



ANSWERS & EXPLANATIONS

GENERAL STUDIES (P) TEST – 4149 (2024)

Q 1.B

- **Prajnaparamita Sutras:**
 - **Nature:** These are a group of **Mahayana Buddhist scriptures** that emphasize the concept of "prajna" or transcendental wisdom. **Hence option 1 is correct.**
 - **Content:** They are known for expounding the perfection of wisdom and the concept of emptiness (shunyata).
 - **Significance:** Prajnaparamita Sutras are highly revered in Mahayana Buddhism, and they played a crucial role in the development of the Mahayana philosophical tradition.
- **Vimalakirti Nirdeśa Sutra:**
 - **Nature:** This is a Mahayana Buddhist text. **Hence option 2 is correct.**
 - **Content:** The sutra revolves around Vimalakirti, a lay Buddhist disciple known for his advanced spiritual attainments. It presents dialogues between Vimalakirti and various bodhisattvas, monks, and celestial beings, discussing profound aspects of Buddhist philosophy and practice.
 - **Significance:** The Vimalakirti Nirdeśa Sutra is valued for its teachings on the nature of reality, non-duality, and the bodhisattva path.
- **Tattvartha Sutra**
 - **Nature:** **This is a fundamental text in Jainism. Hence option 3 is not correct.**
 - **Content:** Tattvartha Sutra, also known as the Tattvarthadhigama Sutra, discusses the key philosophical principles of Jainism, including the nature of reality, ethics, cosmology, and the path to liberation (moksha).
 - **Significance:** It is considered one of the primary and authoritative texts in Jain philosophy, providing a systematic and comprehensive overview of Jain principles.
- **Bhagavati Sutra:**
 - **Nature:** **This is a Jain text. Hence option 4 is not correct.**
 - **Content:** The Bhagavati Sutra, also known as the Kalpa Sutra, is a Jain scripture that narrates the life of Lord Mahavira, the 24th Tirthankara, and includes teachings on ethics, philosophy, and the monastic code.
 - **Significance:** It holds a central place in Jain literature, serving as a guide for Jain monks and nuns, and is revered for its portrayal of the life and teachings of Mahavira.

Q 2.A

- **An adaptation is the appearance/behaviour/structure/mode of life of an organism that allows it to survive in a particular environment. Adaptation may be:**
 - **Morphological:** When trees grew higher, the giraffe's neck got longer.
 - ✓ Many desert plants have thick cuticles on their leaf surfaces and have their stomata arranged in deep pits to minimise water loss through transpiration. Some desert plants like Opuntia have no leaves - they are reduced to spines (to reduce transpiration), and the photosynthetic function is taken over by the flattened stems (few leaves mean less area is available for transpiration).
 - ✓ **Allen's Rule:** Body form or shape is linear in warm climates and more rounded and compact in cold climates. Round forms have a smaller surface area to volume ratios. **Hence option (a) is the correct answer.**
 - Mammals from colder climates generally have shorter ears and limbs to minimise heat loss.
 - An elephant has enormous ears because elephants don't sweat. They use their flapping ears to lose heat and keep the rest of the body
 - ✓ **Bergmann's Rule:** Body size is large in cold climates and small in warm climates. Large bodies have a smaller surface area to volume ratios.

- Both of the above two rules cause systematic changes in the surface area to volume ratios.
- In cold climates where you need to retain heat, so bodies are larger and more compact and In warm climates where you need to expel heat, so bodies are smaller and more linear.
- **Physiological:** In the absence of an external water source, the kangaroo rat in North American deserts can meet all its water requirements through internal fat oxidation (in which water is a by-product). It also has the ability to concentrate its urine so that a minimal volume of water is used to remove excretory products.
- **Behavioural:** Animals migrating temporarily to a less stressful habitat.

