1. Consider the following statements regarding the I-2SEA Submarine Cable System:

1. The I-2SEA Submarine Cable System is an undersea fiber-optic network designed to connect India with major digital hubs in Southeast Asia.
2. Mumbai serves as the primary cable landing station for the I-2SEA system in India.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Answer: (a)

Explanation:

Statement 1 is correct.
The **India–Southeast Asia (I-2SEA) Submarine Cable System** is a next-generation undersea fiber-optic cable network that connects India with key Southeast Asian digital hubs such as Singapore and Kuala Lumpur, enabling high-capacity and low-latency data transmission.

Statement 2 is incorrect.
The system does **not** land at Mumbai. Instead, it has **two landing stations on India's east coast—Machilipatnam (Andhra Pradesh)** and **South Chennai (Tamil Nadu)**. These locations improve connectivity to major data centers while avoiding heavily congested submarine cable routes.

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2. Consider the following statements regarding Matcha Tea:

Statement I: Matcha is a finely ground green tea powder in which the entire tea leaf is consumed rather than being steeped and discarded.

Statement II: Authentic matcha is produced from tea leaves that are shade-grown for several weeks prior to harvesting.

Which one of the following is correct in respect of the above statements?

(a) Both Statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I.
(b) Both Statement-I and Statement-II are correct but Statement-II is not the correct explanation for Statement-I.
(c) Statement-I is correct but Statement-II is incorrect.
(d) Statement-I is incorrect but Statement-II is correct.

Answer: (b)

Explanation:

Statement I is correct.
Unlike conventional green tea, where the leaves are infused in hot water and later removed, **matcha** is consumed as a fine powder mixed directly into water, allowing the entire tea leaf to be ingested.

Statement II is correct.
Before harvesting, matcha tea plants are cultivated under shade for approximately **three to four weeks**. This process increases chlorophyll content and amino acid levels, enhancing the tea's vibrant green color and distinctive flavor.

However, **Statement II does not explain Statement I**. The shading technique relates to cultivation and quality enhancement, whereas Statement I refers to the method of preparation and consumption. Therefore, Statement II is **not** the correct explanation for Statement I.

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3. Consider the following statements regarding the geography of Mali:

1. Mali is a landlocked country with no direct access to the sea.
2. The Niger River flows through Mali and serves as a major waterway supporting agriculture, fisheries, and transportation.
3. Bamako is the capital city of Mali.

Which of the following is correct?

(a) All three statements are correct.
(b) None of the statements is correct.
(c) Only Statements 2 and 3 are correct.
(d) Only one statement is correct.

Answer: (a)

Explanation:

Statement 1 is correct.
Mali is a **landlocked country in West Africa**, surrounded entirely by land and dependent on neighboring countries for maritime access.

Statement 2 is correct.
The **Niger River** is Mali's most significant river. It forms a vast inland delta and plays a crucial role in irrigation, fishing, inland navigation, and sustaining livelihoods in the country's semi-arid regions.

Statement 3 is correct.
Bamako, situated on the banks of the Niger River, is the capital and largest city of Mali.

Hence, **all three statements are correct**.

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4. Consider the following statements regarding the legal admissibility of polygraph tests in India:

Statement I: Polygraph test results are not admissible as substantive evidence to establish the guilt of an accused in a criminal trial.

Statement II: In *Selvi v. State of Karnataka* (2010), the Supreme Court held that involuntary administration of polygraph and similar scientific tests violates the constitutional protections against self-incrimination and infringes personal liberty.

Which one of the following is correct in respect of the above statements?

(a) Both Statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I.
(b) Both Statement-I and Statement-II are correct but Statement-II is not the correct explanation for

Statement-I.
(c) Statement-I is correct but Statement-II is incorrect.
(d) Statement-I is incorrect but Statement-II is correct.

Answer: (a)

Explanation:

Statement I is correct.
Polygraph test results are **not admissible as primary evidence** to establish criminal liability because of concerns regarding their scientific reliability and constitutional validity.

Statement II is correct.
In ***Selvi v. State of Karnataka (2010)***, the Supreme Court ruled that the involuntary administration of polygraph, narco-analysis, and brain-mapping tests violates **Article 20(3)** (protection against self-incrimination) and **Article 21** (right to personal liberty).

