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All India Prelims Mock Test - 02 - Answer Key									
1. (d)	11. (a)	21. (a)	31. (c)	41. (b)	51. (c)	61. (c)	71. (d)	81. (b)	91. (a)
2. (c)	12. (b)	22. (c)	32. (c)	42. (c)	52. (b)	62. (a)	72. (b)	82. (a)	92. (d)
3. (a)	13. (b)	23. (b)	33. (b)	43. (a)	53. (b)	63. (a)	73. (c)	83. (c)	93. (d)
4. (b)	14. (b)	24. (c)	34. (d)	44. (b)	54. (d)	64. (c)	74. (a)	84. (d)	94. (a)
5. (d)	15. (a)	25. (c)	35. (b)	45. (a)	55. (c)	65. (a)	75. (d)	85. (d)	95. (a)
6. (a)	16. (d)	26. (a)	36. (c)	46. (a)	56. (c)	66. (d)	76. (c)	86. (d)	96. (c)
7. (a)	17. (d)	27. (b)	37. (b)	47. (b)	57. (c)	67. (a)	77. (c)	87. (b)	97. (a)
8. (d)	18. (b)	28. (a)	38. (b)	48. (a)	58. (d)	68. (b)	78. (b)	88. (c)	98. (c)
9. (c)	19. (c)	29. (c)	39. (b)	49. (c)	59. (c)	69. (b)	79. (a)	89. (c)	99. (d)
10. (d)	20. (a)	30. (a)	40. (b)	50. (d	60. (b)	70. (a)	80. (b)	90. (b)	100. (c)

Q1.
Answer: d
Explanation:

- **Parliamentary Sovereignty** means unlimited and unconstrained power of the Parliament to enact and alter laws. It is a feature of the unitary system of polity, as in the United Kingdom and Canada, etc.
- **The Constitution of India** establishes India as a sovereign nation by stating that the **people of India are the ultimate authority** and that the Constitution is based on their authority as the supreme law of the land. Therefore, all the organs of the Government, **including the Parliament of India**, are limited by the **supremacy of the Constitution and its provisions.**
- India operates under a **federal system with a division of powers between Centre and States.** The law making power of the Parliament is limited to the subjects listed in the Union List in the Seventh Schedule. It is explicitly prohibited from legislating on matters in the State List.
    - **The Seventh Schedule of the Constitution** follows the ***doctrine of territorial nexus***, where the laws made by the Parliament have limited applicability in the territorial boundaries of the State Legislature and vice versa. Thus, **it limits the sovereignty of the Parliament**.
    - However, under certain circumstances (Emergencies), the Parliament has the authority to legislate on subjects within the State List also.
- The **Part III of the Constitution of India** provides for **justifiable rights** to the citizens in the form of **Fundamental Rights. Parliament is explicitly restricted**, under **Article 13 of the Constitution**, from enacting laws that violate the Fundamental Rights. These rights, crucial for safeguarding individual liberties, cannot be suspended or curtailed by legislative action.
    - However, after numerous judgements, the Supreme Court of India has held that the Parliament can amend any part/provision of the Constitution, including Part III, as long as the certain values of the Constitution (**Basic Structure**) are not altered.
- The **Judicial review** refers to the institutional capacity and authority of the courts of law to assess the validity of laws passed by legislature. The courts are taken to be the custodians of the Constitution in India, essentially providing for the oversight over any arbitrary action of the legislature which may be non-confirming with the broader principles of the Constitution. Hence, **judicial review is an essential**

limitation to the sovereignty of the Parliament.

- Judicial Review as a term is not explicitly mentioned in the Constitution. However, the power of judicial review is derived from Articles 13, 32, 131, 136, 143, 226, and 246.

Therefore, option (d) is the correct answer.

Q2.
Answer: c
Explanation:
The **Constitution of India** is one of the most extensively written statutes of the world, and is considered the largest written constitution as well. It provides explicit mentions as well as definitions for key legal aspects and terms. At the same time the **Constitution remains open to interpretation** by courts for identification of those elements which may have not found explicit mention in the text of the statute, but are implicit to the underlying ideology with which the Constitution was framed.

- **Judicial Review:** It refers to the institutional capacity and authority of the courts of law to assess the validity of actions taken by lower courts and branches of the Government. **Judicial Review as a term is not explicitly mentioned in the Constitution.** However, the power of judicial review is derived from Articles 13, 32, 131, 136, 143, 226, and 246. The Supreme Court, in ***Kesavananda Bharati versus State of Kerala (1973)*****,** reaffirmed that judicial review is a fundamental feature of the Constitution. **So, point 1 is correct.**
- **Basic Structure:** The Doctrine of Basic Structure as interpreted by the Judiciary is identified as key elements of the constitution which are part of the core ideology with which the Constitution was drafted and are indispensable to the functioning of the Constitution. It is a **judicial innovation** and has evolved through various judicial pronouncements starting from the Sajjan *Singh case* of 1965. However, the **term is not explicitly mentioned in the Constitution**. **So, point 2 is correct.**
- **Federal:** It is a system of governance that entails a distinct territorial pattern of Government, one that combines the **centralization of some political powers and decentralization of others.** It involves vertical devolution of powers between various organs of the Government. Though the **term is not found in the text of the Constitution** the Supreme Court has called the Indian system "**quasi-federal**", meaning it has both federal and unitary features (*S.R. Bommai versus Union of India, 1994*). **So, point 3 is correct.**
- **Domicile:** Domicile is a **legal concept** for the purpose of determining which **territorial law is applicable to an individual** and even if an individual has no permanent home, he/she is invested with a domicile by law. Domicile as a term is **mentioned in Article 5 of the Constitution, but is not defined** anywhere in the Constitution. **So, point 4 is not correct.**
- **Religious Denomination: Article 26** of the Constitution **mentions the term Religious Denomination.** Further, the Supreme Court in a 1982 verdict defined the term as a 'religious sect or body having a common faith and organization and is designated by a common name. **So, point 5 is not correct.**

So, only three of the above terms are *not* explicitly mentioned in the Constitution of India.
Therefore, option (c) is the answer.

Q3.
Answer: a
Explanation:

- **The President of India has been vested** with the authority to determine the number of judges to be appointed in a State High Court.
- Article 216 of the Constitution of India says that "every High Court shall consist of a Chief Justice and **such other Judges as the President may from time to time deem it necessary to appoint.**" Thus, the President determines the number of judges in a High Court. **So, option a is correct.**
- The Constitution of India does not specify the strength of a High Court and **leaves it to the President to determine**. Accordingly, the President determines the strength of a High Court from time to time depending upon its workload.

Therefore, option (a) is the correct answer.

Knowledge Box
Appointment and Removal of High Court Judges: ● The Judges of the High Courts are appointed by the President. The Chief Justice of a High Court is appointed by the President after consultation with the Chief Justice of India and the Governor of the state concerned. ● For appointment of other judges, the Chief Justice of the concerned High Court is also consulted. In case of a common high court for two or more states, the Governors of all the States concerned are consulted by the President. ● In the **Second Judges case (1993)**, the Supreme Court ruled that no appointment of a judge of the high court can be made, unless it is in conformity with the opinion of the chief justice of India. In the **Third Judges case (1998)**, the Supreme Court opined that in case of the appointment of high court judges, the Chief Justice of India should consult a collegium of two senior-most judges of the Supreme Court. ● The Constitution of India provides that a judge of the High Court can be removed only by an order of the President. A judge of the High Court may be removed from office on grounds of proved misbehaviour or incapacity. ● The President can issue the removal order only if Parliament has passed a motion for such removal by special majority. The procedure for removal of judges is elaborated in the Judges Inquiry Act, 1968. ● The salaries and allowances of the judges of the high courts are charged on the consolidated fund of the state. However, the pension of a high court judge is charged on the Consolidated Fund of India.

Q4.
Answer: b
Explanation:

- **The Constitution of India** provides for certain **Fundamental Rights** to the persons residing in the country. These Fundamental Rights have certain explicit and implicit provisions, which can not be denigrated by the Executive or Legislative actions of the Government, except for the restrictions as provided in the Constitution itself.
- **Article 19** of the Constitution provides for the **Right to Freedom of Speech and Expression**, this right as propounded by the Supreme Court in the ***Indian Express case, 1986*** also provides for **Right to Freedom of Press, which essentially includes publishing a book.** Hence banning of a book in the Republic of India can be taken to be an infringement of Article 19. **So, pair 1 is correctly matched.**
- **Article 21** asserts that **no person shall be deprived of their life except according to the procedure established by law.** The interpretation and scope of Article 21 have evolved through various landmark judgments of the Supreme Court, expanding its ambit to include protection against torture, custodial violence, the **right to a clean and healthy environment** etc**.** In ***M.C. Mehta case (1986)***, the Court had recognised the right to live in a healthy environment as part of Article 21. Also, in the recent ***M.K. Ranjitsinh v Union of India, 2024***, the apex court ruled that the Constitution confers the **right against the adverse effects of climate change**. **So, pair 2 is correctly matched.**
- **Article 39(d) of Part IV of the Constitution** provides for an explicit **equal pay for equal work for both men and women.** It should be noted here that, Article 39 does not provide for any Fundamental Right and is a part of Directive Principle of State Policy, which the state must endeavour to provide for its citizens. **So, pair 3 is not correctly matched.**
- **Right to reputation** as reiterated by the Supreme Court in ***Subramaniam Swamy case, 2019*** is an indispensable part of Right to dignity as enshrined in the **Article 21** of the Constitution. **Defamation is against the Right to reputation under Article 21. So, pair 4 is not correctly matched.**

So, only two of the above pairs are correctly matched.
Therefore, option (b) is the correct answer.

Q5.
Answer: d
Explanation:

- The word ***whip*** in parliamentary parlance, refers to a written order requiring the party members to attend a session in the legislature for an important vote or vote only in a particular way. A whip is generally in the form of a circular detailing the parliamentary business to the elected members.
- The **Tenth Schedule to the Indian Constitution** which is popularly known as the 'anti-defection law'

allows political parties to issue directions or whips to its elected legislators, requiring them to vote in a particular manner.

- Neither the Tenth Schedule nor the Indian Constitution mentions the word 'whip' explicitly. **The paragraph 2(1)(b) of the Tenth Schedule makes it clear that the parties can issue directions to its legislatures, and the legislatures are bound by the same,** but the term **whip is not mentioned in the constitution *per se***. It is to be noted here that Political parties were given constitutional recognition for the first time only via the Tenth Schedule. **So, statement 1 is not correct.**
- **Defying a party whip does not automatically result in disqualification.** According to the Anti-Defection Law, a legislator can be disqualified only if the party leadership petitions the Speaker or Chairperson, who then decides on the disqualification. Also, it is only on the defection of the Three Line whip that the legislature may invite defection proceedings against him/her, that too could be alleviated if the party concerned condones the acts of its legislature within 15 days. **So, statement 2 is not correct.**
- **Any party, regardless of whether it is recognized or not, has the right to issue a whip to its members.** Even unrecognized parties with representation in the legislature can appoint a whip. The recognition status of the party does not restrict the issuance of a whip; it is more about the party's presence and representation in the legislature. **So, statement 3 is not correct.**

So, none of the above given statements is correct.
Therefore, option (d) is the correct answer.

Knowledge Box
Types of Whips: In the Indian Parliamentary convention, the importance of the whip can be inferred from the number of times an order is underlined. Accordingly, there are three kinds of whips in India: • **One line Whip:** It is usually issued to inform party members of a vote, and allows them to abstain in case they decide not to follow the party line. • **Two line Whip:** It is a directive to the members to be present at the time of voting. In this case the party members couldn't be absent at the time of vote. • **Three Line whip:** It is the strongest of the whips, it is employed on special occasions. It places an obligation on the members to tip toe the party line.

Q6.
Answer: a
Explanation:

- **Section 123 of the Representation of People Act of 1951 (RPA)** defines 'corrupt practices' to include certain acts by a candidate for the furtherance of his prospects in the election. Under the provisions of the Act, an elected representative or candidate can be disqualified if convicted on grounds of corrupt practices.
- **Section 123** of the Act defines '**corrupt practices**' to include the following:
  - bribery,
  - undue influence,
  - false information,
  - promotion or attempted promotion of "feelings of enmity or hatred between different classes of the citizens of India on grounds of religion, race, caste, community, or language.
- Under Section 123 of the RPA Act, 1951 'corrupt practices' **do not include the act of dowry.** The act does attract disqualification, but it is according to Section 8 of RPA, which states that any person who is convicted under the Dowry Prohibition act, 1961 with a punishment for not less than six months, shall be disqualified from the date of conviction. **So, point 1 is not correct.**
- Under section 123 of the RPA, 1951 **'bribery' is deemed to be corrupt practice for the purpose of the Act**. The expression 'bribery' has been defined to mean any gift, offer or promise by a candidate or his agent with the object of inducing an elector to vote or refrain from voting at an election. **So, point 2 is correct.**
- The Supreme Court has recently held that **providing false information about a candidate's educational qualifications cannot amount to a "corrupt act".** The Court said that providing false information about an electoral candidate's educational qualifications cannot be considered a "corrupt practice" under Sections 123 (2) and Section 123 (4) of the Representation of People's Act, 1951. **So, point 3 is not correct.**
- Section 123 (2) deals with '**undue influence'**. It defines 'undue influence' as any direct or indirect

interference by a candidate or his agent with the free exercise of any electoral right. This could include threats of injury, **social ostracism and expulsion from any caste or community**. Moreover, convincing a candidate or an elector that they will become "**an object of divine displeasure or spiritual censure**" will also be considered an interference "with the free exercise of the electoral right of such candidate or elector." **So, point 4 is correct.**

- The Supreme Court has said that **the commitments by a political party or candidate for direct or indirect financial help** to the public at large, **will not amount to corrupt practice.** Also, in a 2013 judgement, the apex court held that **promises of freebies** cannot be termed a corrupt practice. **So, point 5 is not correct.**

So, only two of the above actions could be taken as 'corrupt practices' for the purpose of disqualification of a candidate under the Representation of People Act, 1951.
Therefore, option (a) is the correct answer.

Q7.
Answer: a
Explanation:

- **Selection Committee for the Director of Central Bureau of Investigation (CBI):** As per *The Lokpal and Lokayuktas Act, 2013* (as amended in 2014), the Director of CBI is appointed by a selection committee consisting of - **Prime Minister, Leader of Opposition in Lok Sabha, Chief Justice of India or any Supreme Court judge nominated by him/her.**
- **Selection Committee for the Central Vigilance Commissioner (CVC):** As per the *Central Vigilance Commission Act, 2003,* the selection committee for CVC consists of: **Prime Minister**, **Union Home Minister** and the **Leader of Opposition in Lok Sabha.**
- **Selection Committee for Lokpal:** As per *The Lokpal and Lokayuktas Act, 2013,* the Lokpal is selected through a collegium of **Prime Minister, Speaker of Lok Sabha, Leader of Opposition in Lok Sabha, Chief Justice of India or any Supreme Court judge nominated by him** and **an eminent jurist** (nominated by the President based on recommendation).

Member	CBI Selection Committee	CVC Selection Committee	Lokpal Selection Committee
Prime Minister	✓ Yes	✓ Yes	✓Yes
Union Home Minister	✕ No	✓ Yes	✕ No
Speaker of Lok Sabha	✕ No	✕ No	✓ Yes
Chief Justice of India / SC Judge	✓ Yes	✕ No	✓ Yes
Leader of Opposition in Lok Sabha	✓ Yes	✓ Yes	✓ Yes

So, only two of the above given executives are common to all the three committees.
Therefore, option (a) is the correct answer.

Q8.
Answer: d
Explanation:

- **Article 312** of the Constitution of India provides for the establishment of **All India Judicial Services (**AIJS), similar to central civil services, upon a resolution by the Rajya Sabha supported by at least two-thirds of its members.
- The **42nd amendment act which provided for creation of All India Judicial Service**, specifically mentioned that for the creation of such a service if any provision under Part VI of the constitution needed to be amended, it **will not be taken to as an amendment under Article 368** of the constitution. **So, statement 1 is not correct**
- The Parliament has the full authority to do the same via normal legislative process and any change to the text of constitution whilst doing so, will not be deemed as a constitutional amendment.
- The **District judiciary is dealt under Chapter VI of Part VI of the Constitution** (Articles 233 to 237). **So, statement 2 is correct**.
    - *It must be noted that, though the institution of AIJS would not require a constitutional amendment, still a resolution with two-thirds majority under Rajya Sabha would be required for the same*.

So, Statement–I is incorrect, but Statement–II is correct.
Therefore, option (d) is the correct answer

Q9.
Answer: c
Explanation:

- The **United Nations (UN)** is an international organization founded in 1945. Currently made up of 193 Member States, the UN and its work is guided by the purposes and principles contained in its founding Charter.
- **Non-Member States** of the UN, which are members of one or more specialized agencies, can apply for the status of Permanent Observer. The status of a Permanent Observer is based purely on practice, and **there are no provisions for it in the United Nations Charter. So, statement 1 is correct.**
- In practice, permanent observers (which **can include intergovernmental organisations**) are invited to participate in the sessions and work of the General Assembly and can maintain permanent offices at the UN Headquarters in New York. **The observers have free access to most meetings and relevant documentation**. **So, statements 2 and 3 are correct.**
    - The **European Union (EU) and the African Union (AU)** are examples of intergovernmental organizations with permanent observer status.
- The **practice dates from 1946**, when the Secretary-General accepted the designation of the Swiss Government as a Permanent Observer to the United Nations. Observers were subsequently put forward by certain States that later became United Nations Members, including Austria, Finland, Italy, and Japan. Switzerland became a UN Member on 10 September 2002.

So, all three of the above statements are correct.
Therefore, option (c) is the correct answer.

Q10.
Answer: d
Explanation:

- During the Parliamentary procedures there are several occasions when the two Houses of Parliament have to communicate with each other by means of a written message. The principal objective of messaging is to transmit Bills from one House to the other but it is also used for the transmission of motions and resolutions, passed by one House, which have to be sent to the other House for information or concurrence. **A message sent by either House is conveyed by the Secretary-General of one House to the Secretary-General of the other.**
- Example: If a Bill, other than a Money Bill, originates in Lok Sabha and is passed by it, Rajya Sabha is informed of it through a message along with a copy of the Bill, as passed; and the copy of the Bill also carries an endorsement **signed by the Secretary-General** that the Bill has been passed by Lok Sabha. Rajya Sabha may pass the Bill in the form received and communicate about it to Lok Sabha or may pass it with amendment(s) and return it to Lok Sabha with a message to that effect requesting that concurrence of Lok Sabha in the said amendment(s) be communicated to Rajya Sabha. If the amendments proposed are not agreed to by Lok Sabha, or, if Lok Sabha proposes alternative amendments, the Bill, or the Bill as further amended, is returned to Rajya Sabha with a message. The Bill also carries an endorsement **signed by the Secretary-General** in such a case.

Therefore, option (d) is the correct answer.
Relevance: Recently, the Karnataka Governor returned two cooperative Bills to the State government, requesting reconsideration and modifications before their resubmission.

