Photosynthetic Adaptation

- Employs **Crassulacean Acid Metabolism (CAM)** — a specialized photosynthetic pathway that minimizes water loss.
- **Nighttime (cooler hours):** Stomata open → CO₂ absorbed → stored as **malic acid** in vacuoles.
- **Daytime:** Stomata close → Stored CO₂ released for photosynthesis → minimizes transpiration.

3. Ecological Significance

- Allows survival during **long dry periods** and rapid growth after **sporadic rainfall**.
- Crucial adaptation for **semi-arid and hyper-arid ecosystems**.

4. Contemporary Importance

- Understanding CAM physiology aids in **developing drought-tolerant crops** — vital for **climate change resilience** and **agricultural adaptation**.

5. Analysis of Options

- (a) Correct – CAM is the main adaptation enabling survival in arid environments.
- (b) Incorrect – Deep roots are supplementary, not defining.
- (c) Incorrect – C4 pathway operates differently (daytime uptake).
- (d) Incorrect – Not an aquatic plant.

46) Answer:

- (a) Chenab

Explanation

1. Context

- The **Sawalkote Hydroelectric Project (HEP)** is one of the largest hydropower projects in **Jammu & Kashmir**, reflecting India's

thrust toward **clean energy** and **strategic utilization of Indus River resources**.

- It recently received **environmental clearance**, making it the first major project on an **Indus river** after India's **temporary suspension of the Indus Waters Treaty (IWT)** engagements.

2. Key Facts

- **River:** Chenab River (a major tributary of the Indus).
- **Type:** Run-of-the-river project (minimal water storage).
- **Installed Capacity:** 1,856 MW.
- **Location:** Ramban and Udhampur districts, Jammu & Kashmir.
- **Design Objective:** Maximize hydropower potential while minimizing ecological impact.

3. Significance

- Contributes to **India's renewable energy capacity** and **energy security**.
- Strengthens India's **upper riparian rights** under the **Indus Waters Treaty**.
- Boosts **regional employment** and **infrastructure development** in Jammu & Kashmir.

4. Analysis of Options

- (a) Correct – Located on **Chenab River** in Jammu & Kashmir.
- (b) Incorrect – Ravi is associated with other projects like Ranjit Sagar Dam.
- (c) Incorrect – Beas is not connected to Sawalkote HEP.
- (d) Incorrect – Sutlej hosts projects like Bhakra Nangal.

47) Answer:

- (b) I and II only

Explanation

1. Context

- The **Carbon Credit Trading Scheme (CCTS), 2023** establishes India's **domestic carbon market** under the **Energy Conservation Act, 2001**, supporting emission reduction and **climate action**.
- It creates a framework for **compliance-based and voluntary trading of carbon credits** among industries.

2. Institutional Structure

- **Administered by:**
 - **Bureau of Energy Efficiency (BEE):** Issues carbon credit certificates.
 - **Central Pollution Control Board (CPCB):** Enforces compliance and penalties.

3. Mechanism

- **Mandatory compliance** for notified entities; **voluntary offsets** for others.
- Non-compliance leads to either **buying carbon credits** or **paying environmental compensation**.

4. Significance

- Promotes **low-carbon industrial growth** and **market-based climate solutions**.
- Helps achieve India's **Nationally Determined Contributions (NDCs)** under the **Paris Agreement**.

5. Analysis of Statements

- **Statement I:** Correct – CCTS, 2023 was notified under the **Energy Conservation Act, 2001**.
- **Statement II:** Correct – Non-compliant entities must **purchase certificates or pay penalties**.

- **Statement III:** Incorrect – **CPCB** enforces compliance, not **BEE**.
- **Statement IV:** Incorrect – Offset mechanism is **voluntary**, not mandatory for all.

48) Answer:

- (b) I, II and III

Explanation

1. Context

- The **Siddi community**, also known as **Habshi or Badsha**, represents a **unique Afro-Indian ethnic group** descended from **East African immigrants**, many brought to India as traders, soldiers, or slaves centuries ago.
- They are officially recognized as a **Scheduled Tribe (ST)** in several Indian states.

2. Demographic Distribution

- Found primarily in **Gujarat, Karnataka, and Maharashtra**.
- Some small populations also in **Goa and Andhra Pradesh**.

3. Livelihood and Culture

- Traditionally **hunters and gatherers**, now engaged in **agriculture, labor, and service sectors**.
- Rich **music and dance traditions** blending **African and Indian influences** (e.g., *Dhamal dance*).

4. Policy Context

- Classified as **Scheduled Tribe (ST)** for access to **affirmative action and development schemes**.
- Supported under **PVTG-focused initiatives** by the Ministry of Tribal Affairs.

5. Analysis of Statements

- **Statement I:** Correct – Traditionally hunters/gatherers; now mostly agricultural/daily-wage workers.
- **Statement II:** Correct – Settled mainly in **Gujarat, Karnataka, and Maharashtra**.
- **Statement III:** Correct – Recognized as a **Scheduled Tribe** by the Union Government.

49) Answer:

- (d) I, III and IV only

Explanation

1. Context

- The **Bamiyan Buddhas** in Afghanistan were monumental **6th-century statues**, masterpieces of **Gandharan Buddhist art**, and symbols of cultural syncretism along the **Silk Route**.

2. Historical and Artistic Significance

- Two statues — **174 ft and 115 ft tall**, carved into sandstone cliffs.
- Reflected **Greco-Buddhist art** combining **Indian iconography** and **Hellenistic artistic influence**.
- Constructed during the **6th century CE** under **Kushan and Gupta-era influence**.

3. Destruction and Global Response

- Destroyed by the **Taliban in 2001**, triggering global condemnation.
- The **UNESCO World Heritage Committee** declared the **Bamiyan Valley a World Heritage Site in 2003** to protect remaining archaeological significance.

4. Analysis of Statements

- **Statement I:** Correct – Bamiyan Valley was declared a **UNESCO World Heritage Site** in 2003.
- **Statement II:** Incorrect – Destroyed in **2001 by Taliban**, not during the Soviet-Afghan War.
- **Statement III:** Correct – Built in **6th century**, exemplifying **Gandharan Buddhist art**.
- **Statement IV:** Correct – Two statues; **tallest measured 174 ft**.

50) Answer:

(a) I, II and III

Explanation

1. Context

- India's **microfinance ecosystem** is central to **financial inclusion** and **rural development**, empowering the **poor and women entrepreneurs** through **collateral-free credit** and **institutional linkages**.

2. Major Government Initiatives

- **Pradhan Mantri MUDRA Yojana (PMMY):** Provides **collateral-free microcredit** up to ₹10 lakh for small entrepreneurs.
- **NABARD Refinance Scheme:** Offers **refinancing** to **Microfinance Institutions (MFIs)** and **banks** to enhance lending capacity.
- **SHG–Bank Linkage Programme:** Encourages **Self-Help Groups (SHGs)** to move from **consumption-based** to **production-based credit use**.

3. Significance

- Strengthens **women's economic empowerment, income diversification, and grassroots entrepreneurship**.
- Supports **Atmanirbhar Bharat** and **financial literacy** goals.

4. Analysis of Statements

- **Statement I:** Correct – NABARD provides refinance to MFIs.
- **Statement II:** Correct – SHG–Bank Linkage promotes productive use of credit.
- **Statement III:** Correct – MUDRA Yojana provides **collateral-free loans** to microenterprises.