Q 3.C

- **Palestine** is an area of the **eastern Mediterranean region**, comprising:
 - The **Gaza Strip** (along the coast of the Mediterranean Sea) and
 - The **West Bank** (west of the Jordan River).
- The **Gaza Strip** borders the **Mediterranean Sea** to the west, **Egypt** to the south, and **Israel** to the north and east.
- The **West Bank** is bordered by **Jordan** to the east and **Israel** to the north, south, and west.
- **Hence option (c) is the correct answer.**



Q 4.D

- **The US rail network, with an operating route length of over 250,000km**, is the biggest in the world. Freight lines constitute about 80% of the country's total rail network, while the total passenger network spans about 35,000km.
- **China's rail network, with a route length of over 100,000km**, ranks as the second biggest rail network in the world. The extensive network, operated by state-owned China Railway Corporation, carried 2.08 billion passengers (the second highest after Indian Railways) and 3.22 billion tonnes of freight (the second highest after the US railway network) in 2013.
- **Russia's whole network, operated by state-owned monopoly Russian Railways (RZD), runs for over 85,500km.** In 2013, the network carried 1.08 billion passengers and 1.2 billion tonnes of freight – the third-highest freight volume after the US and China.
- **The Indian nationwide rail network, the fourth longest in the world, is owned and operated by state-owned Indian Railways and includes an operating route length of more than 65,000km.** The network carried about eight billion passengers (the highest in the world) and 1.01 million tonnes of freight (fourth highest in the world) in 2013.
- **Hence option (d) is the correct answer.**

Q 5.B

- **Munda Rebellion:**
 - The Munda rebellion was a significant post-1857 uprising that originated from the destruction of the Munda traditional land system.
 - This was accelerated by the British intervention like the introduction of contractors, and the dislocation of Mundas as indentured laborers, which led to the rebellion by Mundas.
 - **Birsa Munda was the prominent leader of the uprising.** He started Ulgulan movement against the exploitation and discrimination against tribals by the local authorities. He urged tribal people to preserve sacred groves from the Britisher's encroachment.
 - **The rebellion was finally defeated, however, the sacrifice contributed to the Chhota Nagpur Tenancy Act of 1908, granting land ownership rights to tribals. Hence option (b) is the correct answer.**

Q 6.A

- Vishakhadatta was the court poet of **King Chandragupta II**, who was a Gupta emperor in ancient India. Vishakhadatta's most famous work is the Sanskrit play "**Mudrarakshasa**". This historical **drama revolves around the political intrigues in the Mauryan Empire** and specifically depicts the rise of the renowned minister Chanakya. "Mudrarakshasa" is highly valued for its portrayal of ancient Indian political and social life during that period.
- Several other notable writers who flourished during the Gupta period in ancient India, contributing significantly to literature and learning were:
 - **Kalidasa:** Kalidasa was a renowned poet and playwright during the Gupta period. He is often associated with the court of **Chandragupta II**. Major work includes **Abhijnanasakuntalam, Malvikaagnimitra, Meghduta etc.**
 - **Aryabhata:** Aryabhata, an influential mathematician and astronomer, lived during the Gupta era. **Aryabhata and Surya Siddhant** are his important works.
 - **Vatsyayana:** Vatsyayana, traditionally believed to be the author of the "**Kamasutra**" is associated with the Gupta period.
 - **Varahamihira:** Varahamihira, a polymath who excelled in fields like astronomy, mathematics, and astrology, lived during the Gupta era. He is also associated with the court of **Chandragupta II**. Major works: **Panchasiddhantika, Brihat Samhita.**
- **Hence option (a) is the correct answer.**

Q 7.B

- The Bhakti movement, prominent in medieval India, emphasized personal devotion to a chosen deity as a means of attaining spiritual salvation. Salient Features of the Bhakti Movement:
 - The bhakti reformers preached the **principles of monotheism** (oneness of God). **Hence option 1 is correct.**
 - They **believed in freedom from the cycle of life and death.** They advocated that salvation could be attained only by deep devotion and faith in God.
 - They emphasized the self-surrender for obtaining the bliss and grace of God.
 - Gurus could act as guides and preceptors.
 - They **advocated the principle of Universal brotherhood.** **Hence option 2 is correct.**
 - They stressed the singing of hymns with deep devotion.
 - Arguing that all living beings, including humans, were god's children, they strongly denounced the caste system which divided people according to their birth.
 - They **condemned ritualism.** **Hence option 3 is not correct.**
 - They **did not consider any language as sacred and composed poems in the language of the common people.** **Hence option 4 is not correct.**