Q11.
Answer: a
Explanation:

- The **Shanghai Cooperation Organization** (SCO) is **a nine-member multilateral organization** founded on **June 15, 2001, in Shanghai, China.**
- The **founding members** were China, Kazakhstan, Kyrgyzstan, Russia and Tajikistan, called **Shanghai Five, which was established in 1996.**
    - **Following the accession of Uzbekistan** to the organisation in **2001**, with the signing of the Treaty on Deepening Military Trust in Border Regions, **the Shanghai Five was renamed the SCO.**
- On 9 June 2017, at the historic summit in Astana, **India and Pakistan officially joined SCO as full-fledged members.**

- **Iran joined the SCO in 2023 and Belarus joined in 2024.**
- **Currently, 9 countries enjoy the status of the SCO full members:** India, Iran, Kazakhstan, China, Kyrgyzstan, Russia, Pakistan, Tajikistan and Uzbekistan; 2 countries — Afghanistan, and Mongolia — **have an observer status** with the SCO, and **14 countries** — Azerbaijan, Armenia, Bahrain, Cambodia, Egypt, Kuwait, Maldives, Myanmar, Nepal, Qatar, Saudi Arabia, Sri Lanka, Turkey and UAE — **have a dialogue partner status.**
- **To join the Shanghai Cooperation Organization (SCO)**, a country must:
    - Be located in Eurasia
    - Demonstrate commitment to regional peace and stability
    - Be willing to cooperate with other member states in areas like politics, economics, security, and culture
- The Shanghai Cooperation Organization (SCO) has three main goals:
    - **Strengthen regional relationships:** Build mutual confidence and good-neighbourly relations among member countries.
    - **Foster cooperation:** Promote effective cooperation in various fields, including politics, trade, economy, science, technology, culture, education, energy, transportation, tourism, and environmental protection.
    - **Ensure regional peace and stability:** Make joint efforts to maintain peace, security, and stability in the region, and work towards a new, democratic, just, and rational international order.

So, the correct chronological order of countries joining the SCO are Tajikistan - Uzbekistan - India - Iran - Belarus.
Therefore, option (a) is the correct answer.
Relevance: Recently, Belarus joined the Shanghai Cooperation Organization (SCO) as a full member in July 2024.

Q12.
Answer: b
Explanation:

- The **Principal Secretary** is the administrative head of the Prime Minister's Office (PMO) and is considered the most important aide to the PM. S/He is tasked with preparing notes on matters to be discussed between the PM and foreign dignitaries, ensuring coordination among various ministries and departments, sharing important orders before the PM and so on. **So, statement 1 is not correct.**
    - The Cabinet Secretariat functions directly under the Prime Minister. The administrative head of the Secretariat is the **Cabinet Secretary,** who is also the ex-officio Chairman of the Civil Services Board.
- Since 2019, the Office of the Principal Secretary to the Prime Minister has been accorded the **Cabinet Minister rank**. **So, statement 2 is correct.**
    - Along with the Principal Secretary, the National Security Advisor has also been accorded the status of a Cabinet Minister.
    - According to the order of precedence, the Cabinet Ministers rank number seven — after the President, Vice-President, Prime Minister, Governors within their respective States, former Presidents, deputy Prime Minister, as well as the Lok Sabha Speaker and the Chief Justice of India — with the last two on the same level.

Therefore, option (b) is the correct answer.
Relevance: Former RBI governor, Shaktikanta Das has been appointed as the Principal Secretary-2 to the Prime Minister of India.

Q13.
Answer: b
Explanation:

- **Kisan Pehchaan Patra or Farmer ID** is an **Aadhaar-linked** digital identity that is linked dynamically to the State's land records, besides having information like demographic, **crop sown** and **ownership details**.
- The database created through the Farmer ID will be known as Farmer' registry — one of the three registries under **Agri Stack component of the Centre's Digital Agriculture Mission** for creation of digital public infrastructure in the farm sector.
- Farmers will benefit from enhanced access to crop insurance, loans, and other government schemes. The ID will also integrate information on village land maps and sown crops, creating a holistic database to drive policy decisions.
- The Union Ministry of Agriculture and Farmers Welfare has made it **mandatory for the new applicants for**

the direct cash transfer programme PM Kisan to obtain digital IDs linked to land records. The move is to ensure that **only genuine land-owning farmers get the benefits** and simplify the process of registration for various other farmer welfare programmes.

- While existing beneficiaries under direct cash benefit transfer continued to be included into the farmer registry, this farmer id **guarantees that applicant owns the land** and would simplify the registration process for PM-Kisan.

Therefore, option (b) is the correct answer.

Relevance: The Centre has made it mandatory for new applicants to obtain a farmer ID for enrolment into the Pradhan Mantri Kisan Samman Nidhi (PM-Kisan) to get benefits under the scheme.

Q14.

Answer: b

Explanation:

- According to the United Nations, **money laundering is the processing of criminal proceeds to disguise their illegal origin**. This money is generated by a criminal activity but may appear to come from a legitimate source. Money laundering generally involves **three key stages** to integrate funds into the legal financial system.
    - **Placement**: The crime money is injected into the formal financial system
    - **Layering**: Money injected into the system is layered and spread over various transactions and book-keeping tricks to hide the source of origin.
    - **Integration**: Laundered money is withdrawn from the legitimate account to be used for criminal purposes. Now, money enters the financial system in such a way that the original association with the crime is disassociated. The money now can be used by the offender as legitimate money.
- There are **various methods through which money laundering is done**, such as:
    - **Smurfing** (the criminal breaks up large chunks of cash into multiple small deposits, often spreading them over many different accounts, to avoid detection.)
    - "**Mules**" (cash smugglers, who sneak large amounts of cash across borders and deposit them in foreign accounts, where money-laundering enforcement is less strict.)
    - Gambling and laundering money at casinos;
    - Hawala transactions

Therefore, option (b) is the correct answer.

Relevance: The Financial Action Task Force (FATF) has recently released its Mutual Evaluation Report for India.

Q15.
Answer: a
Explanation:

- **Near money**, also referred to as quasi-money or cash equivalents, is a financial economics term describing non-cash assets that are **highly liquid and easily converted to cash**. Central banks utilize the concept of near money in classifying assets as either M1, M2, or M3.
- The **nearness of near monies will vary depending on the actual time frames** to cash conversion. Other factors affecting near money may also include transactional fees or penalties involved with withdrawals.
- **Examples** of near money assets include **savings accounts**, certificates of deposit (**CDs**), foreign currencies, money market accounts, marketable securities and Treasury bills (**T-bills**). In general, near money assets included in near money analysis will vary depending on the type of analysis. **So, statement 1 is correct.**
    - CD is a negotiable, **unsecured money market instrument issued by a bank** as a Usance Promissory Note against funds deposited at the bank for **a maturity period upto one year**. It is a financial instrument with fixed-income facilities and **assured payout from the beginning**. Both Scheduled Commercial Bank and All-India Financial Institutions are authorised to issue a CD at a discount on its face value. They maintain high liquidity due to their **ease of trading in the secondary market and the availability of a buyback facility. So, statement 2 is correct.**

So, both Statement–I and Statement–II are correct and Statement–II explains Statement–I.
Therefore, option (a) is the correct answer.

Q16.
Answer: d
Explanation:

- **Priority Sector Lending Certificates (PSLCs)** aim to enable banks to achieve the priority sector lending target and sub-targets by purchase of these instruments in the event of shortfall and at the same time incentivize the surplus banks.
- Through the PSLCs the seller will be selling fulfillment of priority sector obligation and the buyer would be buying the same. There will be **no transfer of risks or loan assets**. **So, statement 1 is not correct.**
- The PSLCs will be **traded through the CBS portal (e-Kuber) of Reserve Bank of India (RBI)**. The detailed operational instructions for carrying out the trades are available through the e-Kuber portal.
- Scheduled Commercial Banks (SCBs), **Regional Rural Banks** (RRBs), Local Area Banks (LABs), Small Finance Banks (when they become operational) and Urban Co-operative Banks who have originated PSL eligible category loans subject to such regulations as may be issued by the Bank. **So, statement 3 is not correct.**
- There are **four kinds of PSLCs**:
    - PSLC Agriculture: Counting for achievement towards the total agriculture lending target.
    - **PSLC SF/MF (Small and Marginal Farmers)**: Counting for achievement towards the sub-target for lending to Small and Marginal Farmers.
    - PSLC Micro Enterprises: Counting for achievement towards the sub target for lending to Micro Enterprises. PSLC General: Counting for achievement towards the overall priority sector target.
- **PSLCs** may be construed in the nature of **'goods'** in the course of inter-state trade or commerce. With effect from May 28, 2018, **GST has to be paid by the buyer bank under Reverse Charge Mechanism (RCM) at the rate of 18%. So, statement 2 is not correct.**
    - Further, IGST is payable on the supply of PSLC traded over e-kuber portal. If a bank which was liable to pay GST had already paid CGST/SGST or CGST/UGST, the bank is not required to pay IGST towards such supply.
    - Further, as per the extant guidelines, no transaction charge/ fees is applicable on the participating banks payable to RBI for usage of the PSLC module on e-Kuber portal.

So, none of the statements given above is correct.
Therefore, option (d) is the correct answer.
Relevance: For the first time, private sector banks as a group met priority sector lending targets, including sub-targets for major heads in 2023-24.

Q17.
Answer: d
Explanation:

- The Variable Repo Rate (VRR) is **a monetary policy tool used by the Reserve Bank of India (RBI) to manage liquidity in the banking system**. Unlike the fixed repo rate, which is predetermined by the RBI, the **VRR is decided through market-based auctions**. This means banks bid for funds, and the rate is

determined based on demand and supply. **So, statement 1 is not correct.**

- Typically lasting up to **14 days**, VRR serves as a means to **inject short-term liquidity into the banking system**. It is designed to provide banks with better flexibility in borrowing funds while ensuring that interest rates align with current economic conditions. **So, statement 2 is not correct.**
- The RBI uses VRR to balance liquidity and stabilise inflation, ensuring economic growth.

Therefore, option (d) is the correct answer.

Relevance: The Reserve Bank of India (RBI) recently announced a ₹75,000 crore 45-day variable rate repo (VRR) auction.

Knowledge Box:
• **Repo rate:** It is the **rate at which commercial banks borrow from RBI** by mortgaging their dated Government securities and Treasury bills. If the repo rate is increased, the banks have two options either to reduce the borrowing from RBI or borrow at a higher rate from RBI and charge higher interest rate from customers. If banks borrow fewer amounts, the credit creating capacity of banks will come down and money supply will come down.

Q18.
Answer: b
Explanation:
Money Market is essentially a **market for short term (up to one year) funds** and financial assets that are close substitutes for money. In India this market falls directly under the regulatory jurisdiction of the Reserve Bank of India.

- **Treasury Bills (T-Bills)**: These are **money market securities** with varied maturity **dates of less than one year.** These are essential monetary tools used by the RBI to regulate an economy's total money supply and for financing purposes. **So, point 1 is correct.**
- **Commercial Papers (CPs)**: These are **unsecured money market instruments** issued in the **form of promissory notes**. These are privately placed instruments for short term borrowing. **So, point 2 is correct.**
- The call/notice money market forms an important segment of the Indian Money Market. Under call money market, funds are transacted on overnight basis and under **notice money market**, funds are transacted for the period between **2 days and 14 days**. **So, point 4 is correct.**
- The **Capital Market** is the market for borrowing and lending of **medium and long term funds**, generally above three years. The market to raise investment also forms part of the capital market. Stock exchanges and development financial institutions form capital market
    - **Government securities** (G-Secs) are **long-term debt securities** issued by governments to finance their activities. The government bond market is a part of the capital market as it involves the trading of long-term debt securities. **So, point 5 is not correct.**
        - In India, G-Secs are available in a wide range of maturities from 91 days to as long as 40 years to suit the duration of varied liability structure of various institutions.
    - Long-term equity financing through stock exchanges form the **part of the capital markets**. **So, point 3 is not correct.**

So, only three of the above activities form a part of the money market.
Therefore, option (b) is the correct answer.

Q19.
Answer: c
Explanation:
Gross Fixed Capital Formation (GFCF) refers to the growth in the size of fixed capital in an economy. Fixed capital refers to things such as buildings and machinery, for instance, which **require investment to be created**. So private GFCF can serve as a rough indicator of how much the private sector in an economy is willing to invest. Overall GFCF also includes capital formation as a result of investment by the government.

- **Consumption expenditure** is the total amount of money spent by households and businesses on goods and services. A decline in the consumption expenditure can result in **higher private investment** as a reduction in consumption expenditure leads to an increase in savings. **So, statements 1 and 2 are correct.**
- For example: Historically, however, an **increase in private consumption has not led to a rise in private investment in India**. In fact, a **drop in consumption spending has boosted private investment rather than dampening it**.

- Private final consumption expenditure dropped steadily from nearly 90% of GDP in 1950-51 to hit a low of 54.7% of GDP in 2010-11, which was a year prior to when private investment hit a peak and began its long decline.
- And since 2011-12, private consumption has risen while private investment has witnessed a worrying fall as a percentage of GDP.
- The **inverse relationship between consumption and investment is likely because the money that is allocated towards savings and investment**, either by the government or by private businesses, comes at the cost of lower consumption expenditure.

- The paradox of savings, also known as the **paradox of thrift**, refers to the theory that a **rise in the savings rate of individuals can surprisingly cause a fall rather than a rise in the overall savings in an economy**. This is in contrast to the general belief that a rise in individuals' savings rates will cause a rise in the overall savings in the economy. So even though savings may be good for an individual household, it is believed that it may not be good for the wider economy. The idea is part of the under-consumption theories of the business cycle which attribute economic downturns to weak consumption and high savings. **So, statement 3 is not correct.**

So, Only one of the Statements–II and III is correct and that explains Statement–I.
Therefore, option (c) is the correct answer.
Relevance: The recently released economic survey has revealed that the moderation in GDP growth is traced to softening of growth in gross fixed capital formation.

Q20.
Answer: a
Explanation:

- **Imported inflation** is a general and sustainable price increase due to an **increase in the costs of imported products**. This price increase concerns the price of raw materials and all imported products or services used by companies in a country. Imported inflation is also referred to as **cost inflation.** It is believed that a **rise in input costs** pushes producers to raise the price they charge from their local customers, thus boosting inflation.
- A **depreciation** in the value of a country's currency is generally seen as the **most important reason behind imported inflation in an economy.** This is because when a country's currency depreciates, people in the country will have to shell out more of their local currency to purchase the necessary foreign currency required to buy any foreign goods or services, which in turn means that they will effectively be paying more for anything that they import. **So, point 1 is not correct.**
- A rise in import costs even without depreciation in the value of a country's currency is also believed to lead to import inflation. A **rise in international crude oil prices due to fall in oil output**, for instance, is expected to **cause prices to rise across an economy** which imports oil to produce goods and services. **So, point 2 is not correct.**
- The Asian Development Bank recently warned that India could face imported inflation as the rupee could depreciate amid the rise in interest rates in the West. **A rise in interest rates in the West tends to cause the currencies of developing countries to depreciate** against western currencies, which in turns can lead to higher import costs for these countries. **So, point 3 is correct.**

So, only one of the above factors contribute to imported inflation.
Therefore, option (a) is the correct answer.
Relevance: The Asian Development Bank recently warned that India could face imported inflation as the rupee could depreciate amid the rise in interest rates in the West.

Q21.
Answer: a
Explanation:

- India is witnessing an alarming rise in **soil degradation**, threatening its agricultural productivity, food security, and environmental sustainability. Soil, a vital resource supporting the livelihoods of millions of farmers and maintaining ecosystem balance, is under siege from various forms of degradation.
- According to recent estimates, nearly 115 to 120 million hectares (Mha)—roughly 33% of the country's total geographic area (TGA)—are affected by soil degradation, including water erosion, wind erosion, salinity, and vegetation loss.
- The latest Desertification and Land Degradation Atlas of India published by the SAC, which formed the basis for the assessment, reveals that **water erosion is the most significant contributor,** affecting 11.01% of India's land. Other major processes include **vegetation degradation (9.15%) and wind erosion (5.46%)**.

These processes, compounded by deforestation, poor agricultural practices, and climate change, are particularly prevalent in semi-arid and dry sub-humid regions of the country.

So, the correct order is water erosion > vegetation degradation > wind erosion.
Therefore, option (a) is the correct answer.
Relevance: The most recent "Desertification and Land Degradation Atlas of India" was published by the Space Applications Centre (SAC) of the Indian Space Research Organisation (ISRO)

Q22.
Answer: c
Explanation:
Scientists once believed that the use of tools was unique to humans, but growing research reveals skilled tool users across land, air and sea in the **animal kingdom.** Exploring how this behavior evolved in such diverse species could provide valuable insights into the **origins of tool use in humans.**
Animals that use additional tools for hunting or capturing prey:

- **Chimpanzees** are humanity's closest living relatives and learned how to make and use tools long ago without human help, with stone hammers found at a chimp settlement in the Ivory Coast dating back 4,300 years. They are even capable of making spears to hunt other primates for meat and are known to have developed **specialized tool kits for foraging army ants. So, point 1 is correct.**
- **Sea otters**, the largest members of the **weasel family,** use stones to hammer abalone shells off the rocks and crack the hard shells of prey open, making them the only known **tool-using marine mammal for decades**, until dolphins came along. **So, point 2 is correct.**
- **Dolphins** are renowned as brainiacs of the seas and scientists recently discovered they can be tool-using workaholics as well. A group of **bottlenose dolphins** in Shark Bay, Australia, carries marine sponges in their beaks to **stir ocean-bottom sand and uncover prey,** spending more time hunting with tools than any animal besides humans. **So, point 4 is correct.**
- **Penguins** primarily rely on their **vision while hunting**. It is not known how penguins locate prey in the darkness, at night, or great depths. Some scientists hypothesize that penguins are helped by the **bioluminescence (light producing)** capabilities of many oceanic squids, crustaceans and fishes. Penguins catch prey with their bills and swallow it whole while swimming. A penguin has a **spiny tongue and powerful jaws to** grip slippery prey. **So, point 3 is not correct.**

So, only three of the above animals use additional tools for hunting or capturing prey.
Therefore, option (c) is the correct answer.

Q22.
Answer: b
Explanation:

- **Coral spawning** is one of the most spectacular events - where **coral polyps** release their eggs and sperm into the water to regenerate the future generation of corals. **Triggered by water temperature and the lunar cycle**, corals usually spawn on the nights following the **October, November and December full moons** - depending on the location of the reef.
- During spawning, entire colonies of coral release their **eggs and sperm simultaneously,** creating a **snow-storm like phenomenon.** Once the sperm fertilises the eggs, they develop into tiny, free-swimming larvae called **planulae.** These larvae eventually settle on the reef substrate, growing into new coral colonies that can help repopulate reefs.
- It is essential for the health of coral reefs, as it boosts genetic diversity and helps the resilience of the ecosystem to the mounting pressures impacting coral reefs around the globe.

Therefore, option (b) is the correct answer.

Q24.
Answer: c
Explanation:

- The **Central Pollution Control Board (CPCB)** in India uses key water quality parameters like **total coliform organisms**, **pH level** (between 6.5 and 8.5), **Dissolved Oxygen** and **Biochemical Oxygen Demand (BOD)** to assess the state of water quality degradation, which is crucial for effectively planning water quality management programs across the country.
- **Total Coliform Organisms:** This indicates the presence of bacteria in the water, which can be a sign of fecal contamination and potential health risks. **So, point 1 is correct.**
- **pH Level:** It measures the acidity or alkalinity of water. A pH between 6.5 and 8.5 is considered optimal for most aquatic life. **So, point 2 is correct.**
- **Dissolved Oxygen (DO):** This is the amount of oxygen dissolved in water, crucial for aquatic organisms to survive. Low dissolved oxygen levels indicate pollution. **So, point 3 is correct.**
- **Biochemical Oxygen Demand (BOD):** BOD measures the amount of oxygen consumed by bacteria while decomposing organic matter in water. High BOD indicates a high level of organic pollution. **So, point 4 is correct.**

Therefore, option (c) is the correct answer.