The Court also clarified that while the test results themselves are inadmissible as substantive evidence, any material evidence subsequently discovered through **voluntarily obtained** information may be admissible under **Section 27 of the Indian Evidence Act**.

Therefore, **Statement II correctly explains Statement I**.

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5. Consider the following statements regarding the safety functions of a Battery Management System (BMS):

Statement I: When a battery cell exceeds its safe operating temperature, the Battery Management System can reduce power output or initiate cell-balancing measures to protect the battery pack.

Statement II: During electrical faults such as short circuits or overcurrent conditions, the Battery Management System can isolate the battery by disconnecting the charging or discharging circuit through electronic switches or relays.

Which one of the following is correct in respect of the above statements?

(a) Both Statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I.
(b) Both Statement-I and Statement-II are correct but Statement-II is not the correct explanation for Statement-I.
(c) Statement-I is correct but Statement-II is incorrect.
(d) Statement-I is incorrect but Statement-II is correct.

Answer: (b)

Explanation:

Statement I is correct.
A **Battery Management System (BMS)** continuously monitors battery temperature and can reduce power output or perform cell balancing to minimize thermal stress and reduce the risk of thermal runaway.

Statement II is correct.
The BMS also safeguards the battery by using **MOSFETs, contactors, or relays** to disconnect charging or discharging circuits during electrical faults such as overcurrent or short circuits.

Although both statements describe important safety functions, **Statement II does not explain Statement I**. The former deals with electrical isolation during fault conditions, whereas the latter relates to thermal management and cell balancing.

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6. Recent linguistic research on sperm whale communication has revealed which one of the following findings?

(a) Sperm whales produce long, melodious songs comparable to those of humpback whales.

(b) Sperm whales modify the frequency characteristics of individual clicks, generating acoustic patterns similar to the formants that distinguish human vowel sounds.

(c) Their communication relies solely on a simple binary code incapable of conveying contextual information.

(d) Their clicking sounds are merely involuntary responses to pressure changes experienced during deep dives.

Answer: (b)

Explanation:

Option (b) is correct.
Recent studies indicate that sperm whales can vary the **frequency spectrum within individual clicks**, creating acoustic peaks analogous to **human formants**, which are responsible for distinguishing vowel sounds. This finding suggests a far more sophisticated communication system than previously understood.

Option (a) is incorrect.
Unlike humpback whales, sperm whales communicate primarily through **short rhythmic click sequences known as codas**, rather than prolonged songs.

Option (c) is incorrect.
Their communication system is highly structured and capable of conveying complex information, rather than relying on a simple binary code.

Option (d) is incorrect.
The clicking sounds are **deliberately produced for communication and echolocation**, not merely involuntary physiological responses to deep-sea pressure changes.

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7. Consider the following statements regarding the Pashujanya Yudh Abhyas (PYA):

1. Pashujanya Yudh Abhyas (PYA) is an international military exercise conducted to develop joint operational strategies against bio-terrorism.
2. The mock exercise simulates an **Influenza A (H1N1)** outbreak to evaluate outbreak detection and response mechanisms under the **One Health** framework.
3. The **National Joint Outbreak Response Team (NJORT)** functions as the central coordinating agency during the exercise.

Which of the following is correct?

(a) All three statements are correct.
(b) None of the statements is correct.

(c) Only Statements 2 and 3 are correct.
(d) Only one statement is correct.

Answer: (c)

Explanation:

Statement 1 is incorrect.
Pashujanya Yudh Abhyas (PYA) is a **national-level mock exercise**, not an international military exercise. Conducted under the **National One Health Mission**, its objective is to strengthen India's preparedness and coordinated response to zoonotic disease outbreaks rather than military bio-terrorism scenarios.

Statement 2 is correct.
The exercise uses a **simulated Influenza A (H1N1) outbreak** to assess surveillance, containment, and response mechanisms under the **One Health** approach. It evaluates early detection systems and preparedness for disease transmission across animal, wildlife, and human populations.

Statement 3 is correct.
The exercise is coordinated through the **National Joint Outbreak Response Team (NJORT)**, which integrates multiple ministries, scientific institutions such as **ICMR** and **ICAR**, and state authorities to ensure a synchronized response during public health emergencies.