Q 8.A

- The **Shanghai Cooperation Organization (SCO)** is a **permanent intergovernmental international organization** aiming to maintain peace, security, and stability in the region.
- It was **created in 2001** with the objective of strengthening **mutual trust** among the member states alongside promoting effective **cooperation in politics, trade and economy, research and technology, and culture.**
- Recently, during the 23rd SCO Summit chaired by India, **Iran officially joined** the SCO as the **Ninth Member Country.**
- The **other eight member countries** include:

- China,
- India,
- Kazakhstan,
- Kyrgyzstan,
- Pakistan,
- Russia,
- Uzbekistan, and
- Tajikistan.

Q 9.A

- All the public appearances of the Governor and the speeches delivered by him on such occasions have to be in accordance with the policy laid down by the Council of Ministers (not mentioned in the Constitution) headed by the Chief Minister. Similarly the **speeches of the Governor on ceremonial occasions and the annual speech before the Assembly have to be approved by the Cabinet. Hence, statement 1 is correct.**
- The Chief Minister is also the leader of the House. Apart from this formal position, the Chief Minister provides real legislative leadership to the House in the sense that he sets the legislative agenda. The **legislative measures are brought before the Assembly after the approval of the Council of Ministers headed by the Chief Minister.** However, the approval of the **Council of Ministers is not required in the case of a Private Member bill. Hence, statement 2 is not correct.**

Q 10.B

- **Kadalundi mudflats:**
 - Kadalundi mudflats are a vital ecosystem along the Kerala coast, supporting a rich diversity of migratory shorebirds and other wildlife. However, the recent expansion of mangroves has raised concerns about its impact on the mudflat ecosystem. **Hence option (b) is the correct answer.**
- **Mudflat Ecosystem-Carbon storage**
 - While mangroves do play a significant role in carbon storage due to their high biomass and ability to trap sediments, they are not the sole factor.
 - **Mudflats themselves also contribute to carbon storage through the process of accretion**, where layers of sediment and organic matter build up over time, capturing and sequestering carbon. **Additionally, other organisms like algae and seagrasses also contribute to carbon storage** within the mudflat ecosystem.
- **Importance of mudflats for shorebirds:**
 - **Foraging grounds:** The open mudflats provide rich feeding grounds for shorebirds with diverse beak shapes and feeding strategies. They probe the mud for worms, insects, and crustaceans, replenishing their energy for long migrations.
 - **Nesting sites:** Some shorebird species like sandpipers and plovers create simple nests on the open mudflats, relying on camouflage for protection. **Mangrove encroachment can destroy these nesting sites and expose chicks to predators.**
 - Recent studies suggest that the aggressive expansion of mangroves in Kadalundi poses a threat to migratory shorebirds. These birds prefer open mudflats for foraging and nesting, and the **encroachment of mangroves reduces their suitable habitat.** This has led to a decline in the number and diversity of shorebird species using Kadalundi.
 - **Resting areas:** During long journeys, shorebirds use mudflats as safe havens to rest and socialize before continuing their migration. Loss of open space can force them to utilize less suitable or crowded areas, increasing vulnerability.
- **Reasons for concern:**
 - **Loss of open space:** Mangroves thrive in the intertidal zone, where they gradually encroach upon the mudflat area. **This reduces the open mudflat space available for shorebirds to feed and roost.**
 - **Changes in prey availability:** The mudflat's unique sediments and tidal patterns support a specific community of prey animals like worms and crustaceans, which shorebirds rely on for food. Mangrove expansion alters these conditions, leading to a decline in the abundance and diversity of these prey species.
 - **Competition for resources:** Mangroves can compete with shorebirds for space, food, and sunlight. This can lead to increased stress and displacement of shorebirds, especially during peak feeding and breeding seasons.

