

Solutions

DATE : 20th Jan-2nd Feb

1) **Answer:** (b) She granted land to merchants and weavers to promote the textile industry.

Explanation:

- **Economic Development:** Ahilyabai Holkar focused on **promoting local industries**, especially textiles.
- **Land Grants:** She provided **land to weavers and merchants**, fostering the growth of the **Maheshwari saree industry**, which contributed to the region's economic stability.
- **Industrial Support:** Her policies were aimed at **empowering local artisans** and merchants, integrating them into the economic framework.
- **No Standardized Currency or Banking System:** Unlike other reforms seen elsewhere, there's no historical evidence of her **standardizing currency** or **setting up a centralized banking system**.
- **Trade-Friendly Environment:** By avoiding high import tariffs, she created a **conducive environment for trade**.

2) **Answer:** (c) Developing bioengineering and material science experiments under microgravity conditions.

Explanation:

- **Microgravity Research:** The primary objective of **Ax-4** is to leverage the **microgravity environment** aboard the ISS for **scientific experiments**.
- **Focus Areas:** Key areas include **bioengineering, pharmaceuticals,** and **material science**, which benefit from the unique conditions in space.
- **Not Focused on Medical or Tourism:** Unlike other missions, it doesn't specifically target **medical research** on human endurance or **commercial space tourism**.
- **Technological Advancements:** These experiments can lead to **innovations** in drug development and advanced materials that are difficult to achieve on Earth.

3) **Answer:** (d) Cold temperatures slow down the natural oxidation of ammonia in water.

Explanation:

- **Chemical Processes:** In winter, **low temperatures** reduce the **rate of nitrification**, where ammonia is converted into less harmful nitrites and nitrates.
- **Persistent Ammonia Levels:** As a result, **ammonia remains in the water longer**, leading to higher contamination levels.
- **Agricultural Activity:** Contrary to what might be assumed, **agricultural runoff** is typically higher during the monsoon, not winter.
- **Water Flow:** Winter also sees **reduced river flow**, compounding the problem by diluting the natural purification capacity.

4) **Answer:** (d) 1 and 3 only.

Explanation:

- **Natural and Human Sources:** Ammonia arises **naturally** (from decaying matter) and **anthropogenically** (fertilizers, livestock waste).
- **Volcanic Eruptions:** They primarily emit **sulfur dioxide (SO₂)** and **carbon dioxide (CO₂)**, not ammonia, making statement 2 incorrect.

- **Agriculture's Role:** **Livestock waste** and **fertilizer use** are key contributors to ammonia pollution, especially in rural areas.

5) **Answer:** (b) Livestock excrete nitrogen-rich waste, which volatilizes into ammonia.

Explanation:

- **Decomposition of Manure:** **Livestock manure**, rich in nitrogen (mainly urea), **breaks down** and releases ammonia gas into the atmosphere.
- **Ammonia Emissions:** This is a **significant source** of ammonia emissions globally, often surpassing industrial contributions.
- **Feed Production:** While impactful in other environmental aspects, **feed production** does not directly contribute to ammonia emissions like manure does.

6) **Answer:** (a) 1 and 2 only.

Explanation:

- **Historical Shift:** The Yamuna was initially a **tributary of the Saraswati River**, which changed due to **tectonic movements**.
- **Tectonic Influence:** Its current course was shaped by **Himalayan tectonics during the Quaternary period**.
- **No Rift Valley:** Unlike the Narmada and Tapi rivers, the **Yamuna does not follow a rift valley**; it flows through the **plains**.

7) **Answer:** (c) 3 and 4 only.

Explanation:

- **Lower Course Dependency:** In its **lower course**, the Yamuna relies heavily on **groundwater inflow** and **treated wastewater**, especially downstream of Delhi.
- **Natural Flow Reduction:** Natural sources like **glacial melt** and **rainfall** are more critical upstream, while downstream they're diverted for agriculture and domestic use.

8) **Answer:** (b) Only two.

Explanation:

- **RBI's Role:** The **PSS Act, 2007** empowers the **RBI to regulate, supervise,** and **control** payment systems.
- **Foreign Entities:** They **must obtain RBI approval** before operating payment systems in India, contrary to what statement 2 suggests.
- **Penalties:** The RBI can **impose fines** and **revoke licenses** for non-compliance, ensuring a regulated financial ecosystem.

9) **Answer:** (c) 1 only.