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8. Match the following components of a Polygraph Test with their corresponding physiological functions:

Column A (Component)	Column B (Physiological Function)
1. Pneumograph Tubes	**A.** Measures changes in skin conductivity resulting from sweat gland activity.
2. Cardiovascular Cuff	**B.** Records variations in breathing rate and respiratory depth.
3. Galvanic Skin Response (GSR) Sensors	**C.** Monitors heart rate, pulse, and blood pressure.

Select the correct answer using the code given below:

(a) 1-C, 2-B, 3-A
(b) 1-A, 2-C, 3-B
(c) 1-B, 2-A, 3-C
(d) 1-B, 2-C, 3-A

Answer: (d)

Explanation:

The correct matching is as follows:

Component	Correct Function
1. Pneumograph Tubes	**B.** Measure changes in breathing rate and respiratory depth by recording chest and abdominal movements.
2. Cardiovascular Cuff	**C.** Continuously monitors heart rate, pulse, and blood pressure during the examination.

Component	Correct Function
3. Galvanic Skin Response (GSR) Sensors	**A.** Detect changes in skin conductivity caused by increased sweat gland activity associated with stress or emotional arousal.

Therefore, the correct sequence is:

1 – B, 2 – C, 3 – A

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9. Consider the following statements regarding the Medical Innovations Patent Mitra Initiative:

1. The Medical Innovations Patent Mitra Initiative serves as a digital platform that supports healthcare innovators in securing and commercializing intellectual property.
2. The initiative is administered by the **Department for Promotion of Industry and Internal Trade (DPIIT)**.
3. The initiative provides complete financial support only for domestic patent filings, while international patent applications are excluded from its funding.

Which of the following is correct?

(a) Only Statements 1 and 2 are correct.
(b) Only Statements 1 and 3 are correct.
(c) All three statements are correct.
(d) Only Statement 1 is correct.

Answer: (d)

Explanation:

Statement 1 is correct.
The **Medical Innovations Patent Mitra Initiative** functions as a centralized digital platform that assists medical researchers and innovators in protecting intellectual property and facilitating the commercialization of healthcare innovations.

Statement 2 is incorrect.
The initiative is developed and administered by the **Indian Council of Medical Research (ICMR)**, not the **Department for Promotion of Industry and Internal Trade (DPIIT)**.

Statement 3 is incorrect.
The initiative provides **government-funded legal and financial support for both domestic and international patent filings**, including patent drafting, prosecution, and maintenance, thereby reducing financial barriers faced by researchers.

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10. Consider the following statements regarding the Battery Management System (BMS):

1. A Battery Management System (BMS) is an electronic control system that monitors and manages the electrical and physical parameters of individual battery cells within a battery pack.
2. One of the primary objectives of a BMS is to increase performance differences among individual cells in order to create localized high-voltage regions within the battery pack.
3. The BMS employs built-in sensors to continuously monitor parameters such as voltage, current, and temperature.

Which of the following is correct?

(a) All three statements are correct.
(b) None of the statements is correct.
(c) Only Statements 1 and 3 are correct.
(d) Only one statement is correct.

Answer: (c)

Explanation:

Statement 1 is correct.
A **Battery Management System (BMS)** is an electronic control unit responsible for monitoring and regulating the operating conditions of individual battery cells to ensure safety, efficiency, and long-term performance.

Statement 2 is incorrect.
The purpose of a BMS is to **minimize performance differences among cells** by maintaining balanced charging and discharging. Deliberately creating localized high-voltage zones would compromise battery stability, accelerate degradation, and increase the risk of thermal runaway.

Statement 3 is correct.
The BMS continuously monitors critical operating parameters such as **voltage, current, and temperature** using integrated sensors. It also estimates battery characteristics such as **State of Charge (SoC)** and **State of Health (SoH)** to optimize battery performance and ensure operational safety.

11.Consider the following statements regarding the Great Indian Bustard:

Statement I: The **Great Indian Bustard** is regarded as a flagship indicator species for the ecological health of India's dry grassland and scrubland ecosystems.

Statement II: Indicator species are highly sensitive to changes in environmental conditions, and fluctuations in their populations provide valuable insights into the health and integrity of the ecosystems they inhabit.

Which one of the following is correct in respect of the above statements?

(a) Both Statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I.
(b) Both Statement-I and Statement-II are correct but Statement-II is not the correct explanation for Statement-I.
(c) Statement-I is correct but Statement-II is incorrect.
(d) Statement-I is incorrect but Statement-II is correct.