Knowledge Box

About Central Pollution Control Board, Powers, Functions

- It is a **statutory organisation** constituted in September, 1974, under the **Water (Prevention and Control of Pollution) Act, 1974.**
- Further, CPCB was entrusted with the powers and functions under the **Air (Prevention and Control of Pollution) Act, 1981.**
- It serves as a field formation and also provides technical services to the Ministry of Environment and Forests of the provisions of the **Environment (Protection) Act, 1986.**
- **Principal Functions of the CPCB:**
  - To promote cleanliness of streams and wells in different areas of the States by prevention, control and **abatement of water pollution.**
  - To improve the quality of air and to prevent, control or **abate air pollution** in the country.
- It **advises the Central Government** on matters related to control and abatement of air and water pollution.
- It also **coordinates the affairs of other State Pollution Control Boards**, **assists them**, furnishes guidance, and **helps in conflict resolution** in case of any disagreement among them.

Relevance: A new report by the Central Pollution Control Board submitted to the National Green Tribunal has said that as per statistical analysis, the water quality during the recently-concluded Maha Kumbh in Prayagraj was fit for bathing.

Q25.
Answer: c
Explanation:

- **Biodegradable plastics** are plastics that can be broken down by microorganisms (bacteria, fungi) into natural substances like water, carbon dioxide and biomass over time.
- **Polyvinyl Alcohol (PVA)** is **water-soluble and biodegradable**. It is widely used in applications like laundry detergent pods, packaging materials and biodegradable films. Microorganisms in water and soil can enzymatically break down PVA into harmless byproducts like water and carbon dioxide.
- **Polylactic Acid (PLA)** is derived from renewable resources like **corn starch and sugarcane**. PLA is considered as a biodegradable and degrades under **industrial composting conditions** (high temperature and humidity) but **does not degrade easily in natural environments**. It is used in food containers, 3D printing and medical implants.
- **Polyethylene Terephthalate (PET)** is the most commonly used **thermoplastic polymer** in the world. It belongs to the family of **polyesters**. PET is produced by the polymerization of ethylene glycol and terephthalic acid. When heated together under the influence of **chemical catalysts, ethylene glycol and terephthalic acid** produce PET in the form of a molten, viscous mass that can be spun directly to fibres or solidified for later processing as plastic. It is **non-biodegradable** and takes hundreds of years to decompose.
- **Polyhydroxybutyrate (PHB)** is a type of **Polyhydroxyalkanoate (PHA)** that is biodegradable and produced by bacteria. PHB **degrades naturally in soil**, marine environments, and compost. It is used in biomedical applications, agricultural films, and biodegradable packaging.

Therefore, option (c) is the answer.

Q26.
Answer: a
Explanation:

- **Island gigantism** occurs when species isolated on islands **grow significantly larger than their mainland relatives**. This phenomenon is primarily **due to the absence of large mammalian predators**, as islands often lack such species due to over-water dispersal challenges. Instead, smaller predators like birds, reptiles, and small carnivores take their place but are less efficient hunters.
- **Examples of Island Gigantism:**
  - **Giant tortoises:** Found in the Galápagos and Seychelles.
  - **Komodo dragon**: The world's largest lizard, found in Indonesia. **So, row 1 is correctly matched.**
- **Phenotypic plasticity** is the ability of organisms to alter their traits in response to environmental changes. It is observed across all life forms, including plants, animals, and bacteria.
- **Examples of Phenotypic Plasticity:**
  - **Cold tolerance in organisms:** Long-term exposure to sub-lethal low temperatures increases resistance.
  - **Pneumatophores in mangroves:** Roots adapt to low oxygen by growing upward as aerial roots. **So, row 2 is correctly matched.**
  - **Snail shell thickening:** Snails develop thicker shells when sensing predators.
- **Adaptive Radiation** is a process where a **single species rapidly diversifies into many species** that fill different ecological roles. This process is characterized by a variety of morphological and physiological traits.
  - The examples of Adaptive Radiation include **Australian marsupials**, cichlid fish, and Darwin's finches (also known as Galapagos finches).
- The **wings of bats and birds are not examples of adaptive radiation**, but they are examples of analogous organs that evolved through convergent evolution. **So, row 3 is not correctly matched.**

Therefore, option (a) is the correct answer.

Q27.
Answer: b
Explanation:

- **Most autotrophs** use a process called **photosynthesis** to make their food. In photosynthesis, autotrophs use energy from the sun to convert water from the soil and carbon dioxide from the air into a nutrient called **glucose.**
- **All plants with green leaves,** from the **tiniest mosses** to towering fir trees, synthesize, or create, their own food through photosynthesis. Algae, phytoplankton and some **bacteria** also perform **photosynthesis.**
- Some rare autotrophs produce food through a process called **chemosynthesis,** rather than through photosynthesis. Autotrophs that perform **chemosynthesis do not use energy from the sun to produce food**. Organisms that use chemosynthesis live in extreme environments, where sunlight is absent, such as in **volcanoes, deep sea vents**, etc. In chemosynthesis, hydrogen sulfide or methane is utilized to produce energy.
- For example, bacteria **living in active volcanoes oxidize sulfur to produce their own food**. At Yellowstone National Park in the U.S. states of Wyoming, Idaho and Montana, bacteria capable of chemosynthesis have been found in hot springs.

Therefore, option (b) is the correct answer.

Q28.
Answer: a
Explanation:

- A **food web** consists of all the **food chains in a single ecosystem**. Each living thing in an ecosystem is part of multiple food chains. Each food chain is one possible path that energy and nutrients may take as they move through the ecosystem. All of the interconnected and overlapping food chains in an ecosystem make up a food web.
- **Food webs** are defined by their biomass. Biomass is the energy in living organisms. Autotrophs, the producers in a food web, convert the sun's energy into biomass. **Biomass decreases with each trophic level in a food web.** There is always more biomass in lower trophic levels than in higher ones. **So, statement 2 is correct.**
- Because biomass decreases with each trophic level, there **are always more autotrophs than herbivores in a healthy food web**. There are more herbivores than carnivores. An ecosystem cannot support a large number of omnivores without supporting an even larger number of herbivores and an even larger number of autotrophs. **So, statement 1 is correct.**
- A healthy food web has an abundance of autotrophs, many herbivores and relatively few carnivores and omnivores. This balance helps the ecosystem maintain and recycle biomass.

So, both Statement–I and Statement–II are correct and Statement–II explains Statement–I.
Therefore, option (a) is the correct answer.

Q29.
Answer: c
Explanation:

- **Ethylene oxide** is a **flammable gas** with a sweet odor. It dissolves easily in **water.** The ability of ethylene oxide to damage DNA makes it an effective sterilizing agent but also accounts for its cancer-causing activity.
- **Applications of Ethylene oxide:**
  - It is widely used in the **medical industry to sterilize surgical instruments,** catheters and disposable medical devices that cannot withstand high temperatures of steam sterilization. It effectively kills bacteria, fungi and viruses, ensuring medical equipment remains free from contamination. **So, statement 1 is correct.**
    - It is used by the **spice industry** as a **fumigant** to reduce **microbial contamination,** such as ***E. coli*** **and** ***Salmonella***. In India, ethylene oxide has been used as a disinfectant on **sesame seeds** for several years. However, it **does not enhance flavor in food, and it can be toxic. So, statement 2 is not correct.**
    - **It is a key ingredient** in the production of surfactants, which are used in **detergents, shampoos, and cleaning agents.** It reacts with other chemicals to form ethoxylated compounds, which improve the ability of detergents to remove grease and dirt.
  - It is primarily used as an **intermediate in the production of several industrial chemicals,** the most notable of which is ethylene glycol. **So, statement 3 is correct.**

Therefore, option (c) is the correct answer.
Relevance: The Indian government has ordered food commissioners to collect samples from all spice manufacturers.

Q30.
Answer: a
Explanation:
Biosphere Reserve:

- It is a large area of land or water that is recognised and protected by the **United Nations Educational, Scientific, and Cultural Organization (UNESCO).** The main objective of a biosphere reserve is to promote sustainable development through the conservation of biodiversity, cultural heritage and sustainable use of natural resources. The biosphere reserve typically includes **three zones:**
  - **Core zone:** a strictly protected area where human activities are not allowed.
  - **Buffer zone:** an area where limited human activities are allowed, including research and eco-tourism.
  - **Transition zone:** an area where sustainable development is encouraged, such as farming, forestry, and other human activities.

Therefore, option (a) is the correct answer.

Knowledge Box
Other protected areas: ● A **National Park** is an area of land that is protected by the government for its natural, ecological, or scenic value. The primary objective of a national park is to conserve the natural environment and protect it from human interference. The national parks are generally **not inhabited by humans** and **human activities are restricted.** ● **Wildlife sanctuary** is an area of land that is set aside for the protection of wildlife, a safe refuge. The primary objective of a wildlife sanctuary is to protect the **habitats of wild animals and promote their breeding.** The sanctuary is usually a small area, and human activities are restricted to prevent disturbance to the animals. ● **Ramsar sites** are wetlands of international importance designated under the Ramsar Convention, an international treaty for the **conservation and sustainable use of wetlands.**

Q31.
Answer: c
Explanation:

- The **Indus script**, also known as the Harappan script, is a corpus of symbols produced by the Indus Valley Civilisation. Most inscriptions containing these **symbols are extremely short**, making it difficult to judge whether or not they constituted a writing system used to record a Harappan language. Despite many attempts, the "script" has not yet been deciphered.
- Unlike other ancient scripts, such as **Egyptian hieroglyphs**, the **Indus script lacks bilingual inscriptions**, such as the **Rosetta Stone**, which helped decipher Egyptian writing. Without a known reference language or key, scholars have struggled to make any significant breakthroughs in translating the Indus script. The absence of bilingual inscriptions **limits comparative linguistic analysis**, making it extremely difficult to understand the meaning of the symbols. **So, point 1 is correct.**
- Most of the **Indus inscriptions** are **very short, with an average of only 4-5 symbols**. This brevity makes it hard for researchers to identify **linguistic patterns**, structures, or context that could help in decoding the script. Longer texts would provide more clues, such as repetitive symbols or common words, which could aid in interpretation. **So, point 2 is correct.**
- The **Indus script** is likely more complex. It is thought to contain a mix of **logograms** (symbols representing words or concepts) and possibly **phonetic symbols** (representing sounds or syllables). Therefore, **not every symbol corresponds to a single word**. Scholars believe the script is more nuanced and involves multiple layers of representation, making this statement inaccurate.
- The **direction of writing in the Indus script is not consistent**. Some inscriptions are written from **left to right**, while others are written from **right to left**, and some even appear to be **top to bottom**. This inconsistency in the direction of writing complicates efforts to standardize its reading and interpretation. **So, point 3 is correct.**

So, all three of the above reasons make deciphering the Indus Valley Civilisation script difficult.
Therefore, option (c) is the correct answer.

Q32.
Answer: c
Explanation:

- Ancient India was a renowned centre of higher education. There were many important centres of education like Nalanda, Takshashila, Vikramashila, Odantapuri, Vallabhi etc.
- **Vikramashila University** was one of the ancient universities located in Bhagalpur, Bihar.
    - It was **founded by King Dharmpala of the Pala Dynasty in the 8th century**. It reached its pinnacle of glory in the 12th century, under the administration of Ramapala. **So, row 1 is not correctly matched.**
    - It was a famous centre of learning of Tantric Buddhism.
    - The university used to teach both spirituality and perfection in worldly skills.
    - It was destroyed in 1203 by Bhaktiyar Khilji, who also destroyed Nalanda University.
- **Nalanda University** was an ancient centre of higher learning, located in the ancient kingdom of Magadha, presently in Bihar. It is one of India's oldest universities.
    - It was established in the 5th century AD **by Kumaragupta I of Gupta Empire.**
    - It was destroyed by Bhaktiyar Khilji.
    - It was devoted to Buddhist studies, but it also trained students in fine arts, medicine, mathematics, astronomy, politics, and the art of war.
    - The **Chinese scholars I-tsing and Xuan Zang visited Nalanda in the seventh century CE. So, row 2 is correctly matched.**
    - Chinese pilgrim Xuan Zang travelled across India from 629–645 CE in search of Buddhist manuscripts and "correct" teachings. He spent roughly five years in Nalanda, where he studied under the mahavihara's grand abbot, Silabhadra.
    - The Chinese pilgrim Yijing or I-tsing stayed in the mahavihara from 675-685 CE.
- **Odantapuri University** was an important seat of Buddhist learning during the **Pala period** (8th to 12th centuries AD).
    - It was **founded by Pala Emperor Gopala in the 8th century**.
    - Odantapuri was considered the second oldest of India's universities. It was situated in Magadha, now in Bihar.
- **Atisha** was a Buddhist religious teacher who visited both the Vikramashila Monastery and the **Odantapuri (for twelve years)**. **So, row 3 is correctly matched.**

Therefore, option (c) is the correct answer.

Q33.
Answer: b
Explanation:

- In classical Indian Philosophy, the **doctrine of karma** is regarded to be one of the most essential and fundamental doctrines. The law of karma holds that every action, physical or mental, has its own outcomes which must be faced either in this present life or in the lives to come. When we perform good deeds, it refers to good karma and future happiness and bad karma results when we do bad actions or deeds.
- **Jainism** considers that through the action of body, speech and mind, karma is produced technically. The Jainas state that an individual is entirely responsible for his birth, death and suffering because **whatever the individual receives is because of his past action**. The person who performs good action gets good results and the person who performs bad action gets bad results. Thus, karma forms a central and fundamental part of Jain faith. **So, point 1 is correct.**
- **The theory of Karma is a fundamental doctrine in Buddhism.** In Buddhism, it is considered that karma is nothing but it is birth, death, pleasure, pain. It also admits that so far as karma operates no one can proclaim to be free from all this suffering. **So, point 2 is correct.**
- **Ajivikas** was a sharman school founded by Makkhali Gosala in 5th century BC. Ajivikas were fatalists who led a simple ascetic life, without clothes and any material possession. They opposed Buddhism and Jainism and were atheists. **They did not believe in karma doctrine unlike Jainism and Buddhism,** and considered it as a fallacy. **So, point 3 is not correct.**
- The **Charvakas, or Lokayata,** were materialists who **rejected** metaphysical concepts, including the afterlife, existence of God and **karma**. They did not believe in the existence of any form of karma affecting life circumstances or future births. **So, point 4 is not correct.**

So, only two of the above subscribe to the doctrine of Karma.
Therefore, option (b) is the correct answer.

Q34.
Answer: d
Explanation:

- **Silappadikaram and Manimekalai**, two of the greatest Tamil epics of the Sangam period called **"Five Great Assemblies" as Aimperunkulu and "The eight Groups of Attendants" as Enperayam.**
- **During the Sangam Age in South India**, the power of the hereditary monarch was restricted by five councils known as the "Five Great Assemblies". They included ministers, augurs or astrologers, priests, physicians and representatives of the people.
- **All government power was in the hands of the king and the "Five Great Assemblies."** Each of these assemblies had its own place in the main city where they could hold meetings and **perform their administrative duties**. **These assemblies were called Aimperunkulu.**
- Besides the "Five Great Assemblies", another group of persons called "**The eight Groups of Attendants,"** is mentioned in the Sangam literature. They served the king in various capacities.
- The **eight groups of Attendants** included perfumers (sandu), betel bearers (Ilai), garland makers (Pu), armourers (Kachchu), arecanut servers (Pakku), dressing valets (adai), torch or light-bearers and body guards. These were groups of officials who simply had individual obligations to the king and no collective status.

Therefore, option (d) is the correct answer.

Q35.
Answer: b
Explanation:

- **The Turkish invasions of India** during the medieval period introduced several technological advancements that significantly influenced various aspects of Indian society.
- Paper was first manufactured in China around the first century CE. The **Indians perhaps knew about paper in the 7th century CE**, but they never used it as writing material.
    - Its use is mentioned by **7th-8th century Chinese Buddhist pilgrim memories** as well as some Indian Buddhists, a Kakali and Sava- likely Indian transliteration of Chinese Zhi. **So, point 1 is not correct.**
- Prior to the Turkish influence, traditional writing materials in India included palm leaves and birch bark. The Turks led to the widespread production and use of paper, replacing earlier materials. This advancement

facilitated the proliferation of literature, administrative documentation, and record-keeping, thereby enhancing educational and cultural activities.

- The **Turks introduced the use of lime mortar** in construction, which provided a stronger and more durable binding material compared to the **previously used mud mortar**. This innovation enabled the erection of monumental structures featuring arches and domes, marking a significant evolution in Indian architecture. **So, point 2 is correct.**
- It is now an established fact that **iron-stirrup (rikab) was unknown in India**. Perhaps surcingle, 'big toe stirrup' and 'suspension hooks' were used in India, but **stirrup proper was the contribution of the Turks**. **So, point 3 is correct.**
- The **first Printing Press was established in Goa** in September, 1556 by **Portuguese** and it functioned in the colegio de Sao Paulo at Old Goa. The latter started printing books on Christian saints, sermons, grammars and vocabularies in the Marathi and Konkani languages and dialects, but in Roman script rather than in the Devanagari script. **So, point 4 is not correct.**

Therefore, option (b) is the correct answer.

Q36.
Answer: c
Explanation:

- **The Sanchi Stupa** is located in Sanchi of Madhya Pradesh. It contains relics or remains of the Buddha and his disciples. It has been recognised as a UNESCO World Heritage Site since 1989.
- It was **initially built by Mauryan King Ashoka** in the 3rd century B.C. The mound of the Stupa was built by Ashoka. Over the course of the next few centuries, additions were made to the stupa by various rulers and dynasties.
- During the rule of the **Shunga Dynasty (2nd–1st century BCE),** the **original brick structure was enlarged** and the mound was covered in sandstone slabs. Also, a walkway (pradakshina patha) was constructed around the stupa which was bounded by stone railing. A harmika or square structure was also added to the stupa.
- **The most elaborate additions to the Stupa were made by the Satavahana Dynasty (1st BC to 2nd century AD).** Four stone gateways or toranas were added to the Stupa. These toranas consisted of stone pillars which were richly carved.
- The later addition to the grand stupa was during the **Gupta Dynasty** (5th century CE), when four shrines were added at the cardinal entry points. **The victory inscription of Chandragupta II is carved on a railing of the Stupa**. A pillar bears inscriptions in early Brahmi and ornamental Sankha Lipi from the Gupta period.
- The **Kanva Dynasty (1st century BCE)** is **not recorded to have made any contributions** to the Sanchi Stupa. They were a short-lived dynasty that succeeded the Shungas.

Therefore, option (c) is the answer.

Q37.
Answer: b
Explanation:

- The **Mughal Empire** governed vast regions of the Indian subcontinent from the early 16th to the mid-19th century. Established in 1526 by Babur, a Timurid prince with Turkic-Mongol ancestry, the Mughal dynasty grew its influence under notable emperors such as Akbar, Jahangir, Shah Jahan and Aurangzeb.

- The **tombs of Mughal rulers** are a significant aspect of their architectural legacy, serving as both grand memorials and representations of the empire's artistic and cultural achievements. These tombs often reflect the dynasty's unique blend of Persian, Central Asian, and Indian architectural styles.