Q 11.B

- **Faraizi Movement:**
 - **Origins and Leader:**
 - ✓ **Founded in 1819 by Haji Shariatullah**, a Muslim scholar and reformer in Faridpur, East Bengal. **Hence statement 1 is not correct.**
 - ✓ His teachings emphasized strict adherence to the Quran and Sunnah, rejecting practices considered un-Islamic like idol worship, caste distinctions, and extravagant rituals.
 - **Goals and Principles:**
 - ✓ **Aimed to purify Islam and revive its spiritual core within the Bengali Muslim community. Hence statement 2 is correct.**
 - ✓ Promoted social justice and equality, challenging prevailing hierarchies and advocating for the rights of the underprivileged.
 - ✓ Emphasis on self-reliance, economic independence, and education for both men and women.
 - **Impact and Significance:**
 - ✓ The movement gained a large following among peasant communities and artisans in East Bengal, attracting both men and women.
 - ✓ It challenged the authority of local zamindars (landlords) and colonial officials, leading to conflicts and occasional uprisings.
 - ✓ It provided a sense of spiritual and social empowerment for Bengali Muslims, fostering a collective identity and resistance against oppression.
 - **Challenges and Decline:**
 - ✓ Faced internal divisions and accusations of extremism after Shariatullah's death in 1838.
 - ✓ **Under the leadership of Haji's son, Dudu Mian**, the movement became revolutionary from 1840 onwards. He gave the movement an organizational system from the village to the provincial level with a khalifa or authorized deputy at every level.
 - ✓ Dudu Mian was arrested several times, and his arrest in 1847 finally weakened the movement.

Q 12.B

- **Matangini Hazra:**
 - **Early Life and Social Work:**
 - ✓ Born in 1869 in a poor agricultural family near Tamluk, Bengal, Matangini Hazra faced societal challenges from a young age. Married at 12 to an older man, she was widowed by 18, finding solace in social work and community support.
 - ✓ Her dedication earned her the affectionate nickname "**Gandhi Buri**" (Old Gandhi) for her association with the non-violent resistance movement. **She was a staunch Gandhian and was among the thousands of women who answered the Mahatma's call to join the freedom struggle. Hence statement 1 is not correct.**
 - **Active Resistance against Colonial Rule:**
 - ✓ Matangini's journey in the freedom struggle began in the 1930s with the Civil Disobedience Movement. She actively participated in various campaigns, including picketing liquor shops, protesting against the Salt Act, and advocating for khadi production. Despite arrests and imprisonment, she remained undeterred.
 - **Leadership and Martyrdom:**
 - ✓ The Quit India Movement of 1942 witnessed Matangini's greatest act of courage.
 - ✓ **Leading a procession of unarmed volunteers towards the Tamluk Police Station on September 29, 1942, she aimed to hoist the national flag.**
 - ✓ When faced with police brutality, she stood tall, refusing to back down. Though bullets hit her, she kept moving forward, holding the flag aloft until she breathed her last. **Hence statement 2 is correct.**

Q 13.C

- India as well as the USA are both leading democracies of the world. In this regard, elections in both countries are of utmost importance.
- The USA follows a **decentralized voter registration system** wherein **each state** is responsible for maintaining its **own voter rolls**. However, **India** follows a **centralized voter registration system** managed by the **Election Commission of India (ECI)**. Hence, **statement 1 is not correct.**
- In the **General elections in India**, the **first-past-the-post (FPTP) system** is utilized. This is also known as the **simple majority system**, wherein the **candidate with the highest number of votes** in a constituency is **declared the winner**. This system is used in India in direct elections to the **Lok**

Sabha and State Legislative Assemblies. The US Presidential Election on the other hand, makes use of the **Proportional Representation** system. Hence, statement 2 is not correct.