Explanation:

- **Bacterial Characteristics:** **Salmonella** is indeed a **gram-negative, rod-shaped bacterium** affecting the **gastrointestinal tract**.
- **Severity of Illness:** Not all **Salmonella strains** cause severe illness; many result in mild symptoms or are asymptomatic.
- **Acid Resistance:** **Salmonella can survive in acidic environments**, like the stomach, through **acid resistance mechanisms**.

10) Answer: (a) 1 and 3 only.

Explanation:

- **Climate Influence:** Warm and humid climates create ideal conditions for **Salmonella growth**, explaining higher outbreak rates in such areas.
- **Refrigeration:** Merely slows bacterial growth; it does not kill **Salmonella**. Effective elimination requires cooking at high temperatures.
- **Cross-Contamination:** A common cause of infection is **cross-contamination** between raw and cooked foods, highlighting the need for **strict hygiene practices**.

11) Answer: (d) To promote rooftop solar energy installations and provide free electricity to households up to a certain limit.

Explanation:

- The scheme encourages **rooftop solar adoption** to increase India's share of renewable energy.
- Provides **up to 300 units of free electricity per month** through government-subsidized solar panel installations.
- **Ministry:** Ministry of New and Renewable Energy (MNRE).
- **Financial Outlay:** ₹75,021 crore, with incentives for **DISCOMs** to facilitate installations.
- The scheme **does not mandate 100% solar adoption** and is focused on **households**, not commercial/industrial projects.

12) Answer: (a) Only one.

Explanation:

- **Correct Statement:** The DRC is the **second-largest country in Africa** by area, after Algeria.
- **Incorrect Statement:** The **Congo River is the second-longest river** in Africa, after the Nile.
- **Incorrect Statement:** The DRC **has a coastline** (37 km along the Atlantic Ocean), making the claim of "no coastline" incorrect.

13) Answer: (b) To integrate MSMEs into a unified digital ecosystem to enhance market access.

Explanation:

- The **TEAM (Trade Enablement and Marketing) Initiative** aims to **digitally integrate MSMEs** using the **Open Network for Digital Commerce (ONDC)**.
- Focuses on **market access, reducing operational costs**, and empowering MSMEs in e-commerce.
- Aims to onboard **5 lakh MSMEs** and ensure **50% participation of women-led businesses**.
- Not focused on **direct financial subsidies** or traditional marketing.

14) Answer: (b) Only two.

Explanation:

- **Incorrect:** Fusion involves **light atomic nuclei** (Hydrogen isotopes) fusing to form a **heavier nucleus (Helium)**, not heavy nuclei.
- **Correct:** Requires **extremely high temperatures (100 million Kelvin)** to overcome **electrostatic repulsion** between atomic nuclei.
- **Incorrect:** Unlike fission, **fusion does not produce long-lived radioactive waste**; Helium is the primary byproduct, and radioactive elements (like Tritium) have **shorter half-lives**.

15) Answer: (b) Only two.

Explanation:

- **Correct:** Implemented by the **Ministry of Mines**, focusing on **critical minerals for renewable energy, defense, and electronics**.
- **Incorrect:** The mission includes **both domestic exploration and overseas acquisitions**, not just domestic mining.
- **Correct:** Aims to **reduce dependence on China** for **Rare Earth Elements (REEs)** and **Lithium**, crucial for EV batteries and high-tech industries.

16) Answer: (a) Only one.

Explanation:

- **Correct:** The retina **converts light into neural signals**, which are transmitted to the brain via the **optic nerve**.
- **Incorrect:** **Rod cells** are responsible for **night vision**, while **cone cells** handle **color vision** in bright light.
- **Incorrect:** Retinal diseases affect the **retina**, not the **cornea**; the cornea is the **transparent outer layer of the eye**.

17) Answer: (c) It aims to establish a global framework for ethical AI regulation and governance.

Explanation:

- The summit focuses on **global AI regulation** to balance **innovation and ethical AI development**.
- Co-chaired by **French President Emmanuel Macron and Indian PM Narendra Modi**.
- It is **not the first AI Summit** (earlier summits include Bletchley Park 2023, Seoul 2024).
- Includes **global participation**, not just Europe.

18) Answer: (a) Only one.

Explanation:

- **Incorrect:** The scheme is implemented by **Ministry of New and Renewable Energy (MNRE)**, not the **Ministry of Power**.
- **Incorrect:** Beneficiaries **cannot avail multiple subsidies** from different government schemes.
- **Correct:** Households **can sell surplus solar electricity** back to the grid.