- The geographical location of these tombs provide an insight on the political and geographical extent of the empire during that time.

    - **Babur's Tomb (Bagh-e-Babur), Kabul, Afghanistan**: It is located in the Bagh-e-Babur (Babur's Garden) in Kabul, Afghanistan and is notable for its serene garden setting and the influence of Persian garden design. Babur, the founder of the Mughal Empire in India, is entombed in Kabul, the city which served as his capital post his ouster from Samarqand.
    - **Akbar's Tomb, Sikandra, Agra, Uttar Pradesh, India:** Located in **Sikandra, near Agra**, this tomb is the final resting place of Emperor Akbar, one of the greatest Mughal rulers. It is notable for its unique **blend of Persian, Central Asian, and Indian architectural elements**. Called as the consolidator of the Mughal empire in India, the reign of Akbar oversaw the zenith of political influence of Mughals, with Agra emerging as the seat of power for India.
    - **Aurangzeb's Tomb, Khuldabad, Maharashtra, India:** It is located in **Khuldabad, near Aurangabad** in Maharashtra. Unlike the grandiose tombs of other Mughal emperors, Aurangzeb's tomb is simple and modest, reflecting his austere and religious lifestyle. The only Mughal king to be buried south of the Vindhyas, Aurangzeb spent a considerable time of his regnal years fighting with Marathas at the Deccan frontier, with Delhi being vacant for political intricacies to play.

So, the correct order of the location of Mughal Emperors tombs is in the west to east direction is Babur - Aurangzeb - Akbar.
Therefore, option (b) is the correct answer.

Q38.
Answer: b
Explanation:

- **Charkha** is a hand-driven spinning wheel used for spinning fibre into yarn. It became the symbol of the **Swadeshi movement, started in 1905** and later brought into **greater prominence by Mahatma Gandhi**.
- The **Swadeshi Movement** was launched from Calcutta in 1905 as an immediate response to the British Government's decision to partition Bengal. It called for a boycott of foreign goods and a promotion of goods made in India i.e., "Swadeshi" goods**. The charkha became the symbol of the Swadeshi movement.** It represented the assertion of an Indian way of life and a counter to the mechanisation that led to the ruin of India's textile industry.

- In 1921, at the Bezwada (now Vijayawada) session of Congress, a young freedom fighter **Pingali Venkaiah**, presented a design of a flag to Mahatma Gandhi. The flag consisted of three stripes representing multiple communities living in harmony in India. A charkha was superimposed in the center, signifying the country's progress. Gandhi encouraged people to spin their own cloth and boycott British textiles.
- The flag that was approved at the Congress Committee meeting in 1931 had a 'charkha' in the centre.

Therefore, option (b) is the correct answer.

Q39.
Answer: b
Explanation:

- The entire history of the freedom movement is replete with the saga of bravery, sacrifice and political sagacity of hundreds and thousands of women of India.
- **Annie Besant was the first female President of Indian National Congress (1917).**
  - She founded the Home Rule League in Madras in 1916. She also joined the Theosophical Society of India. She also edited 'New India' and 'Commonwealth'.
- **Sarojini Naidu** was elected as the President of the Indian National Congress Party in 1925. She **was the first Indian woman to assume that position. So, pair 1 is not correctly matched.**
  - She was appointed the Governor of Uttar Pradesh after India achieved independence in 1947. She was India's first woman governor.
  - She was a gifted poet in the English language and was popularly known as the **Nightingale of India**.
- **Kamaladevi Chattopadhyay** (1903-1988) was the first woman to run for a legislative seat in India and interestingly, she was also the **first Indian woman to be arrested by the British government. So, pair 2 is correctly matched.**
- **Kadambani Ganguli** was a graduate of Kolkata University and the first woman doctor from Bengal. She attended the Calcutta Session of Congress as delegate in 1890. She **became the first woman to speak from the Congress platform** when she proposed a vote of thanks to the President Pheroze Shah Mehta. **So, pair 3 is not correctly matched.**
  - **Vijay Laxmi Pandit** was the first woman to become the President of the United Nations General Assembly.
- **Muthulakshmi Reddy became the first woman legislator**, when she was appointed to the Chennai Legislative Council in 1927. She became the first woman member to be nominated to the legislative council in colonial India. **So, pair 4 is correctly matched.**
  - She was the first girl student to be admitted into a Men's College, the first woman House Surgeon in the Government Maternity and Ophthalmic Hospital, the first woman legislator in British India, the first Chairperson of the State Social Welfare Advisory Board, and the first woman Deputy President of the Legislative Council.

So, only two of the pairs given above are correctly matched.
Therefore, option (b) is the correct answer.

Q40.
Answer: b
Explanation:

- **Kumbh Mela,** in Hinduism, is a religious pilgrimage that is **celebrated four times over a course of 12 years.** The geographical location of Kumbh Mela spans over **four locations** in India and the Mela site keeps rotating between one of the four pilgrimages on four sacred rivers.
- A full Kumbh Mela is held every 12 years in the four cities. A half ("Ardha") Kumbh is held mid-way between two full Kumbhs.
- The festival rotates between four key locations in India: **Prayagraj, Haridwar, Nashik and Ujjain**. Each site is tied to a sacred river - the Ganges, Godavari and Shipra.

So, Ujjain, Nashik, Haridwar and Prayagraj which are identified by

B, C, D and E respectively, identify the locations of Kumbh Mela.

Therefore, option (b) is the correct answer.

Relevance: With a massive gathering of more than 1.53 crore pilgrims for the final holy dip on Maha Shivratri, the 45-day Maha Kumbh came to a close.

Q41.
Answer: b
Explanation:

- **Meridional circulation** refers to the large-scale atmospheric motion organized into distinct patterns known as meridional cells, such as the Hadley, Ferrel and Polar cells. It involves the **poleward transport of heat and moisture through vertical and horizontal motions in the atmosphere**.
    - **Hadley cell**: At **low latitudes**, **air moves toward the equator**, where it is heated and rises vertically. In the upper atmosphere, air moves poleward. This forms a convection cell that governs tropical and sub-tropical climates.
    - **Ferrel cell:** In this **mid-latitude atmospheric circulation cell**, air near the surface flows poleward and eastward (westerlies), while air higher in the atmosphere moves equatorward and westward.
    - **Polar cell: At higher latitudes, air rises and travels toward the poles**. Once over the poles, the air sinks. At the surface, air moves outward from the polar highs, creating east-blowing surface winds called polar easterlies. It is the smallest and weakest of the cells.

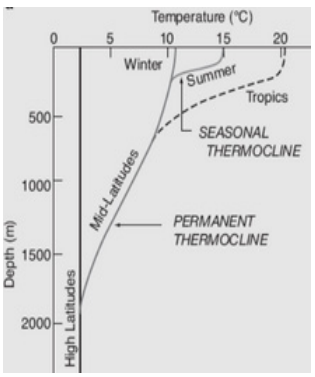
Therefore, option (b) is the correct answer.

Q42.
Answer: c
Explanation:

- A **soil profile** is a vertical section of soil that shows different layers called **horizons** (e.g., O, A, B, C, and R horizons). These layers vary in composition, structure, and organic matter content.
- A soil profile is a **display of vertical sections from the ground surface down to the parent rocks**. Thus a soil profile denotes the vertical distribution of soil components (e.g. the living organisms-flora and fauna- and organic matter, the inorganic minerals, the soil solution and the attributes of soil atmosphere, as discussed earlier) and various associations of the properties of these components.
- The soil profile is characterised by the following common properties.
    - On an average there is a **gradual decrease** of **organic matter,** number of living organisms, **activity of living organisms (microbial activity)** etc. with increasing depth in the soil profile. **So, points 2 and 4 are correct.**
    - The **level of aeration of soil decreases** from the surface downwards in the soil profile. **So, point 1 is correct.**
    - There is **increase in the number and variety of parent minerals** from the surface downward in the soil profile upto the base of parent rocks. **So, point 3 is not correct.**
    - There is no definite trend of either increase or decrease in the content of soil water with depth because there is a lot of fluctuation in water content. The content of soil water is determined by (i) the location of groundwater, (ii) nature of movement of groundwater, (iii) frequency and amount of rainfall, (iv) absorptive characteristics of different horizons of the soil profile.
- Soil nutrients like **nitrogen, phosphorus and potassium** are often concentrated in the topsoil due to organic matter decomposition and fertilization practices. These nutrient levels typically decrease with depth.

So, only three of the above soil properties typically decrease in concentration as depth increases in a soil profile.
Therefore, option (c) is the correct answer.

Q43.
Answer: a
Explanation:



- The **thermocline** is a distinct layer in the ocean where the temperature changes rapidly with depth. It separates the **warmer surface waters** from the **colder deep waters**. The presence or absence of a thermocline varies depending on factors such as latitude, season, and oceanic conditions. Typically, thermoclines are well-developed in tropical and temperate waters but **are weak or absent in polar regions**, where surface and deep-water temperatures are nearly uniform.

- In tropical and mid-latitude regions, a well-developed thermocline exists due to **strong solar heating** at the surface, which creates a temperature gradient with depth. However, at higher latitudes (closer to the poles), **surface waters are already cold**, and there is **no significant temperature contrast** with deeper layers. This **prevents the formation of a well-defined thermocline**. Additionally, salinity and density differences are also reduced because of the continuous mixing of surface and deep waters due to strong ocean currents and wind action. **So, statements 1 and 2 are correct.**

So, both Statement–I and Statement–II are correct and Statement–II explains Statement–I.
Therefore, option (a) is the correct answer.

Q44.
Answer: b
Explanation:

- **Pseudocereals** are plants that are **not part of the cereal family**, but are used in similar ways to cereals. They are also known as **pseudograins**. They produce starch-rich seeds that can be used in food applications similarly to cereal grains. The most widely known representatives include **buckwheat, amaranth, quinoa, and canihua,** which is less well known. All of these pseudocereals have **good nutritional compositions**, with high concentrations of essential amino acids, essential fatty acids, minerals, and some vitamins. Starch granules in pseudocereals are among the smallest measured, and the starch is characterized by low amylose content (except for buckwheat).
- **Quinoa** is considered a pseudocereal because it belongs to the **Amaranthaceae family and is not a grass**. It is used like a grain in cooking due to its similar nutritional profile and versatility. It is rich in protein, fiber and essential amino acids, making it a popular choice for health-conscious consumers. **So, point 1 is correct.**
- **Buckwheat** is another pseudocereal, originating from the **Polygonaceae** family. It is not a grass but is commonly used like a grain in foods such as **soba noodles and pancakes.** Its high nutritional value, including **essential amino acids and antioxidants**, makes it a valuable alternative to traditional cereals. **So, point 2 is correct.**
- **Amaranth** is also a pseudocereal from the **Amaranthaceae** family, much like quinoa. It is highly nutritious, containing **proteins, fiber and micronutrients such as iron and magnesium.** Its seeds are used in various culinary applications, including porridge and baking, due to their grain-like properties. **So, point 3 is correct.**
- **Barley** is a **true cereal grain** that belongs to the **Poaceae** family, which is a group of grasses. It is cultivated for its edible seeds and is widely used in the production of food, beverages, and animal feed. **So, point 4 is not correct.**
- Millets are also a **true cereal grain** from the **Poaceae** family. They are known for their small, round seeds and are grown mainly in **arid and semi-arid regions.** Millet is a staple in many parts of Asia and Africa and is valued for its drought resistance and nutritional benefits. **So, point 5 is not correct.**

So, only three of the above are pseudocereal.
Therefore, option (b) is the correct answer.

Knowledge Box
Cereals: ● **Cereals** belong to the grass family, or ***Poaceae*.** They are cultivated for their edible grains, which are starchy and dry. ● Also called ***Gramineae***, *Poaceae* is a large and nearly ubiquitous family of monocotyledonous flowering plants (angiosperms). It is by far the most economically important family of angiosperms, providing food to mankind. ● Some of the best examples of ***Gramineae*** are ***Triticum* (wheat), *Oryza* (rice), *Saccharum* (sugarcane), *Bambusa* (bamboo), *Avena* (oats), *Zea* (corn)**, etc.

Q45.
Answer: a
Explanation:

- **Tropical deciduous forests** occur in regions with **heavy rainfall for part of the year followed by a marked dry season**. These forest formations are dense and lush during the wet summers, but become a dry landscape during the dry winters when most trees shed their leaves. Trees like **tendu, palas and amaltas belong to these forests**.

Tropical Deciduous forests:

- These are the most widespread forests in India. They are also called the **monsoon forests**. They spread over regions which receive **rainfall between 70-200 cm**. On the basis of the availability of water, these forests are further divided into **moist and dry deciduous**.
- The moist deciduous forests are more pronounced in the regions which record rainfall between 100-200 cm. These forests are found in the northeastern states along the foothills of Himalayas, eastern slopes of the Western Ghats and Odisha. **Teak, sal, shisham, hurra, mahua, amla, semul, kusum, and sandalwood,** etc. are the main species of these forests.
- **Dry deciduous forest** covers vast areas of the country, where **rainfall ranges between 70 -100 cm.** On the wetter margins, it has a transition to the moist deciduous, while on the drier margins to thorn forests. As the **dry season begins, the trees shed their leaves completely** and the forest appears like a vast grassland with naked trees all around. **tendu, palas, amaltas**, bel, khair, axlewood, etc. are the common trees of these forests. **So, statement 1 is not correct but statement 2 is correct.**

Tropical Evergreen forests:

- These forests are found in warm and humid areas with an **annual precipitation of over 200 cm.**
- Species found in these forests include rosewood, mahogony, aini, ebony, etc. **So, statement 1 is not correct.**

Tropical Thorn forests:

- These forests occur in the areas which receive rainfall less than 50 cm. These consist of a variety of grasses and shrubs.
- In these forests, plants remain leafless for most part of the year and give an expression of scrub vegetation. **So, statement 3 is not correct.**
- Important species found are babool, ber, and wild date palm, khair, neem, khejri, palas, etc.

So, only one of the statements given above is correct.
Therefore, option (a) is the correct answer.

Q46.
Answer: a
Explanation:

- **A propulsion system**, be it the earth-to-orbit or the in-space, is the one that gives a rocket power to lift off from the Earth, across the dense atmosphere and later reach its destination. The selection of an appropriate propellant system is based on the thrust required, reusability, cost and core competency.

- **The cryogenic engine** uses liquid oxygen and liquid hydrogen. Handling liquid hydrogen is challenging, given that it needs to be stored at minus 253 degrees Celius and it is highly inflammable. A **semi-cryogenic engine uses a liquid oxygen – kerosene combination**, where kerosene is readily storable; this combination offers advantages like high-density impulse (with respect to cryogenic), less toxic (with respect to storage) and cost-effectiveness.

Therefore, option (a) is the correct answer.

Relevance: The Indian Space Research Organisation (ISRO) recently successfully conducted the test on a semi-cryogenic engine (SE2000), going a step closer to finalising the crucial cryogenic stage.

Q47.

Answer: b

Explanation:

- ***Homo floresiensis*** individuals stood approximately 3 feet 6 inches tall, had **tiny brains**, large teeth for their small size, shrugged-forward shoulders, no chins, receding foreheads, and relatively large feet due to their short legs.
- Remains of one of the most recently discovered early human species, ***Homo floresiensis*** **(nicknamed 'Hobbit')**, have so far **only been found on the Island of Flores, Indonesia.** The fossils of *H. floresiensis* date to between about 100,000 and 60,000 years ago, and stone tools made by this species date to between about 190,000 and 50,000 years old.
- Despite their small body and brain size, ***H. floresiensis*** **made and used stone tools**, hunted small elephants and large rodents, coped with predators such as giant Komodo dragons, and may have used fire.
- The **diminutive stature and small brain** of *H. floresiensis* may have resulted from **island dwarfism**—an evolutionary process that results from long-term isolation on a small island with limited food resources and a lack of predators.
- They hunted small elephants and large rodents, while coping with formidable predators like giant Komodo dragons. May have employed fire, demonstrating an impressive level of adaptability.

Therefore, option (b) is the correct answer.

Knowledge Box:

Homo habilis:
- **Time:** 2.4-1.4 million years ago
- **Location:** Eastern and Southern Africa
- **One of the earliest Homo species**, *Homo habilis* had a slightly larger brain and smaller face and teeth than its predecessors.
- It retained some ape-like features, but was nicknamed "handy man" for its association with early stone tool use.

Homo rudolfensis:
- **Time:** 1.9-1.8 million years ago
- **Location**: Eastern Africa (Kenya, possibly Tanzania and Malawi)
- *Homo rudolfensis* had a braincase size of 775 cubic centimeters, larger than Homo habilis.
- It also featured a longer face and larger teeth, sparking debate about its classification as either Homo or Australopithecus.

Homo erectus:
- **Time**: 1.89 million - 110,000 years ago
- **Location**: Africa, Western Asia, and East Asia
- *Homo erectus* **had modern human-like body proportions**, with elongated legs and shorter arms.
- They likely walked and ran long distances, and had adaptations for life on the ground. They had expanded braincase, **modern human-like growth rate**, evidence of care for weak individuals, association with early handaxes and stone tool innovation.
- **Considered the first species to expand beyond Africa,** Homo erectus was highly variable and long-lived, existing for about **nine times as long as *Homo sapiens*.**

Relevance: A microscopic analysis of a 700,000-year-old miniature human arm and dental fossils has put an end to the debate on the origins of *Homo floresiensis*.

Q48.
Answer: a
Explanation:

- **Cryopreservation** is a common technique that is used **to preserve the structure and function of cells and tissues at very low temperatures.** The low temperatures cause biochemical and metabolic reactions to occur at a much slower speed.
- Cryopreservation usually involves the use of one or more **components that protect cells from the otherwise lethal effects of freezing**. These components are known as **cryoprotectants.**
    - Cryoprotectants are defined as components that allow a high degree of cell survival during freezing. They **protect cells from damage** caused by cooling because they increase the total concentration of solutes in the system and reduce the amount of ice that is formed at a given temperature. The most commonly used **cryoprotectants** for the storage of microorganisms for long periods of time include **glycerol, dimethyl sulfoxide, methanol, ethylene glycol, propylene glycol, and serum albumin.**
- They are very simple molecules of low molecular weight and with **little or no toxicity**. They are highly soluble in water and able to interact with water through hydrogen bonds.
- Cryoprotective agents can be divided into two classes: penetrating agents and non-penetrating agents.
    - **Penetrating cryoprotective agents** have an appreciable effect on the system freezing point. They are normally used in high concentrations to protect cells from damage caused by slow freezing. Such agents **include glycerol, ethylene glycol, dimethyl sulfoxide (DMSO), ethanol, methanol, ammonium acetate, and trimethylamine acetate** (TMAA).
    - **Non-penetrating agents** are used in low concentrations and generally require faster freezing and thawing rates to confer protection. They include polyvinylpyrrolidone (PVP) and **polyethylene glycol** (PEG).

Therefore, option (a) is the correct answer.