Answer: (a)

Explanation:

Statement I is correct.
The **Great Indian Bustard** is recognized as a flagship indicator species for India's **grassland and semi-arid ecosystems**. Its presence, breeding success, and population trends provide important information about the ecological condition of these fragile habitats.

Statement II is correct.
Indicator species are selected because they are **highly responsive to environmental changes**.

Variations in their populations often reflect habitat degradation, pollution, fragmentation, or other ecological disturbances.

Since the Great Indian Bustard's survival is closely linked to the health of grassland ecosystems, **Statement II correctly explains Statement I**.

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12. In the context of virology and vaccine development, the term "viral interference" refers to:

(a) A process in which host cells undergo spontaneous genetic mutations that prevent all viruses from attaching to their surface.

(b) The blockage of blood vessels caused by the accumulation of synthetic nanoparticles used in vaccine formulations.

(c) A phenomenon in which one viral strain replicates more efficiently within a host and suppresses the replication of other co-infecting or co-administered viral strains.

(d) The transmission of viruses through electromagnetic fields or high-voltage power transmission lines.

Answer: (c)

Explanation:

Option (c) is correct.
Viral interference is a biological phenomenon in which one virus or viral strain replicates more successfully inside the host, thereby inhibiting the replication of other viral strains present simultaneously.

This phenomenon is particularly relevant in the development of **multivalent live-attenuated vaccines**, such as dengue vaccines. If one vaccine strain dominates replication, it may suppress the others, leading to an uneven immune response. Such an imbalance can reduce vaccine effectiveness and, in certain situations, contribute to **Antibody-Dependent Enhancement (ADE)**.

Option (a) is incorrect.
Viral interference does not involve spontaneous genetic mutations in host cells that block viral attachment.

Option (b) is incorrect.
It has no connection with nanoparticle-induced blockage of blood vessels.

Option (d) is incorrect.
Viruses are not transmitted through electromagnetic fields or electrical transmission lines.

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13. The term "Velvet Divorce" in international relations refers to:

(a) The peaceful settlement of maritime boundary disputes between India and its neighboring coastal countries.

(b) The withdrawal of the Russian Federation from the G8 grouping following geopolitical developments.

(c) The peaceful dissolution of Czechoslovakia into the independent states of the Czech Republic and Slovakia in 1993.

(d) The abolition of colonial-era pilgrimage taxation policies by the East India Company.

Answer: (c)

Explanation:

Option (c) is correct.
The **Velvet Divorce** refers to the **peaceful dissolution of Czechoslovakia** on **1 January 1993**, resulting in the emergence of two sovereign nations—the **Czech Republic** and **Slovakia**.

The separation occurred without armed conflict or political violence, making it one of the most peaceful state dissolutions in modern history.

Option (a) is incorrect.
The term has no relation to maritime boundary settlements involving India.

Option (b) is incorrect.
It does not refer to Russia's exit from the G8.

Option (d) is incorrect.
It is unrelated to colonial taxation policies under the East India Company.

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14. Consider the following statements regarding the WT-MARUT Portal:

1. The WT-MARUT Portal was launched jointly by the **Ministry of Culture** and the **Archaeological Survey of India (ASI)**.
2. The portal has been developed primarily to facilitate the repatriation of prehistoric bronze artefacts from museums located abroad.
3. The WT-MARUT Portal functions as a business-to-business (B2B) digital platform that supports India's domestic wind energy manufacturing ecosystem.

Which of the following is correct?

(a) All three statements are correct.
(b) Only Statement 3 is correct.
(c) Only Statements 2 and 3 are correct.
(d) None of the statements is correct.

Answer: (b)

Explanation:

Statement 1 is incorrect.
The **WT-MARUT Portal** was launched by the **Ministry of New and Renewable Energy (MNRE)** during the **Global Wind Day Conference**. It has no association with the Ministry of Culture or the Archaeological Survey of India.

Statement 2 is incorrect.
The portal is **not related to the repatriation of cultural artefacts**. Instead, it has been created to strengthen and streamline India's wind energy manufacturing ecosystem.

Statement 3 is correct.
WT-MARUT is India's first **Business-to-Business (B2B) digital platform** dedicated to the wind energy sector. It connects wind turbine manufacturers, component suppliers, developers, independent power producers, and policymakers, thereby improving coordination across the domestic wind supply chain.