19) Answer: (c) All three.

Explanation:

- **Correct:** Focuses on **global AI regulatory framework** to prevent AI misuse.
- **Correct:** Aims to **bridge AI development gaps** between developed and developing nations.
- **Correct:** Addresses **AI monopolization** by tech giants like **Google, Microsoft, Amazon** to ensure fair AI access.

20) Answer: (d) Retinitis Pigmentosa.

Explanation:

- **Retinitis Pigmentosa (RP)** is an **inherited retinal disease** caused by **genetic mutations**, leading to **progressive vision loss**.
- Starts with **night blindness** and **peripheral vision loss**, eventually leading to **complete blindness**.
- Unlike **Diabetic Retinopathy** or **AMD**, RP is caused by **genetic factors**.

21) **Answer:** (c) A regulated platform for trading IPO-allotted shares before official listing.

Explanation:

- **Purpose:** Allows trading of IPO shares between allotment and official listing in a regulated manner.
- **Regulation:** Operates under SEBI's oversight to reduce grey market trading and ensure transparency.
- **Settlement Cycle:** Works within T+3 days, preventing informal and speculative trading.
- **Difference from Grey Market:** Unlike the unregulated grey market, this platform provides a formal and safer alternative for IPO investors.

22) **Answer:** (d) Both (b) and (c).

Explanation:

- **GSLV Mk I & Mk II:** Used cryogenic upper stages (CUS), but Mk I relied on Russian cryogenic engines, while Mk II used the indigenous CE-7.5 engine.
- **GSLV Mk III (LVM3):** Uses an advanced cryogenic stage (C25) with CE-20 engine, making it India's most powerful cryogenic propulsion system.
- **PSLV:** Does not use cryogenic propulsion, instead employing a solid-liquid-solid-liquid (four-stage) configuration.

23) **Answer:** (a) Only one.

Explanation:

- **Incorrect:** ASER is conducted by Pratham NGO, not NSSO.
- **Incorrect:** ASER focuses on rural areas, not urban schools.
- **Correct:** ASER evaluates foundational literacy and numeracy (FLN) in children across three groups:
 - Pre-primary (3-5 years)
 - Elementary (6-14 years)
 - Older children (15-16 years)

24) **Answer:** (a) Only one.

Explanation:

- **Correct:** SEBI regulates both primary (IPO) and secondary (stock exchanges) markets.
- **Incorrect:** SEBI mandates a T+3 settlement cycle, not T+5.
- **Incorrect:** The grey market operates outside SEBI's regulatory framework and is not formally regulated.

25) **Answer:** (d) None.

Explanation:

- **Incorrect:** Bhashini is developed by Ministry of Electronics and IT (MeitY), not NITI Aayog.
- **Incorrect:** Supports 22 Indian languages, not just Hindi and English.
- **Incorrect:** It is open-source and available for private use, startups, and MSMEs, not just government applications.

26) **Answer:** (a) Only one.

Explanation:

- **Incorrect:** WHO promotes lower-sodium substitutes like potassium chloride, not higher-sodium alternatives.
- **Incorrect:** Guidelines exclude pregnant women, children, and those with kidney issues due to potential health risks.
- **Correct:** The main objective is to reduce sodium intake to lower cardiovascular disease risks.

27) **Answer:** (c) A method where human evaluators fine-tune the AI model by ranking generated responses.

Explanation:

- **Training Process:** Involves supervised learning, where human evaluators rank model-generated responses to train a reward model.
- **Reinforcement Learning:** AI is further optimized based on human preferences, improving response quality.
- **Difference from Other Methods:** Unlike historical data-based training, RLHF actively incorporates human oversight for better alignment with human expectations.

28) **Answer:** (b) Only two.

Explanation:

- **Incorrect:** PSLV is not the only operational launch vehicle for interplanetary missions; GSLV Mk III (LVM3) is also capable.
- **Correct:** GSLV Mk III (LVM3) is India's heaviest launch vehicle, designed for satellite launches and human spaceflight (Gaganyaan mission).
- **Incorrect:** SSLV is entirely solid-fuelled, not a hybrid propulsion system.

29) **Answer:** (b) Only two.

Explanation:

- **Incorrect:** WASP-127b is a Hot Jupiter, not a Super-Earth (it is a gas giant, not rocky).
- **Correct:** Its atmosphere is highly transparent, making it ideal for spectroscopic studies.
- **Correct:** Discovered using the transit method, where its light curve dips as it passes in front of its host star.