Q49.
Answer: c
Explanation:

- **Quantum computers** are computers that consist of quantum bits, or "qubits," which are typically subatomic particles such as electrons or photons that speed up calculations using specially designed quantum algorithms. By manipulating information stored in these qubits, scientists can quickly produce high-quality solutions to difficult problems.
- Five main platforms are being explored for their potential to build quantum computers: **superconducting circuits, silicon quantum dots, light, neutral atoms** and **ion traps**. **Trapped-ion quantum computers** use charged atoms (ions) trapped in electric fields as qubits. **So, statement 2 is not correct.**
- Charged atom (ion) is just one atom floating without anything around it, so it is in a pure quantum state. Scientists are using lasers to precisely control their quantum state. The strong Coulomb forces between these ions can be used to realize logical gate operations by coupling different qubits. The researchers have demonstrated trapped-ion qubits with **long coherence times, high-fidelity state preparation and readout, and single- and two-qubit logic gate operations with low error rates**. Hence, these qubits can be prepared and manipulated with record-breaking accuracy, offering a promising scalable platform for quantum computing. These properties **make the trapped-ion quantum computing superior to other conventional quantum computing methods. So, statement 1 is correct.**

So, Statement-I is correct but Statement-II is incorrect.
Therefore, option (c) is the correct answer.
Relevance: Japan's Fugaku supercomputer has gained an edge following the recent installation of the Reimei quantum computer.

Q50.
Answer: d
Explanation:

- **Monolayer Amorphous Carbon (MAC)** is a new material recently synthesized at the National University of Singapore.

- It is **a newly developed carbon material with high strength and durability**. Like graphene, MAC is a **two-dimensional**, **single-atom-thick** material.
- Carbon-derived materials like graphene are among the strongest on Earth. Monolayer Amorphous Carbon is **eight times tougher than graphene.**
- However, unlike graphene, which has a crystalline hexagonal lattice, MAC consists of both crystalline and amorphous regions, forming a **composite structure**. The toughness of MAC is attributed to this composite structure.
- **The unique design of MAC prevents cracks from propagating easily,** allowing the material to absorb more energy before breaking.

Therefore, option (d) is the correct answer.
Relevance: Scientists have developed the crack-resistant 2D material that is 8 times tougher than graphene.

Q51.
Answer: c
Explanation:

- **A no-confidence motion** is an attempt, usually by an Opposition party, to get the government of the day to prove its majority on the floor of the House. The motion can only be moved by a member in the Lok Sabha, and, once moved, it offers MP's an opportunity to discuss the government's performance, before voting on whether the ruling party has the "confidence" of the House. The motion needs the **support of 50 members** to be admitted.
- A no-confidence motion is slightly different from a motion of confidence, or trust vote, which is moved by the government, as an ordinary motion under Rule 184. A government can prove its majority by moving a confidence motion as a counter to the opposition parties.
- When the Speaker is satisfied that the matter proposed to be discussed is in order under the rules, s/he shall read the motion to the House and shall request those members who are in favour of leave being granted to rise in their places. If not less than **1/5th of the total number of members of the House** for the time being rise accordingly, the Speaker shall inform that **leave is granted.** On the other hand, lesser members than required rise the Speaker shall inform that **leave is not granted**. **So, statement 1 is not correct.**
- There is **no restriction on moving of more than one no-confidence motion in a session**, although this has not been done so far, which may be necessitated on account of some new developments that might have taken place since the discussion on the first motion. The second motion would, therefore, be admissible only if it is based on new matters not covered by the discussion on the previous motion. **So, statement 2 is not correct.**
- **Rule 198 of the Rules of Procedure and Conduct of Business in Lok Sabha** lays down the procedure for moving a Motion of No-Confidence in the Council of Ministers. The usual format of such a motion is that "this House expresses its want of confidence in the Council of Ministers". Under the Rules, **only a motion expressing want of confidence in the Council of Ministers as a body is admissible. So, statement 3 is correct.**
- A Motion of No-confidence **need not set out any grounds** on which it is based. Even when grounds are mentioned in the notice and read out in the House, they do not form part of the No-confidence Motion.

Therefore, option (c) is the correct answer.

Q52.
Answer: b
Explanation:

- **President's rule** under Article 356 of the Constitution of India was first imposed in Punjab on 20th June, 1951. The State was under President's rule for almost a year until 17th April, 1952.
    - Manipur is tied with Uttar Pradesh for the most frequent imposition.
- **In 1957**, the **Communist Party of India (CPI)** created history by winning the Assembly election in **Kerala**, forming India's first democratically elected communist government.
- The **First Administrative Reforms Commission** (ARC) as a Commission of Inquiry was set up in **January**, **1966**, to examine the public administration of the country and make recommendations for reform and reorganisation when necessary. It was initially chaired by **Morarji R Desai** and later on **K. Hunmanthaiya** became its chairman when Shri Morarji R Desai became the Deputy Prime Minister of India. The Commission submitted the 20 reports before winding up in mid- 1970.
- The **Socially and Educationally Backward Classes Commission** (SEBC) was set up on January 1, **1979**. The Commission came to be known as the **Mandal Commission**, named after its chairman, B P Mandal. The

formation of the Commission was announced on December 20, 1978, by then Prime Minister Morarji Desai of the Janata Party.

So, the correct sequence is Imposition of President rule for the first time (1951) - Formation of the first Communist Party Government in an Indian State (1957) - Constitution of the first Administrative Reforms Commission (1966) - Establishment of Mandal Commission.
Therefore, option (b) is the correct answer.

Q53.
Answer: b
Explanation:

- **Persian Gulf**, a shallow marginal sea of the Indian Ocean that lies between the Arabian Peninsula and southwestern Iran.
- It is bordered on the north, northeast and east by **Iran**; on the southeast and south by part of Oman and by the United Arab Emirates; on the southwest and west by **Qatar**, Bahrain and Saudi Arabia; and on the northwest by **Kuwait and Iraq**. The term Persian Gulf (or Arabian Gulf, the name used by Arabs) sometimes is employed to refer not only to the Persian Gulf proper but also to its outlets, **the Strait of Hormuz and the Gulf of Oman**, which open into the Arabian Sea. **So, points 1, 2, 4 and 5 are correct.**
- **Syria and Yemen do not border the Persian Gulf. So, points 3 and 6 are not correct.**
- The Persian Gulf receives only small amounts of river-borne sediment except in the northwest, where immense quantities of silt are deposited by the **Tigris, Euphrates and Kārūn rivers** and other smaller streams as they empty into the gulf.

So, only four of the above countries border the Persian Gulf.
Therefore, option (b) is the correct answer.

Q54.
Answer: d
Explanation:

- **Article 142** of the Constitution of India empowers the Supreme Court to **pass any order or decree necessary to ensure complete justice** in a case before it.
- This provision allows the court to take actions beyond the scope of existing laws if required, enabling it to deliver justice even in situations where **no specific legal provision exists**.
- This provision facilitated the introduction of **judicial activism** in India. Judicial activism in India is influenced by the Constitution's principles of justice.

Therefore, option (d) is the correct answer.

Knowledge Box
• **Articles 50, 124 and 129** of the Constitution of India reinforce the independence of the judiciary from the executive and legislature. • **Article 136** of the Constitution of India allows the Supreme Court to grant a**Special Leave Petition (SLP)** to appeal from any judgment, decree, or order. This is a discretionary power of the Supreme Court. The SLP can be provided even if a High Court refuses to provide the certificate of fitness for appeal. • The Supreme Court has been granted the discretionary powers to review its own judgments under **Article 137 of the Constitution**.

Q55.
Answer: c
Explanation:

- **Article 53 (1)** of the Constitution of India states that, the executive power of the Union shall be vested in the President and shall be exercised by him/her either directly or through officers subordinate to him in accordance with this Constitution.
- **The Constitution (Forty-second Amendment) Act of 1976,** by amending the **Article 74 (1),** made it obligatory for the President to act in accordance with the advice of the Council of Ministers headed by the Prime Minister. **So, statement 2 is not correct.**
- This rigidity was, however, partly diluted by the **Constitution (Forty-Fourth Amendment) Act, 1978** which authorised the President to require the Council of Ministers to **reconsider such advice** either generally or otherwise. The President shall act in accordance with the advice tendered after such reconsideration.

In other words, the President may return a matter once for reconsideration of her/his ministers, but the reconsidered advice shall be binding. Therefore, **it has been the Council of Ministers and not the President** which bears the responsibility for all executive action. **So, statement 1 is correct.**

So, Statement-I is correct but Statement-II is incorrect.
Therefore, option (c) is the correct answer.

Q56.
Answer: c
Explanation:

- **"Hidden hunger"** refers to **micronutrient deficiencies in people** in varying degrees of severity. The micronutrients of most concern are essential **amino acids (in proteins), iron, zinc, vitamin A, vitamin C, vitamin D, iodine, folic acid and B12.**
- **Micronutrients** are a group of nutrients like vitamins and trace minerals that are required in small amounts for normal growth and development.
- These enable the body to produce enzymes, hormones and other essential substances. They also play a central role in metabolism and in the maintenance of tissue function.
- A **new study** by scientists at the International Crops Research Institute for the Semi-Arid Tropics (**ICRISAT**), the International Food Policy Research Institute (**IFPRI**) and the Center for Economic and Social Studies (**CESS**) has revealed that **many Indians in rural areas suffer from protein deficiency** in spite of producing sufficient protein-rich foods or being able to afford them. The study reveals this condition as 'hidden hunger'.
- The researchers found that diets in these areas were dominated by cereals like rice and wheat, which contributed 60-75 percent of daily protein intake. But while these foods provide some protein, they lack the **essential amino acids** necessary for balanced nutrition.

Therefore, option (c) is the correct answer.
Relevance: A recent report suggests that rural Indians are suffering from 'hidden hunger'.

Q57.
Answer: c
Explanation:

- The **Governor** is the **Executive Head of the State** within the meaning of **Article 153 and 154** of the Constitution of India. Article 154 vests the executive powers of the State in the Governor who exercises it either directly or through officers subordinate to him in accordance with the Constitution. Under **Article 163,** the Governor as the Constitutional Head exercises all powers under the Constitution on the aid and advice of the Council of Ministers. It includes summoning and proroguing the Session of the State Legislature, Promulgation of Ordinances, giving assent to the Bills and appointing the Council of Ministers.
- According to **Article 163** of the Constitution of India, if any question arises whether any matter is or is not a matter as respects which the Governor is by or under this Constitution required to act in her/his discretion, **the decision of the Governor in his discretion shall be final.**
- The validity of anything done by the Governor **shall not be called in question** on the ground that he ought or ought not to have acted in his discretion.

Therefore, option (c) is the correct answer.

Q58.
Answer: d
Explanation:

- The **process of law making** begins with the introduction of a Bill in either House of Parliament. A Bill can be introduced either by a Minister or a member other than a Minister. In the former case, it is called a **Government Bill** and in the latter case, it is known as a **Private Member's Bill**. However, no Private Members' Bill has been passed by Parliament since 1970.
- In Rajya Sabha and Lok Sabha, as also in State Legislatures, **a particular day of every week** is allocated for the transaction of Private Members' Legislative Business.
- A Bill may be **introduced in either House of Parliament.** However, a **Money Bill** can not be introduced in Rajya Sabha. It can only be introduced in Lok Sabha with **prior recommendation of the President** for introduction in Lok Sabha. If any question arises whether a Bill is a Money Bill or not, the decision of the Speaker thereon is final. However, there is **no bar on the introduction of a Money Bill by a Member of Lok Sabha**. **So, point 1 is correct.**

- **Article 110(1)(a) to (f)** defines a Money Bill as a Bill that contains 'only' provisions dealing with one or more of six specific matters. 'The custody of the **Consolidated Fund or the Contingency Fund of India**, the payment of money into or the **withdrawal of money from any such Fund**' is one of these six matters.
- **Example: Salary, Allowances and Pension of Members of Parliament (Amendment) Bill, 1964** was a Money Bill and introduced by a private member (Raghunath Singh).

- Bills introduced under **Article 3** of the Constitution of India, which deals with the creation and alteration of States, are considered 'ordinary bills'. It can be **introduced by any Member of Parliament. So, point 2 is correct.**
- **Constitution Amendment Bills** under **Article 368** of the Constitution of India can be introduced in either House of Parliament, and **by any Member of Parliament. So, points 3 and 4 are correct.**

Therefore, option (d) is the correct answer.

Q59.
Answer: c
Explanation:

- The **Committee on Estimates**, constituted for the first time in 1950, is a Parliamentary Committee **consisting of 30 members, elected every year by the Lok Sabha from amongst its Members**. It **does not include any Members from the Rajya Sabha**.
- The Chairperson of the Committee is appointed by the Speaker from amongst its members. A **Minister cannot be elected as a member** of the Committee and if a member after selection to the Committee is appointed a Minister, the member ceases to be a Member of the Committee from the date of such appointment. The term of office of the Committee is **one year**.
- Soon after it is constituted, the **Committee selects such of the estimates pertaining to a Ministry/ Department of the Central Government or such of the statutory and other bodies of the Central Government** as may seem fit to the Committee. The Committee also examines matters of special interest which may arise or come to light in the course of its work or which are specially referred to it by the House or the Speaker.

Therefore, option (c) is the correct answer.

Q60.
Answer: b
Explanation:

- **The Third Schedule of the Constitution of India** contains the forms of oaths and affirmations for various government officials including Union Ministers, State Ministers, Members of Parliament, Candidates for election to Parliament, Members of the state legislature, Candidates for election to the state legislature, Judges of the Supreme Court, Judges of a High Court and Comptroller and Auditor General (CAG) of India.
- Among these, **Judges of the Supreme Court and CAG** have the same form of oath or affirmation. **The form of the oath is:**
  - "I, A.B., having been appointed Chief Justice (or a Judge) of the Supreme Court of India (or Comptroller and Auditor-General of India) do swear in the name of God/solemnly affirm that I will bear true faith and faith and allegiance to the Constitution of India as by law established, 1 [that I will uphold the sovereignty and integrity of India, that I will duly and faithfully and to the best of my ability, knowledge and judgment perform the duties of my office without fear or favour, affection or ill-will and that I will uphold the Constitution and the laws."

Therefore, option (b) is the correct answer.

Q61.
Answer: c
Explanation:

- **Wallace Line**, **an imaginary boundary between the Asian and Australian faunal regions**, was proposed by the 19th-century British naturalist **Alfred Russel Wallace**.
- The line extends from the Indian Ocean through the **Lombok Strait (between the islands of Bali and Lombok), northward through the Makassar Strait (between Borneo and Celebes) and eastward, south of Mindanao, into the Philippine Sea.**
- The Wallace Line, in many ways, acts like an invisible fence shaped by nature's own design. This unique divide helped shape some early ideas about how species change over time. It sparked thoughts on biogeography, the study of how plants and animals are distributed across the planet.

- When **Charles Darwin and Alfred Russel Wallace independently wrote about natural selection** in the mid-1800s, they each pointed to real-world examples of animals adapting to local conditions. The stark difference between these islands stood out to Wallace.

Therefore, option (c) is the correct answer.

Q62.
Answer: a
Explanation:
In a world moving towards **'gated globalization,'** where trade barriers, tariffs and selective trade agreements shape economic policies, the **Inverted Duty Structure** can create significant challenges for economies, especially those aiming for self-reliance.

- The **Inverted Duty Structure** occurs when **import duties on raw materials or intermediates are higher than those on finished goods**. Ideally, an economy should impose lower duties on raw materials to encourage local manufacturing.
- If finished goods are cheaper to import, **businesses prefer imports over local production**, leading to a **decline in domestic manufacturing**.
    - Manufacturers face higher production costs due to expensive raw materials where **locally produced goods struggle to compete with cheaper imported finished products**. **So, statement 1 is correct.**
        - In India, it has impacted manufacturing of **solar panels**, where finished products have lower import duties than raw materials.
- As local manufacturing becomes unviable, businesses shift to **importing finished goods** rather than producing them domestically. This leads to **higher imports**, worsening the **trade deficit** (when imports exceed exports). **So, statement 2 is correct.**
- The Inverted Duty Structure **discourages local manufacturing and value addition**. When industries prefer importing finished goods over producing locally, domestic jobs in manufacturing, supply chains and logistics shrink. **So, statement 3 is not correct.**

Therefore, option (a) is the correct answer.
Relevance: The Union Budget 2024-25 has proposed measures to address the Inverted Duty Structure (IDS) in India.

Q63.
Answer: a
Explanation:

- **Gross Domestic Product (GDP)** measures the aggregate production of final goods and services taking place within the domestic economy during a year. It is the **measure of production arising out of the activities of economic agents within the territory of the country.**
    - When adjustments are made to this product by deducting the income of non-residents within the country and adding the income of residents abroad, the **national product is obtained.**
- **Net National Product (NNP) or Net National Income (NNI)** is the **sum of income earned by all factors of the production in the form of wages, profits, rent and interest, etc., belonging to a country during a year.** It is the National Product and is not bound by production within the national boundaries. It is that income or product which accrues to the economic agents who are resident of the country.
    - Net National Product measures output regardless of where that production has taken place (in domestic territory or abroad).
    - Gross National Product (GNP) ≡ Gross Domestic Product + Net factor income from abroad
    - Net National Product (NNP) ≡ Gross National Product (GNP) - depreciation
- **Gross Domestic Product** includes the **production of final goods and services within the domestic territory.** So, profits earned by a foreign company from its investments in India **will be included in the calculation of GDP.**
    - Net National Product (NNP) considers income earned by nationals or residents only. The income earned by foreigners in India is deducted from GDP to arrive at NNP. **So, profits earned by a foreign company from its investments in India will not be included in the calculation of NNP or NNI. So, point 1 is not correct.**
- **Profits earned by an Indian importer of electronic components** through their supply in India **will be included in the calculation of both GDP and NNI.** It is included in GDP as the economic activity is taking place within the territory of India. It will be included in NNI as the economic agent is a resident. **So, point 2 is correct.**

- **Betting and gambling** are prohibited under the **Public Gambling Act, 1867** and are considered illegal. The Constitution of India in its Seventh Schedule empowers the State Governments to make laws regarding gambling and betting activities. Most of the States have passed enactments prohibiting gambling and betting. **Income accrued from illegal activities like gambling and betting are not included while calculating GDP or NNI. So, point 3 is not correct.**
- **Transfer payments** are the payment for which no goods or services are received in return. They are one-way payments and **are not included in the calculation of GDP or NNP.**
    - **Transfer payment** includes forms of income such as old age pensions, education grants, unemployment benefits, gifts etc. These transfers by the Government don't involve a return of any productive service from the beneficiaries to the government and thus cannot be included in calculation of national product.
    - The **PM-KISAN** is a type of **transfer payment.** Under this scheme, the financial benefit of Rs **6,000/- per year** is transferred into the bank accounts of farmers' families across the country. Thus PM-KISAN transfers to the farmers are **not included in the calculation of GDP** or NNP. **So, point 4 is not correct.**
- Gross Domestic Product or Net National Product (NNP) calculated at the market prices includes **total indirect taxes less total subsidies.** The market value of the goods and services will include the indirect taxes like excise duties, customs, sales tax etc., levied by the government on goods and services**.** So, **import duties are included while calculating GDP or NNP at Market Price**. **So, point 5 is correct.**
    - GDP at Market Prices = GDP at Factor Cost + Indirect taxes – Subsidies

So, only two of the above are included in the calculation of Gross Domestic Product as well as the Net National Income.
Therefore, option (a) is the correct answer.
Relevance: The recently released economic survey has revealed that the moderation in GDP growth is traced to softening of growth in gross fixed capital formation.

Q64.
Answer: c
Explanation:

- **'Non-Convertible Preference shares'** are those that are issued to shareholders but **cannot be converted to equity shares**. These shares are **preference shares** and hence they **do not carry voting rights**. They **neither result in the expansion** of the company's equity base or increase its debt.
- Such shares **do not require an immediate payout** and are cumulative in nature. On redemption, the

shareholders receive a cash payout since these shares do not convert to equity.
- They always pay a **fixed dividend to the shareholder** until redemption.
- Recently the Securities and Exchange Board of India (SEBI) has announced changes to IPO listing rules for the NCRPS wherein it has reduced the **timeline from earlier 6 days to 3 days.**

Therefore, option (c) is the answer.

Q65.
Answer: a
Explanation:
The **National Health Family Survey (NFHS)** is one of the largest cross-sectional surveys in the world and plays a very important role in seeing the health sector's growth in India. Its comprehensiveness in data points serves as a baseline for policymakers to amend or continue the health policy at the national and state levels. The trends and gap pockets in **NFHS-4 and NFHS-5** are as follows:

- Data on women's empowerment suggest both positive and negative trends when comparing the two surveys. Among employment, there is a **one-unit increase among currently married women** from 31% to 32% in NFHS-5. There is a **significant increase of 25% among women who have a bank account**, rising from 53% to 79%, and nearly 54% now have a mobile phone compared to 46% in NFHS-4. **So, points 1 and 3 are correct.**
- However, there is a **decline in the percentage of women participating in decision-making within the family,** dropping from 84% in NFHS-4 to 71% in NFHS-5. **So, point 2 is not correct.**
- A critical aspect of the data is **husband justification for beating his wife**, which shows an upward trend among men with a 2% increase from 42% to 44%. Conversely, among women, a 7% decline was observed, decreasing from 52% to 45%. Overall, the data highlights **mixed progress in women's empowerment**. **So, point 4 is not correct.**

Therefore, option (a) is the correct answer.

Q66.
Answer: d
Explanation:

- The **Principal Purpose Test (PPT)** has been developed as one of the actions to tackle **Base Erosion and Profit Shifting by multinationals.** It is aimed at preventing misuse of tax treaties.
- Under the Base Erosion and Profit Shifting (BEPS) framework, the **PPT checks whether a business arrangement is genuinely commercial or created mainly to avoid taxes**. If the primary purpose is tax-saving, treaty benefits can be denied. Thus, the PPT is **done to prevent tax avoidance.**

Therefore, option (d) is the correct answer.

Knowledge Box
• The **Common Parlance Test** is a way to classify the goods for the **determination of rate of tax or tariff.** Broadly, the Common Parlance Test means that the goods have to be classified in a manner as understood by the common man. The commodity is classified based on how ordinarily or commonly it is known and its purpose and use. • The **Double Taxation Avoidance Agreement (DTAA)** is a bilateral agreement between countries designed to **prevent taxpayers from being taxed twice on the same income** in both their resident and source countries. This mechanism is crucial in today's globalized world where individuals and businesses earn income from multiple countries.

Relevance: Recently, Central Board of Direct Taxes (CBDT) has issued updated guidelines for application of the Principal Purpose Test (PPT) under India's Double Taxation Avoidance Agreements (DTAAs).

Q67.
Answer: a
Explanation:
In 2023, **India imported $37 billion of agricultural and related products** from the world. In the past 5 years, India's imports have grown substantially, up by $12.5 billion (51 percent) from FY 2019. India is ranked as the eighth largest global importer of agricultural and related products.

- **India's agricultural imports are dominated by two commodities**: Edible oils and pulses. **Imports of pulses had come down considerably** — from $3.9 billion in 2015-16 and $4.2 billion in 2016-17 to an average of $1.7 for the five years ending 2022-23 — on the back of increased domestic production. That

underwent a reversal with a poor crop in 2023-24. In **edible oils**, the outgo during 2024-25 is expected to be the highest after 2021-22 ($19 billion) and 2022-23 ($20.8 billion), which was basically due to the war in Ukraine that drove up global prices.

- In the case of cotton, the Bt revolution, the planting of genetically modified hybrids turned **India into the world's second largest exporter after the USA**. The country's cotton exports were valued at $4.3 billion, $3.7 billion and $3.6 billion in 2011-12, 2012-13 and 2013-14 respectively. That has collapsed to $781.4 million in 2022-23 and $1.1 billion in 2023-24.
    - During April-December 2024, India's cotton exports were, at $575.7 million, not only 8.1% lower than for the same period of 2023, but its imports of $918.7 million were up 84.2%. Thus, from an exporter, India is today a net importer of cotton.

TOP IMPORTS ($MN)

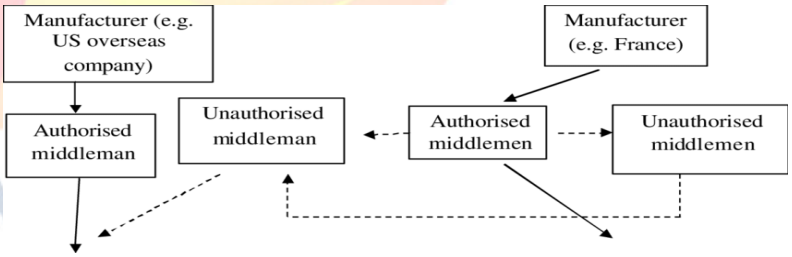
	2022-23	2023-24	Apr-Dec 2023	Apr-Dec 2024
Vegetable oils	20,837.7	14,871.66	11,638.03	13,518.96
Pulses	1,943.89	3,746.78	2,467.93	3,789.75
Fresh fruits	2,483.95	2,734.97	2,032.64	2,230.2
Cashew	1,805.67	1,431.39	1,193.04	1,414.36
Spices	1,336.65	1,455.57	1,123.81	1,220.61
Raw cotton	1,438.69	598.66	498.81	918.69
Natural rubber	937.6	739.18	554.15	875.7
TOTAL	35,686.2	32,870.03	24,641.45	29,251.41

Source: Department of Commerce

So, the correct sequence becomes Natural Rubber-Raw cotton-Pulses- Vegetable oils.
Therefore, option (a) is the correct answer.
Relevance: The recently released data from the Department of Commerce suggests that the imports, especially of pulses and edible oils, have surged.

Q68.
Answer: b
Explanation:

- **Parallel imports** (or gray market goods) refer to **branded goods that are imported into a market and sold there without the trademark owner's consent in that market.**
- The goods are manufactured by or under license of the brand owner and therefore are **not counterfeit**, but they may have been formulated or **packaged for a particular jurisdiction** and are imported into a different jurisdiction in contradiction to the brand owner's intention. The unofficial status of the gray market increases its riskiness.



Therefore, option (b) is the correct answer.
Relevance: Russia allowed businesses to import goods without trademark owner approval, resulting in over $70 billion in parallel imports over the past two years.

Q69.
Answer: b
Explanation:

- India has a **well-developed tax structure** with clearly demarcated authority between **Central and State Governments and local bodies**. The Central Government levies taxes on income (except tax on agricultural income, which the State Governments can levy), customs duties, central excise and service tax.
- **State Own Tax Revenue (SOTR)** refers to the budgetary resources that state governments generate through taxes they levy and collect. The own tax revenue of States includes money raised through **stamp duty**, **registration fees**, **motor vehicle tax**, sales tax, state excise and other taxes, along with the State component in Goods and Services Tax (GST), or State GST (SGST). It is an indicator of the state's ability to raise finances. **So, points 1, 2 and 3 are correct.**
- Taxes which are solely collected by the Central Government includes:
    - Direct Taxes: **Corporation Tax**, Income Tax, Other Taxes in Income & Expenditure, Wealth Tax, **Security Transaction Tax** and Other Tax and Duty on Commodities & Services. **So, points 4 and 5 are not correct.**
    - Indirect Taxes: Central GST, Union Excise Duty on petroleum products & tobacco and Custom duties.

So, only three of the above form part of the State Own Tax Revenue (SOTR).
Therefore, option (b) is the correct answer.
Relevance: In the last decade (FY16 to FY25), 23-30% of the total revenue of States was collected from the Centre as transfers.

Q70.
Answer: a
Explanation:

- The recently concluded **Conference of Parties (COP)-29 of the United Nations Framework Convention on Climate Change (UNFCCC) at Baku**, Azerbaijan is largely referred to as the ***'finance COP'*** because the discussions regarding climate finance dominated the summit. Discussions at the forum led to the partial finalization of the Article 6 of the Paris agreement.
- **Article 6 of the Paris Agreement** consists of principles and mechanisms for how countries can "pursue voluntary cooperation" to reach their climate targets. One of the mechanisms under Article 6 is **Internationally Transferred Mitigation Outcomes (ITMOs).**
- ITMOs is a carbon market mechanism provided by Article 6.2 of the Paris Agreement**.** It allows **countries to trade emission reductions and removals** with one another through **bilateral or multilateral agreements. So, statement 1 is correct.**
    - Specifically, **this Article provides a framework for countries to purchase the Greenhouse Gas (GHG) mitigation performance** from other countries in order to meet their emission reduction commitments. These commitments are set out in the **Nationally Determined Contributions (NDCs)** of each member country of the Paris Agreement.
    - In essence, a country that fails to meet its emission reduction targets (according to its NDC) can purchase ITMOs from another country that has achieved emission reductions beyond its national targets, as set out in its NDC.
    - This mechanism allows the selling country (that has achieved emission reductions beyond its domestic targets) to profit from the sale of these ITMOs and the buying countries that have not achieved their targets to meet their emission reduction commitments.
- ITMOs can be measured in **carbon dioxide equivalent (CO_2e) or using other metrics**, such as **kilowatt-hours (KWh) of renewable energy.** Therefore, **these can be quantified in "non-GHG" metrics** (e.g. kWh of renewable energy, hectares of forest). **So, statement 2 is not correct.**

Therefore, option (a) is the correct answer.

Knowledge Box
Carbon credits v/s Internationally Transferred Mitigation Outcomes (ITMOs): ● Both Carbon credits and ITMOs are terms used in the context of climate change mitigation and the reduction of greenhouse gas emissions. ● **Carbon credits are units that represent one ton of greenhouse gases (GHG) reduced or removed from the atmosphere.** These credits are generated through the implementation and operation of carbon projects. ● **ITMOs** are a type of unit that, like carbon credits, represent a ton of GHG reduced or removed from the atmosphere. **They must be verified by an external entity.** ● Carbon credits are units generated by different types of projects that can be **purchased by private or governmental entities to offset their emissions.** ● ITMOs are part of a mechanism created under the Paris Agreement that allows **countries to trade verified emission reductions with each other.** It enables some parties to meet their national emission reduction commitments (NDCs) and others to obtain economic benefits for achieving emission reductions beyond their national targets. **ITMOs are used internationally and are a form of cooperation between countries to achieve global climate goals.** ● ITMOs differ from carbon credits as they count toward countries' Nationally Determined Contributions (NDCs).

Q71.
Answer: d
Explanation:
Harmful Algal Bloom (HAB) occurs when toxin-producing algae grow excessively in a body of water. The excessive algal growth, or algal bloom, becomes visible to the naked eye and can be green, blue-green, red, or brown,

depending on the type of algae. Some of the methods to control HABs are as follows:

- **UV-C exposure: UV-C (200–280 nm) irradiation** is a promising approach to prevent HABs through **suppressing microalgal growth.** It has several advantages. Firstly, it is chemical-free, therefore there is less possibility of **Disinfection By-Product (DBPs)** formation and negative impacts on ecosystems. Secondly, UV-C irradiation equipment has a simple structure and the possibility to be installed on the mobile device for larger water applications. **So, point 1 is correct.**
- **Ultrasound: Ultrasound at different frequencies and powers can be used to control HABs.** There are two approaches to the control of algae with ultrasound, either using a continuous **low power ultrasound at sub-cavitation levels** with a floating transducer or more **powerful ultrasound** in which the effects are the result of cavitation. Low power ultrasound can declump and stress algae leading to death. High power ultrasound can disrupt the algae structure. **So, point 2 is correct.**
- **Use of hydrogen peroxide:** In recent years, research has focused on using Hydrogen peroxide (H_2O_2) to control freshwater blooms (cyanobacteria and Prymnesium parvum, or golden algae). Some of the trials have indicated that **controlled concentrations of H_2O_2 are deadly to *Prymnesium parvum*. So, point 3 is correct.**
- **Use of Clay:** When sprinkled on surface waters during an algal bloom, the tiny but dense clay particles will "flocculate" or combine with other particles in the water, including the algae cells. As these aggregations, known as **"flocs,"** grow, they sink through the water until they reach the bottom. This **flocculation and sinking process can rupture cell membranes, killing the algae cells.** In deeper water, darkness, prolonged contact with the clay and eventual burial in sediments on the seafloor can also kill the algae cells. **So, point 4 is correct.**

Therefore, option (d) is the correct answer.

Relevance: Recently, Indian National Centre for Ocean Information Services (INCOIS) identified nine key algal bloom hotspots along India's east and west coasts.

Q72.
Answer: b
Explanation:

- **'Avoided emissions'** refer to the greenhouse gas emissions that have been 'avoided' by using a **specific product or service,** comparing it to a situation had the product or service not been used. It is the **reductions in emissions that occur as a result of the use of a product or service.**
- **For example:**
  - Solar panel installations and the emissions avoided by replacing fossil fuel energy sources.
  - Agricultural IoT sensors communicate soil conditions to farmers to minimise fertiliser and water usage.
  - Concrete mix control technology to minimise cement usage during construction.

Therefore, option (b) is the correct answer.

Knowledge Box
• **Carbon sequestration:** It is the process of **capturing and storing atmospheric carbon dioxide.** It is one method of reducing the amount of carbon dioxide in the atmosphere with the goal of reducing global climate change. **For example,** Geologic carbon sequestration is the process of storing carbon dioxide (CO2) in underground geologic formations, Biologic carbon sequestration refers to storage of atmospheric carbon in vegetation, soils, woody products and aquatic environments. • **Fugitive emissions:** These are **unintended emissions** from facilities or activities that cannot reasonably pass through a **vent, stack, or chimney system.** These emissions can occur during the extraction, production, processing, storage, transportation and distribution of various substances including fossil fuels like oils and natural gasses.

Q73.
Answer: c
Explanation:

- **Nocturnal species** are animals that are primarily **active during the night**. These species have specialized adaptations such as enhanced night vision, heightened senses of smell and hearing, etc.
- Nocturnal animals have evolved specialized **sensory adaptations** to aid in hunting and navigation at night. Animals like **owls and large cats** possess unique hearing mechanisms; **owls have offset ears**, while large cats have highly maneuverable ears, allowing them to detect prey in low-light conditions. **So, statement 1 is correct.**

- Some animals with the extrasensory adaptation use **echolocation to navigate and find food**—bats, for example. **Bats** release a **high-pitched sound** that bounces off objects, **including prey.** The echoes tell the bat how far away the objects and prey are. Some snakes have heat-sensitive sensory receptors that, like echolocation, help them navigate and find prey. **So, statement 2 is correct.**
- Many nocturnal animals, excluding birds, rely on their **strong sense of smell**, facilitated by the Jacobson's organ in the roof of their mouths, which is further enhanced when they pull their lips back and grimace.
- The **Jacobson's organ**, also known as the vomeronasal organ (VNO), is a special sense organ in **snakes** that helps them **detect chemicals in the air.** It is located on the roof of the snake's mouth. The organ helps snakes hunt and track their prey. **So, statement 3 is correct.**

So, all three of the above statements are correct.
Therefore, option (c) is the correct answer.

Knowledge Box
How do animals see in the dark? ● Nocturnal animals have evolved **physical traits** that let them roam in the dark more effectively. The eyes get bigger and the pupils widen. Owl eyes, for example, are so big that they can't move in the socket, but their wide pupils help them collect more light. ● A reflective layer called **tapetum** sits behind the retina; any light that passes through the eye reflects back onto the tapetum. The **retinas contain rod cells,** which pack their **DNA** in a way that turns each cell's nucleus into a **light-collecting lens.** This is different from how the rods of non-nocturnal animals or humans work.

Q74.
Answer: a
Explanation:

- **"Biodiversity leakage"** refers to the unintended **displacement of environmentally harmful activities (e.g., deforestation, agriculture)** from one area to another due to **conservation efforts**. When one region enforces strict conservation policies, activities like logging or farming may shift to other regions, often with weaker environmental protections.
- In this process, **conservation policies** in one region **inadvertently drive environmental degradation in another region.**
- Conservation policies in one region can lead to environmental degradation in another region due to the **displacement of activities like agriculture, logging, or mining**. For example, protecting forests in one country may lead to increased deforestation in another country to meet global demand for timber or agricultural products.
- Biodiversity leakage is undermining global efforts to halt biodiversity loss. There are concerns that large-scale conservation initiatives in regions like Europe and China are causing production shortfalls for agricultural commodities.

Therefore, option (a) is the correct answer.

Q75.
Answer: d
Explanation:

- **Endocrine Disruptors (EDCs)** are chemicals that interfere with the hormonal system, leading to reproductive, developmental and metabolic disorders. Many of these pollutants enter water bodies through **industrial discharge, agricultural runoff, pharmaceutical waste and plastic degradation**.
- **Bisphenol A (BPA)** is a synthetic chemical widely used in the production of **plastic containers, water bottles, food packaging and epoxy resins.** It is known to leach into water sources from plastic waste, particularly under high temperatures. **BPA mimics estrogen,** disrupting the endocrine system and causing **reproductive and developmental issues. So, point 1 is correct.**
- **Polychlorinated Biphenyls (PCBs)** are industrial chemicals previously used in **coolants, electrical transformers and capacitors.** They belong to the group of organic compounds known as persistent organic pollutants, characterized by long-range transport, persistence, bioaccumulation and high toxicity. They enter water bodies through industrial waste, landfills and atmospheric deposition. **PCBs disrupt thyroid function and estrogen metabolism,** leading to developmental disorders, immune suppression and an increased risk of cancers. **So, point 2 is correct.**
- **Atrazine** is a widely used **herbicide,** primarily in agriculture, that contaminates surface and groundwater

through runoff from fields. It is a known **endocrine disruptor** that affects the hormonal balance in wildlife and humans. It is harmful to various bodily systems, including the reproductive system, nervous system, adrenal glands and thyroid gland. **So, point 3 is correct.**

- **Arsenic** is a naturally occurring heavy metal found in groundwater, primarily due to **geological sources, mining and industrial discharge.** While arsenic is well-known for its toxic and carcinogenic properties, it also acts as an endocrine disruptor by interfering with glucocorticoid and thyroid hormone signaling. Chronic exposure to excess arsenic in drinking water has been strongly associated with increased risks of multiple cancers, diabetes, heart disease and reproductive and developmental problems in humans. **So, point 4 is correct.**

Therefore, option (d) is the correct answer

Q76.
Answer: c
Explanation:

- **Tanka, Kundi and Khadin** are traditional **water conservation techniques** used in the **arid and semi-arid regions** of Western India, particularly in Rajasthan.
- In the deserts of Rajasthan, **well or tanka type structures are built underground** in almost every house. These structures are used for **collecting rainwater,** which is used by humans and livestock for drinking. The catchment area is specially prepared by plastering a mixture of clay, silt from the pond, coal ash and gravel to collect more runoff water in the tank constructed for the purpose.
- **Kunds or kundis** are traditional rainwater harvesting structures **found in the Thar Desert in Rajasthan and Gujarat**. They have a saucer-shaped catchment area that slopes towards a central well, resembling an upturned cup in a saucer. These structures are used for **collecting drinking water.**
- **Khadin** is a land-use system developed centuries ago by the **Jaisalmer district of Rajasthan**. This system is based on the **principle of harvesting rainwater on farmland** and subsequent use of this water-saturated land for crop production. It is practised where **rocky catchments and valley plains occur in proximity**. The runoff from the catchment is stored in the lower valley floor enclosed by an earthen 'bund'.