30) **Answer:** (b) Only two.

Explanation:

- **Correct:** Next-Generation Launch Vehicle (NGLV) is planned to replace PSLV and GSLV for future missions.
- **Correct:** Unified Launch Vehicle (ULV) is designed as a modular system for different payload configurations, reducing costs.
- **Incorrect:** ISRO does not yet have a fully reusable orbital launch system like SpaceX's Starship; RLV concepts are still in development.

31) **Answer:** (d) It provides exporters the option to authenticate documents using blockchain technology.

Explanation:

- **Correct Features:** The eCoO 2.0 system facilitates the issuance of both preferential and non-preferential Certificates of Origin (CoO).
- **Re-export Capability:** Allows for back-to-back CoOs for re-exported goods.
- **Mandatory Online Processing:** From January 1, 2025, all non-preferential CoOs must be processed online.
- **No Blockchain Integration:** The system does not yet use blockchain technology for authentication but supports Aadhaar-based e-signing and digital signatures.

32) **Answer:** (d) Introduction of invasive species like the Nile Perch.

Explanation:

- **Major Disruption:** The Nile Perch, introduced in the 1950s, led to a **drastic decline in native fish species**, particularly cichlids, disturbing the ecosystem.
- **Biodiversity Loss:** The food chain was disrupted, leading to **imbalanced aquatic life**.
- **Other Factors:** While climate change affects the lake, factors like **volcanic activity and salinity increase** are **not major contributors**.

33) **Answer:** (c) To provide international recognition to cities that demonstrate exceptional efforts in conserving and sustainably managing their wetlands.

Explanation:

- **Recognition Initiative:** The WCA scheme acknowledges cities that **actively protect and manage wetlands**.
- **Introduced in COP12 (2015):** Established under the Ramsar Convention to **encourage sustainable urban wetland conservation**.
- **Accreditation Validity:** Cities receive **recognition for six years**, with renewal options.
- **Indian Examples:** Indore (Sirpur Lake) and Udaipur (Pichola, Fateh Sagar Lakes) received accreditation.

34) **Answer:** (b) Only two.

Explanation:

- **Correct:** Originated as **martial training for Maratha soldiers**, enhancing **agility and coordination**.
- **Incorrect:** Not limited to **female dancers or Navratri celebrations**; performed by **both men and women** at various events.
- **Correct:** Uses **percussion instruments** like Dhol, Nagara, and Tasha for rhythmic beats.

35) **Answer:** (a) High sea surface temperatures and increased latent heat flux.

Explanation:

- **Fuel for Cyclone:** Warmer sea surface temperatures supply **latent heat**, intensifying storms.
- **Bombogenesis Process:** Interaction between **cold Arctic air and warm oceanic air** fueled rapid storm intensification.
- **Strong Jet Stream Influence:** A **high-speed jet stream** (200+ mph winds) contributed to **storm deepening**.

36) **Answer:** (b) Only two.

Explanation:

- **Correct:** Piezoelectric lighters use **quartz crystals** to generate sparks without batteries.
- **Correct:** Electronic lighters require an **external power source** (batteries).
- **Incorrect:** Piezoelectric lighters **do not require recharging**, as they work through **mechanical pressure**.

37) **Answer:** (b) The Portuguese had strong international support and refused to negotiate.

Explanation:

- **Portuguese Resistance:** Unlike princely states, Portugal **refused negotiations** on Goa's integration.

- **Western Diplomatic Support:** As a NATO member, Portugal received **international backing**, delaying India's intervention.
- **Final Liberation (1961):** Operation Vijay led to Goa's liberation on **December 19, 1961**.

38) **Answer:** (a) The Punjab National Bank (PNB).

Explanation:

- **Founded in 1894:** Lala Lajpat Rai co-founded PNB to promote **financial independence from British-controlled banks**.
- **Swadeshi Movement Influence:** Aimed at **reducing economic dependence** on British institutions.
- **Role in Freedom Movement:** Lal-Bal-Pal trio (Lala Lajpat Rai, Bal Gangadhar Tilak, Bipin Chandra Pal) emphasized **economic nationalism**.

39) **Answer:** (c) Statement-I is correct but Statement-II is incorrect.

Explanation:

- **Correct:** eCoO 2.0 **improves transparency and efficiency** in India's **export certification process**.
- **Incorrect:** It **does not replace all other DGFT trade documentation platforms** but serves as an **upgrade** to the existing system.