Therefore, option (c) is the correct answer.

Q77.
Answer: c
Explanation:

- **Solar Ponds** are solar thermal energy systems that **collect and store solar energy**, thereby providing a sustainable source of heat and power. These are typically sizable **human-made bodies of water** that use the sun's heat as a **stable temperature source** in areas where traditional cooling technologies cannot be implemented.
- Solar ponds differ from other solar thermal energy systems as they store the collected heat instead of transferring it through fluids or devices. Solar ponds may use any number of different fluid heating and cooling mechanisms.
- **Solar ponds** store **thermal energy,** which can be used to **generate electricity** via Rankine cycle or Organic Rankine Cycle (ORC) systems, particularly in off-grid areas. **So, statement 1 is correct.**
- The heat stored in solar ponds is utilized for **seawater desalination through processes** like **Multi-Stage Flash (MSF)** distillation and **Reverse Osmosis (RO). So, statement 2 is correct.**
- Solar ponds can also power **absorption refrigeration systems,** which use heat instead of electricity, making them highly beneficial for cooling applications in tropical regions. **So, statement 3 is correct.**

So, all three of the above statements are correct.
Therefore, option (c) is the correct answer.

Q78.
Answer: b
Explanation:

- The **Bagh Caves** are a collection of **nine rock-cut monuments** located on the southern slopes of the **Vindhyas** near Bagh, Dhar district, **Madhya Pradesh,** India. They were developed around the 6th century A.D. These are known for mural paintings

- They are **located on the banks of the Baghani River** in Madhya Pradesh.
- It is believed that **Buddhist monk Dataka constructed these caves.** The caves were carved between the late 4th and early 6th centuries AD.
- The Bagh caves, like the Ajanta caves, were **carved out of the perpendicular sandstone rock** face of a hill on the far bank of the Baghani, a seasonal stream.
- Only five of the nine caves have survived. All of them are '**viharas'** or resting places of monks, with a quadrangular design. The **'chaitya,'** or prayer hall, is a tiny chamber usually found toward the back.
- **Cave 4, also known as the Rang Mahal, is the most important** of the five caves that still exist (Palace of Colors).

Therefore, option (b) is the correct answer.

Knowledge Box

- The rock cut caves of **Badami** are an example of the **Chalukyan Rock Cut Architecture.** This rock cut architecture dates back to the 6th century AD. Badami has four cave shrines, out of which three are Brahmanical shrines and one is a Jain shrine.

- **Sittanavasal Caves** are rock-cut caves located in **Tamil Nadu.** These caves are known for the paintings based on Jainism. It has murals that have **close resemblance to Bagh and Ajanta paintings.** The paintings here are on the theme of Jain Samavasarana (Preaching hall). Samavasaran are audience halls where Tirthankaras deliver sermons.

- **Udayagiri and Khandagiri Caves** were made under the **Kalinga King Kharavela** in 1st-2nd century BC near modern-day **Bhubaneswar.** The cave complex has both man-made and natural caves possibly carved out for residence of Jain monks. There are 18 caves in Udayagiri and 15 in Khandagiri. Udayagiri caves are famous for the Hathigumpha inscription which is carved out in Brahmi script.

Q79.
Answer: a
Explanation:

- **Pottery** remains one of the most important archaeological markers for understanding ancient civilizations. It helps in dating settlements, understanding their technological advancements and tracing socio-cultural developments.
- **Ochre Coloured Pottery (OCP) (~2000 BCE - 1500 BCE)** flourished in Hastinapur, Bahadarabad, Saipai and other Upper Gangetic sites. It was associated with **late Harappan cultures**. These settlers used **copper tools**, lived in **mud houses** and engaged in **agriculture and hunting**.
- **Painted Grey Ware (PGW) (~1200 BCE - 600 BCE)** flourished in Hastinapur, Mathura, Ropar, Purana Qila, Bhagwanpur and Haryana. It was associated with **later Vedic culture and Mahabharata sites**. These people practiced **iron metallurgy** and established **fortified settlements**.
- **Northern Black Polished Ware (NBPW) (~600 BCE - 200 BCE)** flourished in Taxila, Tamluk, Amravati and various sites across Northern India. Considered **luxury pottery of the elites**, it was associated with the **iron age**, **urbanization and coinage**.

Therefore, option (a) is the correct answer.

Q80.
Answer: b
Explanation:

- **Buddhaghosa** was a 5th-century **Theravāda Buddhist scholar** from India who settled in Sri Lanka. He is best known for his work **Visuddhimagga,** a comprehensive commentary on the **Pali Canon**, which serves as a systematic guide to Buddhist meditation and doctrine. His commentaries are considered authoritative in **Theravāda Buddhism**. **So, statement 1 is correct.**
- **Vajrabodhi** was a Mahayana Buddhist monk who was instrumental in the **spread of Esoteric (Vajrayana) Buddhism in China** during the Tang Dynasty. He did **not translate Pali texts into Sinhalese** but focused on bringing Vajrayana teachings from India and Sri Lanka to East Asia. **So, statement 2 is not correct.**
- **Amoghavajra** was one of the most influential Buddhist monks in China, responsible for the **expansion of Esoteric (Vajrayana) Buddhism under the Tang Dynasty.** He was a disciple of Vajrabodhi. He was known for translating **Vajrayana texts from Sanskrit to Chinese. So, statement 3 is correct.**

Therefore, option (b) is the correct answer

Q81.
Answer: b
Explanation:

- Founded by **Sage Kapila**, **Samkhya** is one of the oldest philosophical systems in India, emphasizing **dualistic realism**. It recognizes two **eternal and independent** principles: **Purusha (conscious self)** and **Prakriti (primordial matter)**.
    - According to the **Samkhya Philosophy, Purusha** or self is **an eternal reality**. Purusha is the self, subject and knower. It can never be an object because, the existence of objects can be proved in some ways whereas, non-existence can't be proved in anyways. **Purusa is neither the body, nor the mind (mānas), neither ego (ahaṁkāara) nor intellect (buddhi).** It is not the substance which has the quality of consciousness. **It is itself pure-consciousness.**
    - **Prakṛti** is the **ultimate cause of the universe**. It is regarded as the first cause. All effects of the universe are based upon it. Being the first element of the universe, Prakṛti itself is uncaused, eternal and all pervading. It consists of **three gunas—Sattva (harmony), Rajas (activity) and Tamas (inertia)**—which exist in equilibrium.
- The **Samkhya doctrine** asserts that understanding the **distinction** between Purusha and Prakriti leads to liberation, allowing the self to remain an **unaffected observer**, free from worldly suffering.

Therefore, option (b) is the correct answer.

Q82.
Answer: a
Explanation:

- The **Delhi Sultanate** existed from A.D. 1206 to 1526. Five different dynasties – the Slave, Khalji, Tughlaq, Sayyids and Lodhis – ruled under the Delhi Sultanate.
    - **Firoz Tughlaq** became the sultan of Delhi after the death of Muhammad-bin-Tughlaq in 1351. Under Firuz Shah, **'water tax' (haq-i-sharb) was taken from those cultivators who irrigated their land** from the water supplied from the canals constructed by the state. **So, pair 1 is correctly matched.**
    - During the reign of **Alauddin Khalji,** three types of taxes were levied on the peasants by the Sultan. These were **the Kharaj (also called Kharaj-I-jizya) or cultivation tax;** Charai, a tax on milching cattle; and Ghari (a tax on houses). Kharaj was the **land tax** and the lands of all sizes were subject to the procedure of measurement of land called **Masahat** and fixation of the yield per Biswa (Wafa-I-Biswa). Generally, the tax was collected in cash, though sometimes collected in kind for specific purposes.
- The Mughal emperors had several sources of revenue. They levied direct taxes on income and persons, profession and property etc. They also raised substantial sums by indirect taxes such as customs duties, transit dues, octroi, sales tax and the excise duty on manufactures.
    - **Rahdari was the road tax** imposed by the Mugal emperors, on inland and overseas trade. This was a road-toll collected on goods passing through various territories. **So, pair 2 is not correctly matched.**
    - **Katraparcha was a tax taken from merchants on their products**. It was levied on products like **cotton, silk and wool cloth.** Indigo, saltpetre and salt were other important commodities subjected to this taxation. **So, pair 3 is not correctly matched.**

So, only one of the pairs given above is correctly matched.
Therefore, option (a) is the correct answer.

Q83.
Answer: c
Explanation:

- **The Zabti system** was one of the most significant land revenue assessment methods under the **Mughal Empire.** Also called the **Dahsala system**, it was introduced by Raja Todarmal during Akbar's reign.
- Sher Shah had established a **rai or per bigha yield for lands** which were under continuous cultivation (polaj), or those land which very rarely allowed to lie fallow (parauti). The rai was based on three rates, representing good, middling and low yields and one third of the sum of these was appropriated as land revenue.
- Akbar adopted Sher Shah's rai. He introduced his **karori experiment** and appointed karoris all over North India in 1574- 75. In 1580, Akbar instituted a new system **ain dahsala**, where the average produce, of

different crops as well as the average prices prevailing over the last ten years were calculated.

- The Zabti system was not universally applied across the Mughal Empire. It was mainly enforced in core regions such as Delhi, Agra, Allahabad, Awadh, Lahore and Multan. It was **not suitable for areas with unpredictable rainfall and varying soil fertility**, which required more flexible taxation systems.
- **Nasaq** was not an independent method of assessment; it was subordinate to other methods. It was a method or procedure which could be adopted whatever be the basic method of revenue assessment and collection that was in force. In North India it was nasaq-i-zabti, while in Kashmir it was **nasaq-i-ghalla-bakhshi**.

Therefore, option (c) is the correct answer.

Q84.
Answer: d
Explanation:

- The **Civil Service** was brought into existence by **Lord Cornwallis (1786-93**). From the beginning, East India Company (EIC) carried its trade through servants who later became administrations as the Company became a territorial power.
- Until 1853, appointments were made by EIC Directors. The **Charter Act of 1853** introduced competitive examinations for recruitment to the Indian Civil Service (ICS). The **Macaulay Committee,** formally known as the **Committee on the Indian Civil Service**, was established in **1854**. It was headed by **Thomas Babington Macaulay** and recommended:
  - Competitive examinations as the basis for recruitment
  - Age limits for candidates (initially set at 18–23 years)
  - A generalist education system to prepare candidates for the exams
- In **1877, Lord Lytton** lowered the **maximum age** of eligibility from **21 to 19 years,** which was seen as a move to discourage Indians from competing for the service.
- Against this reduction in maximum age; the **Indian Association** took up this question and organised an all-India agitation against it, popularly known as the **Indian Civil Service Agitation.**
  - The Indian National Association, often known as the Indian Association, was founded in **1876 by Surendranath Banerjee and Ananda Mohan Bose.**

Therefore, option (d) is the correct answer.

Q85.
Answer: d
Explanation:

- The **Simon Commission**, officially known as the **Indian Statutory Commission**, was established by the British government in 1927 to **review the Government of India Act, 1919** and recommend constitutional reforms. The commission was chaired by Sir John Simon and included Seven British members, sparking controversy and anger in India due to the **lack of Indian representation.**
- Arriving in India in 1928, it was met with protests, including the iconic **"Simon Go Back"** demonstrations. The commission aimed to evaluate the Act, recommend reforms and address communal representation and law and order.
- The Indian reaction to an all-white Commission was immediate and against it completely and that too unanimously.
- The Congress decided to **oppose the Commission in its 1927** session in Madras under the **leadership of Mukhtar Ahmed Ansari** "at every stage and in every form". Nehru even succeeded in getting a snap resolution passed from the session that Congress' goal was to have complete independence. **So, point 3 is correct.**
- Others who boycotted it included Hindu Mahasabha, Punjab Naujawan Sabha Hindustan Seva Dal in Karnataka.
- In the Muslim League, there was a split. **Muhammad Ali Jinnah was for boycotting the Commission**, but **Muhammad Shafi was in support of the Government**. Thus in 1927, the Muslim League had two sessions-Jinnah led one at Calcutta where he opposed the Commission. Another was held at Lahore which was led by Muhammad Shafi, where he supported the Government. **So, point 2 is not correct and point 4 is correct.**

- Apart from the Shafi faction of the league, the supporters of the commission included the Unionist Party of Punjab, the Justice Party of Periyar and B.R. Ambedkar.
    - **B.R. Ambedkar** was appointed by the **Bombay Legislative Council to work with the Simon Commission**. In 1928, he submitted two memoranda to the Commission on behalf of the Bahishkrit Hitakarini Sabha, **formed to place the grievances of the 'untouchables' before the government** – these included the education of the 'depressed classes' and safeguards for the protection of their interests as a minority. **So, point 1 is not correct.**

Therefore, option (d) is the correct answer.

Q86.
Answer: d
Explanation:

- **Shah Jahan and Shivaji were contemporaries** of each other. **Shah Jahan** was the Mughal emperor from **1628 to 1658 CE**. **Shivaji**, the founder of the **Maratha Empire**, was born in **1630 CE** and was active against the Mughals from the 1650s onwards. Though Shivaji's major conflicts were with **Aurangzeb**, he was alive during **Shah Jahan's reign** and started his early expansion.
- **Ajatshatru**, the king of **Magadha**, ruled during **492–460 BCE**. **Gautama Buddha** is believed to have lived between **563–483 BCE**. According to Buddhist texts, Ajatshatru was a **follower of Buddha** in the later part of his life and was instrumental in supporting Buddhism.
- **Harsha**, ruler of **Kanauj**, ruled from **606 to 647 CE**. **Pulakesin II**, the **Chalukya king**, ruled from **610 to 642 CE**. They fought the **Battle of Narmada (618 CE),** where Pulakesin II defeated Harsha and stopped his expansion into the Deccan.
- **Prithviraj Chauhan**, the last major Rajput ruler of **Delhi**, ruled between **1178–1192 CE**. He was defeated by **Muhammad Ghori in 1192 CE** in the **Second Battle of Tarain**. **Alauddin Khilji**, the **Khilji dynasty ruler**, ruled over Delhi much later, from **1296 to 1316 CE**, more than a **century after** Prithviraj Chauhan's time.

Therefore, option (d) is the correct answer.

Q87.
Answer: b
Explanation:

- A **strait** is a narrow **passage of water connecting two larger bodies of water**. It often serves as a crucial maritime route and can be significant for navigation, trade and geopolitical reasons.
- **Strait of Sicily:** It is an important transitional area in the central Mediterranean Sea which **divides the Mediterranean into western and eastern deep-water hollows. So, pair 1 is not correctly matched.**
    - **The Strait of Otranto** connects the **Adriatic Sea with the Ionian Sea** and separates Italy from Albania.
- **Torres Strait:** It is a narrow passage connecting two bodies of water - the **Arafura Sea and Coral Sea in the Pacific Ocean**. It is approximately 145 km wide and contains numerous islands, reefs and sandbanks. **So, pair 2 is correctly matched.**
- **Magellan Strait:** It is a 350-mile navigable **passage between the Atlantic and Pacific oceans** located at the southern extremity of **South America.** It separates the mainland of Patagonia from the archipelago of Tierra del Fuego. **So, pair 3 is correctly matched.**

Therefore, option (b) is the correct answer.

Q88.
Answer: c
Explanation:

- A gota fría or **cold drop** is officially known as a "depresión aislada en niveles altos" ("Dana" to Spanish meteorologists) which translates as "**isolated depression at high altitudes"**. While this weather pattern can result in torrential rainfall, hail, thunderstorms and severe flooding, the exact areas affected can be difficult to predict, as gota fría events are often very localised.
- **DANA**, commonly referred to as the **"cold drop"** is a **meteorological phenomenon** in the **western Mediterranean** region that brings **intense rainfall and flooding.**
- A cold drop occurs when **cold air moves over the warm waters of the Mediterranean Sea**. This seasonal occurrence creates atmospheric instability, causing warm, saturated air to rise rapidly, leading to the formation of towering cumulonimbus clouds in a matter of hours, dumping heavy rain across eastern parts of Spain.
- DANA primarily occurs in the western **Mediterranean region due to the geographic contrast between**

the cold air mass and the warm sea. The phenomenon usually coincides with the **onset of autumn and spring** in the western Mediterranean.

Therefore, option (c) is the correct answer.

Q89.

Answer: c

Explanation:

- **Dragon Fruit (*Hylocereus sp*.)** has its origin in Southern Mexico, Central America and South America. It is a new introduction in India and the commercial cultivation is picking up. It is basically **a climbing cactus vine** tolerant to the abiotic stresses and resistant to pests and diseases.
- **Dragon fruit plant** prefers a **dry tropical climate** with an average temperature of **20-29°C.** It can tolerate high temperatures up to 40°C and even brief cold spells down to 0°C. However, prolonged exposure to frost can damage the plant**. So, point 1 is correct.**
- It has **xerophytes' characters** and has the ability to grow in a wide range of agro–climates including areas of high temperature and water scarcity regions. The dragon fruit can be cultivated commercially up to altitude of 1700 m with **rainfall ranging from 50–150 cm**, **excessive and continuous heavy rainfall (above 300 cm) is not suitable**, as it can lead to fungal diseases, root rot and reduced fruit quality. **So, point 2 is not correct.**
- The dragon fruit could be grown in a wide range of soils, but the soil should be well **drained as water logging hampers its growth** and favors bacterial rot. The **loamy soil**, **rich in organic matter,** is good for its commercial cultivation. **So, point 3 is correct.**
- Dragon fruit cultivation prefers **full sunlight and open areas,** shady areas are not suitable for dragon fruit planting. Dragon Fruit is a **climbing vine cactus species** that requires **full sunlight** to promote flowering and fruiting. Farmers **train the vines on poles or trellises** for support, allowing the branches to grow downwards for fruit production. Without adequate sunlight, the plant may grow weak and produce fewer fruits. **So, point 4 is correct.**

So, only three of the above conditions are required for the cultivation of Dragon Fruit.

Therefore, option (c) is the correct answer.

Q90.