40) **Answer:** (a) Only one.

Explanation:

- **Incorrect:** BHU was founded by **Madan Mohan Malaviya**, not Lala Lajpat Rai.
- **Incorrect:** Purna Swaraj (Complete Independence) was first demanded by **Bal Gangadhar Tilak** and later formalized in **1929**.
- **Correct:** Servants of the People Society (1921) was established by **Lala Lajpat Rai** to promote **social reform and nationalistic ideals**.

41) **Answer:** (a) Recent recovery from tuberculosis or other lung infections.

Explanation:

- **Primary Risk Factor:** CPA primarily affects individuals with **pre-existing lung damage** from infections like **tuberculosis (TB), COPD, and sarcoidosis**.
- **Favorable Environment for Aspergillus:** Damaged lung tissue provides a **suitable environment** for Aspergillus fungi to colonize.
- **Other Factors:** **Second-hand smoke, NSAIDs, or high-altitude living** are not significant contributors to CPA development.

42) **Answer:** (b) 2 and 3 only.

Explanation:

- **Correct:** Introduced to protect **freed slaves' rights** post-Civil War.
- **Correct:** Forms the **legal foundation for equal protection** under US law.
- **Incorrect:** **Excludes children of foreign diplomats** from birthright citizenship.

43) **Answer:** (c) 1 and 2 only.

Explanation:

- **Correct:** Oceans are **deeper** than seas, with **Challenger Deep (~36,070 ft)** as the deepest ocean point.

- **Correct:** Seas generally have **higher salinity** due to **limited water exchange** and **higher evaporation rates**.
- **Incorrect:** Oceans play a **dominant role** in **global climate regulation**, not seas.

44) Answer: (c) Only three.

Explanation:

- **Correct:** Paraquat is a **bipyridyl herbicide** widely used in agriculture.
- **Correct:** Even **small ingestion amounts** can cause **severe toxicity and organ failure**.
- **Correct:** **Pulmonary fibrosis** is a **common delayed complication** of paraquat poisoning.
- **Incorrect:** **Hemodialysis is ineffective** due to paraquat's **high tissue binding capacity**.

45) Answer: (c) To address concerns over market-linked returns in NPS by guaranteeing lifelong pensions.

Explanation:

- **Objective:** Eliminates **NPS-linked uncertainties** by **guaranteeing retirement benefits**.
- **Guaranteed Pension:** Employees receive **50% of the last drawn basic pay** as a **monthly pension**.
- **Market Risk Reduction:** Provides **financial security** unlike the **market-driven NPS**.

46) Answer: (d) 1, 2, and 3 only.

Explanation:

- **Correct:** Poor **stormwater infrastructure** **worsens tidal flooding** by **hindering drainage**.
- **Correct:** Influenced by **gravitational forces of the moon and sun**.
- **Correct:** **Coastal erosion** **increases flooding impact** by **reducing land barriers**.
- **Incorrect:** Not **limited to tropical regions**; occurs in **various coastal areas globally**.

47) Answer: (a) 1 and 2 only.

Explanation:

- **Correct:** Surrounded by **tropical moist and dry deciduous vegetation**, including **Phoenix trees**.
- **Correct:** Home to **rare bird species** like **Sarus Crane** and **Bristled Grassbird**.
- **Incorrect:** It supports **migratory species** like **Bar-headed Goose** and **Red-crested Pochard**.

48) Answer: (d) None.

Explanation:

- **Incorrect:** CPA affects the **lungs, not the gastrointestinal tract**.
- **Incorrect:** Caused by **fungal spores**, not **viral infections**.
- **Incorrect:** **Antibiotics are ineffective**; CPA is treated with **antifungal therapy**.

49) Answer: (a) Only one.

Explanation:

- **Correct:** **Saltwater intrusion** into **freshwater supplies** is a **major consequence**.
- **Incorrect:** Does not **always lead to permanent submersion**; usually **temporary**.
- **Incorrect:** Tidal flooding is **not always caused by storm surges**; can occur due to **high tides, sea-level rise, and erosion**.

50) Answer: (b) Only two.

Explanation:

- **Correct:** Regulated by the **Pension Fund Regulatory and Development Authority (PFRDA)**.
- **Correct:** Guarantees a **monthly pension of 50% of last 12-month average basic pay**.
- **Incorrect:** Employees contribute **10% of their basic pay**, not **15%**.