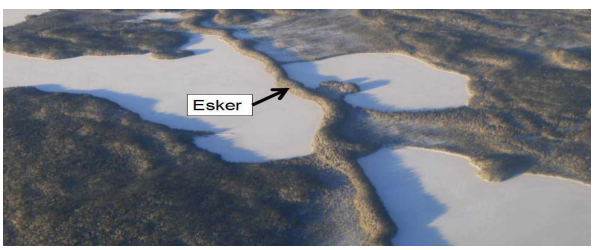
Answer: b

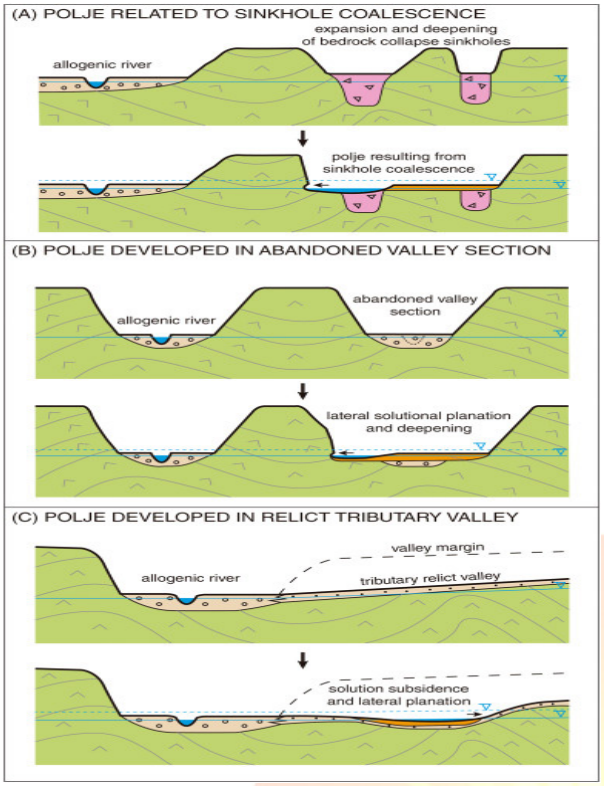
Explanation:

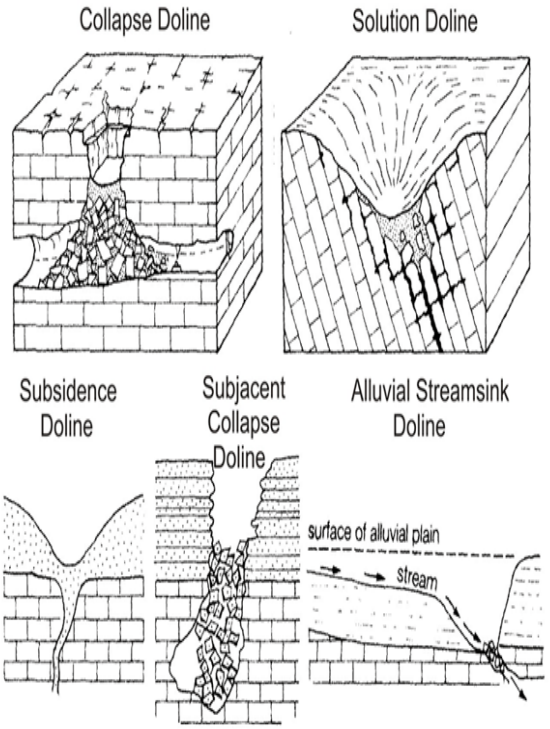
- **Karst** is a type of landscape where the dissolving of the bedrock has created sinkholes, sinking streams, caves, springs and other characteristic features. Karst is associated with **soluble rock types such as limestone, marble and gypsum.**

- **Flowstones** are sheetlike **deposits of calcite or other carbonate minerals,** formed where water flows down the walls or along the floors of a cave. They are typically found in **"solution caves" in limestone** and are the most common speleothem.

- **Eskers** are sediment ridges composed of **gravel and sand**, formed by subglacial water conduits. They are often found beneath ice sheets and can influence the formation of ice-shelf channels. Eskers are created by the **deposition of sediments carried by meltwater beneath glaciers.**







- **Dolines** are depressions or sinkholes formed by the **dissolution of soluble rocks such as limestone**. They are common in **karst landscapes** and can vary in size from small depressions to large, deep holes. Dolines can be formed by the collapse of underground cavities or by the gradual dissolution of the rock surface.
- **Poljes** are large, **flat-bottomed depressions in karst landscapes,** often with residual hills or hums. They are typically drained by ponors (sinkholes) and can be found in areas with extensive limestone dissolution.

Therefore, option (b) is the answer.

Q91.
Answer: a
Explanation:

- **The Beas River** rises from Beas Kund near Rohtang Pass in the western Himalayas in **Himachal Pradesh.** It then enters Punjab and **meets with the Sutlej River at Harike. Thus, it entirely flows within India. So, point 1 is correct.**
    - Its total length is 470 kilometres and major tributaries are Bain, Banganga, Luni, and Uhal, along with Banner, Chakki, Gaj, Harla, Mamuni, Parvati, Patlikuhlal, Sainj, Suketi and Tirthan.
- The **Barak River** is the second largest river in Northeastern India after the Brahmaputra. The river runs through **Manipur, Nagaland, Mizoram, Assam in India and in Bangladesh. Thus, it is a transboundary river. So, point 2 is not correct.**
    - Barak has a length of about 900 km of which, 564 km fall in India.
    - It rises from the **Manipur hills,** then flows along Nagaland-Manipur border through hilly terrains and enters Assam. It further enters Bangladesh where it is known by the name of the **Surma and the Kushiyara**. It is later called the **Meghna** before receiving the combined flow of the Ganga and the Brahmaputra.
    - The principal tributaries of Barak are the Jiri, the Dhaleswari, the Singla, the Longai, the Sonai and the Katakhal.
- **Lohit** is a major tributary of Brahmaputra river. It is a **transboundary river** that flows through **India and China.** It rises from Tibet. The river then flows through Arunachal Pradesh before merging with Brahmaputra in Assam. **So, point 3 is not correct.**
- **Teesta** is a **transboundary river** that flows through **Sikkim, West Bengal and Bangladesh**. It is a 414 km-long river flowing through the Indian states of **Sikkim and West Bengal,** before flowing into the river Jamuna in **Bangladesh.** It is the fourth-largest trans-boundary river shared between India and Bangladesh. **So, point 4 is not correct.**
    - It originates in the Himalayas near **Chunthang in Sikkim** and flows to the south through West Bengal and Bangladesh. Teesta river originates from a glacial lake **Khangchung Chho.**

- **The Gomati** is a tributary of the Ganga. It flows **entirely through the state of Uttar Pradesh** and thus in India. **So, point 5 is correct.**
    - The Gomati River originates from the **Gomat Taal** in the Pilibhit district in Uttar Pradesh. It merges with the Ganges near Saidpur, Uttar Pradesh. The river extends to about 900 km.
    - Important tributaries of the Gomati include the Sai River, Chowka River, Kathina River and Saryu River.

So, only two of the above flow entirely within India.
Therefore, option (a) is the correct answer.
Relevance: The Territorial Army recently established a new task force dedicated to the rejuvenation and protection of the Gomti River.

Q92.
Answer: d
Explanation:

- **Karewas** are the thick deposits of glacial clay and other materials embedded with moraines. **Karewas are found in Kashmir region**. The Kashmir Himalayas are famous for Karewa formations, which are useful for the cultivation of Zafran, a local variety of saffron.
- There are numerous small seasonal streams that flow through the **Shiwaliks**. These streams are called **Chos in Punjab** and Khads in Himachal Pradesh. The southern slopes of Shiwalik range in **Punjab and Himachal Pradesh** are almost devoid of forest cover. The northern part of Punjab-Haryana plain adjoining Shiwalik hills has been intensively eroded by these chos.
- In the **Thar desert of Rajasthan,** speedy winds force the sand dunes to move from one place to another along the direction of the wind. These moving or shifting sand dunes are locally known as **dhrians**.
- The **coastal backwaters** located in the **Malabar region of Kerala** are known as **kayals**. A number of lakes or backwaters (kayals) lie along the coast of Kerala, the largest of which is the **Vembanad kayal** which stretches for more than 80 km in length.

So, the correct sequence of the geographical features according to their location from North to South is Karewas - Chos - Dhrians - Kayals.
Therefore, option (d) is the correct answer.

Q93.
Answer: d
Explanation:

- A **beach placer,** also known as a **placer deposit,** is a type of mineral deposit that forms **on the beach sand or along the shoreline**. It is a concentration of valuable or heavy minerals transported and deposited by natural processes such as **water currents, waves and tides.**
- **Ilmenite ($FeTiO_3$)** is one of the most abundant **titanium-bearing minerals in beach sand deposits** and is a primary source of **titanium.** Ilmenite is mainly used to produce titanium dioxide (TiO_2), which is used in paints, plastics and cosmetics due to its high opacity. It is also used in the aerospace industry for manufacturing lightweight alloys. **So, point 1 is correct.**
- **Rutile** is a **high-purity form of titanium dioxide (TiO_2)** and is a key source of **titanium.** Ilmenite and rutile along with other heavy minerals are **important constituents of beach sand deposits**. Because of its high refractive index, it is also used in optical instruments and gemstones. It is a crucial raw material for titanium metal production, which is used in the aerospace and medical industries**. So, point 2 is correct.**
- **Gold placers** are often found along riverbanks and in **coastal areas where gold-bearing rivers meet the ocean**. The action of waves and tides helps to concentrate and deposit the gold particles on the beach. **So, point 3 is correct.**
- **Zircon** occurs in close association with other heavy minerals, such as ilmenite, rutile and monazite **in beach sands,** along the coastal tracts. It is a major source of zirconium metal, which is used in nuclear reactors, corrosion-resistant alloys and electronics. It is also used in the foundry industry and as a gemstone (Zirconia). **So, point 4 is correct.**

Therefore, option (d) is the correct answer.

Q94.
Answer: a
Explanation:

- Around 13.8 billion years ago, the **universe expanded faster than the speed of light** for a fraction of a second, a period called **cosmic inflation**. Scientists aren't sure what came before inflation or what powered it. It's possible that energy during this period was just part of the fabric of space-time.

- Cosmologists think inflation explains many aspects of the universe we observe today, like its flatness, or lack of curvature, on the largest scales. Inflation may have also magnified density differences that naturally occur on space's smallest, quantum-level scales, which eventually helped form the universe's large-scale structures.

Therefore, option (a) is the correct answer.
Relevance: NASA's SPHEREx mission is intended to gain insight into the phenomenon of cosmic inflation.

Q95.
Answer: a
Explanation:

- **Light** has a dual nature: wave and particle. Dual nature of light means that light has two different natures, sometimes it behaves like a particle, sometimes like a wave.
- According to Quantum Theory, light consists of tiny bits of energy that behave like particles called **photons.**
- According to wave nature, **light** is an electromagnetic wave consisting of **electric and magnetic fields** with continuous distribution of energy over the region of space over which the wave is extended.
- The phenomena of **interference, diffraction and polarisation** can be explained in a natural and satisfactory way by the wave nature of light.
- The **photoelectric effect** and the **Compton effect** demonstrate the **particle nature of light**. Photoelectric effect is the phenomenon of emission of electrons by metals when illuminated by light of suitable frequency. Photoelectric effect involves conversion of light energy into electrical energy. **So, point 1 is correct.**
- **Diffraction** of light refers to the phenomenon where light waves bend around obstacles or spread out as they pass through narrow openings. **To explain the phenomena of diffraction, light is thought of as a wave. So, point 2 is not correct.**
- The phenomenon of **polarisation** is based on the fact that the **light waves are transverse electromagnetic waves.** Polarization is a process by which unpolarised light is transformed into polarized light. **So, point 3 is not correct.**
- **Interference** of light is the phenomenon of **multiple light waves interacting with one another** under certain circumstances, causing the combined amplitudes of the waves to either increase or decrease. **So, point 4 is not correct.**

Therefore, option (a) is the correct answer.

Q96.
Answer: c
Explanation:

- **Chorus waves** are naturally occurring electromagnetic emissions in space and are known to play an essential role in accelerating high-energy electrons **forming the hazardous radiation belt environment**.
- When the electromagnetic signal of chorus is converted to an acoustic signal, these waves sound like birds chirping at dawn, hence the name. Chorus waves are known to play a **dominant role in accelerating relativistic electrons in Earth's radiation belts.**
- **Recently,** these chorus waves, **found in a distorted region of Earth's magnetic field**, have been discovered. They challenge assumptions that they only occur near dipolar magnetic fields.
- Chorus waves aren't unique to Earth; similar phenomena have been observed on Mars, Jupiter and Saturn, offering clues about magnetic fields across the cosmos.
- These waves are **produced by plasma instabilities, unstable distributions of charged particles** flowing along Earth's magnetic field lines. Because they can interact with the high-energy particles trapped in our planet's geomagnetic grip.
- They are involved in radiation belts, pulsating and diffuse aurorae. These waves were not limited to the curved magnetospheres of planets and stars but were free to form anywhere out in space with a magnetic field.

Therefore, option (c) is the correct answer.

Knowledge Box

• A **plasma wave** is defined as a charge density wave with longitudinal electric fields that can be sustained by electrons in metals.
• **Langmuir waves** are rapid oscillations of electrons in plasmas or metals. They are also known as **plasma oscillations.**
  ○ NASA has observed Langmuir waves in space using spacecraft like Voyager 2, Ulysses and MAVEN.
  ○ Langmuir waves are electron plasma oscillations that can be found in the solar wind, near Venus and near Uranus.
• **Magnetoacoustic waves** propagate in the solar corona and filament dynamics.

Relevance: Recently, mysterious chirping signals, called chorus waves, have been detected 165,000 kilometers from Earth, far beyond where they were previously thought to exist.

Q97.
Answer: a
Explanation:

- **Malaria** is a serious and potentially deadly disease spread by infected mosquitoes. It is a difficult disease to control. When scientists find a way to combat one strain, the **parasite shifts tactics,** altering its proteins and genetic structure to bypass immunity. This adaptability makes it difficult to develop a **universal and long-lasting vaccine** for malaria. **So, statement 1 is correct.**
- The malaria parasite masters deception, outmanoeuvring the human immune system. Its greatest strength is antigenic variation, where it **frequently changes its surface proteins**, making it **difficult for immune cells to recognise** it and complicates the development of effective vaccines. **So, statement 2 is correct.**
- Adding to the challenge, malaria's life cycle spans multiple stages across **two hosts—humans and mosquitoes**—requiring any potential vaccine to target several phases simultaneously. **So, statement 3 is correct.**
- The cycle begins when an infected ***Anopheles*** mosquito bites a human, injecting ***Plasmodium sporozoites*** that are highly infective, into the bloodstream. These parasites first travel to the liver**, invading liver cells** and multiplying undetected by the immune system. They can remain dormant there, leading to relapses. This **dormancy** and **reactivation of parasites** in the liver make it difficult to completely eradicate the disease.
  - The malaria parasite ***Plasmodium vivax*** **and** ***P. ovale*** has the ability to remain dormant in the liver as a stage called a "**hypnozoite," which can reactivate months or even years after the initial infection**, causing relapses of malaria symptoms.
- The **excessive use of insecticides has led to insecticide resistance in mosquitoes,** making it harder to control them. This resistance is a threat to disease control and can reverse gains made in reducing the spread of diseases like malaria.

So, both Statement–II and Statement–III are correct and both of them explain Statement–I.
Therefore, option (a) is the correct answer.

Q98.
Answer: c
Explanation:

- **Fire-and-forget missiles** are **advanced guided weapons** that can find, track and hit targets on their own, without needing further guidance from the operator after launch with the help of technology to move, guide and control.
- **It incorporates the following components:**
  - **propulsion systems** that give them the **power to fly;**
  - **guidance systems** help them **find and lock onto their target** and
  - **control systems** allow them to **change direction and speed** (using sensors like radar, infrared, or imaging systems)
- **India's Fire-and-Forget Missile Arsenal:**

Advanced Guided Missiles	Fire and Forget Missiles
Anti-tank guided missiles (ATGMs)	• **Nag Mk 2:** A third-generation ATGM with an onboard **infrared seeker** to track targets. **So, point 1 is correct.** • **HELINA (Helicopter-launched Nag):** A helicopter-launched version of the Nag Mk 2. • **SANT (Stand-off Anti-Tank):** A helicopter-launched ATGM with an onboard seeker to track targets.
Surface-to-Air Missiles (SAMs)	• **Akash:** A medium-range SAM with an onboard seeker to track targets. • **Barak-8**: A long-range SAM with an onboard active radar seeker to track targets. • **Pechora:** A short-range SAM that requires operator input to guide the missile to its target.
Cruise missiles	• **Nirbhay:** A subsonic cruise missile with a range of over 1,000 km. • **BrahMos**: A supersonic cruise missile with a range of over 290 km. **So, point 3 is correct.**
Anti-ship missiles	• **BrahMos:** A supersonic anti-ship missile with an onboard seeker to track targets. • **BrahMos-ER (Extended Range):** An extended-range version of the BrahMos, also with a fire-and-forget capability. • **BrahMos-A (Air-launched):** An air-launched version of the BrahMos, with a fire-and-forget capability.
Submarine-Launched Ballistic Missiles (SLBMs)	• **K-15 Sagarika:** A missile with a range of 750 km, deployed on the INS Arihant, with a fire-and-forget capability. • **K-4:** An intermediate-range missile with a range of 3,500 km, ensuring second-strike capability, also with a fire-and-forget capability.
Hypersonic Technology Demonstrator Vehicle (HSTDV)	• A platform for testing hypersonic cruise missiles, capable of achieving speeds over **Mach 5**. While not yet operational, this technology is expected to have **fire-and-forget capabilities.**

- **Agni missiles** do not have an onboard seeker that can autonomously track a target and are not **typically considered "fire-and-forget" missiles in the classical sense.** However, some variants of the Agni missile, like **the Agni-IV and Agni-V,** have advanced guidance systems that allow for more accurate and flexible targeting and are considered as **fire and forget missiles. So, point 4 is correct.**
- **Prithvi missiles** use an inertial navigation system, which guides the missile to its target based on pre-programmed coordinates. They **do not fall under "fire and forget" missile category. So, point 2 is not correct.**

Therefore, option (c) is the correct answer.

Q99.
Answer: d
Explanation:

- 'Diethylcarbamazine Citrate' (DEC) and 'Albendazole' are used in **Mass Drug Administration** programs to eliminate **Lymphatic Filariasis (LF)**, commonly known as **elephantiasis**. LF is caused by parasitic worms like *Wuchereria bancrofti, Brugia malayi and Brugia timori*, which are transmitted through mosquito bites.
- The **MDA program** involves administering these drugs to entire at-risk populations to interrupt the transmission of the disease. This treatment is a part of the **Global Programme to Eliminate Lymphatic Filariasis (GPELF)** by the **World Health Organization (WHO).**
- **Role of the Drugs:**
  - **Diethylcarbamazine Citrate (DEC)**:
    - Kills the microfilariae (larval stage) of the filarial worms.
    - Reduces the density of microfilariae in the blood, preventing transmission by mosquitoes.
  - **Albendazole**:
    - An antiparasitic drug that weakens adult worms and reduces their ability to reproduce.
    - Often used in combination with DEC for enhanced effectiveness.

Therefore, option (d) is the correct answer.
Relevance: Recently, the Union Health Minister launched the National Mass Drug Administration Round for the elimination of Lymphatic Filariasis.

Q100.
Answer: c
Explanation:

- The **CO_2 battery technology** is an innovative long-duration energy storage system that uses **carbon dioxide (CO_2)** as a working fluid. It stores and releases energy through adiabatic compression of carbon dioxide gas, liquefied during charging and evaporating during discharge in the **thermodynamic Brayton Cycle.** Heat creating the compression process is stored and used to expand the CO_2 gas, which is driven through turbines to generate electricity, in a closed-loop cycle.

- **Some of the benefits of the CO2 Battery technology are as follows:**
  - **No use of lithium, cobalts, or rare-earth elements to store electricity. So, point 1 is correct.**
  - **Zero CO_2 as well as any other gas emissions** into the atmosphere during the entire process and no water is produced during the process. **So, point 2 is not correct.**
  - **No requirement of cryogenic temperatures** and high costs that are typically associated with compressed air energy storage. **So, point 3 is correct.**
  - Minimal performance degradation, as it operates on specialized electro-mechanical turbomachinery
  - Massive reduction of costs by storing the CO_2 at ambient temperature in its liquid phase
  - Patented technology that uses only water, steel, and CO_2
  - **Grid-scale energy storage. So, point 4 is correct.**

Therefore, option (c) is the correct answer.

Relevance: Power producer National Thermal Power Corporation (NTPC) announced deployment of the Energy Dome's CO_2 Battery technology at a power plant in Karnataka.