- In the **United States**, citizens cast their votes either **in person** at designated polling stations **or through mail-in absentee ballots**. Some states also allow **early voting**. In contrast, **Indian citizens** have to cast their votes **in person** at polling booths in their respective constituencies using electronic voting machines (EVMs) or paper ballots. Only under **special circumstances**, a **postal ballot voting is permitted**, but there is **no provision for email voting**. Hence, statement 3 is not correct.
- A **coalition government** is a form of government in which different political parties cooperate to form a government. This situation occurs only in a **multiparty system** like **India** with the **first-past-the-post system**. It is practically **not possible** in a **two-party system** like the **USA**, which uses **Proportional Representation**.

Q 14.B

- **Soil**, the biologically active, porous medium that has developed in the uppermost layer of Earth's crust, **a mix of minerals, organic matter, water, and air**. Soils perform vital functions to sustain plant and animal life, regulate water flow, filter and buffer pollutants, cycle nutrients, and provide physical stability and sort.
- **Key components** of the soil are:
 - **Minerals**
 - **Organic Matter**
 - **Water**
 - **Air**
 - **Microorganisms**
 - **Organic Nutrients**
- The percentage composition of the **living organism and organic matter** is **5% to 12%** whereas soil atmosphere is **15% to 35%**. Hence statement 1 is not correct.
- The percentage composition of the **mineral matter** is **38% to 47%** whereas soil solution is **15% to 35%**. Hence statement 2 is correct.

Table 14.1 : Soil components

Major Components	Percentage Composition
1. Living organisms and organic matter	5-12%
2. Mineral matter	38-47%
3. Soil solution	15-35%
4. Soil atmosphere	15-35%

- Hence, option (d) is the correct answer.

Q 15.D

- **Burrakatha**, performed mainly in **Andhra Pradesh and Telangana** is a **theatrical form**, where a storyteller accompanied by his partner sings dances and recites a story, before the people of a village under the patronage of a village elder. It is mainly performed in the states of Andhra Pradesh and Telangana.
- The term '**burra**' refers to '**tambura**', a **stringed instrument worn across the right shoulder of the performer**. '**Katha**' means a story.
- The main performer (kathakudu) plays the tambura with his right hand as he dances rhythmically forward and back on the stage while reciting a story. Burrakatha's stories fall into three categories - mythological, historical and sociopolitical. Burrakatha was popularly used to showcase the suffering that rural communities had been experiencing and to awaken the masses during the Telangana Rebellion. Hence, option (d) is the correct answer.

Q 16.C

- Global warming, the long-term heating of the earth's surface, expedited due to anthropogenic forces or human activities since pre-industrial times and has increased the planet's average temperature by 1.1 degrees Celsius. While changes are witnessed across the planet, any change in the surface air temperature and the net radiation balance tend to produce larger changes at the north and south poles. **This**

phenomenon is known as **polar amplification**; these changes are more pronounced at the northern latitudes and are known as the **Arctic amplification**.

- Among the many global warming-driven causes for this amplification, **the ice-albedo feedback, lapse rate feedback, water vapour feedback and ocean heat transport are the primary causes**. Sea ice and snow have high albedo (measure of reflectivity of the surface), implying that they are capable of reflecting most of the solar radiation as opposed to water and land. In the Arctic's case, global warming is resulting in diminishing sea ice.
- As the sea ice melts, the Arctic Ocean will be more capable of absorbing solar radiation, thereby driving the amplification. The lapse rate or the rate at which the temperature drops with elevation decreases with warming. Studies show that the ice-albedo feedback and the lapse rate feedback are responsible for 40% and 15% of polar amplification respectively.
- **The causes and consequences of Arctic amplification are cyclical — what might be a cause can be a consequence too.**
 - The warming of the Arctic Ocean and the seas in the region, the acidification of water, changes in the salinity levels, is impacting the biodiversity, including the marine species and the dependent species. The warming is also increasing the incidence of rainfall which is affecting the availability and accessibility of lichens to the reindeer. **The Arctic amplification is causing widespread starvation and death among the Arctic fauna.**
 - The permafrost in the Arctic is thawing and in turn **releasing carbon and methane which are among the major greenhouse gases responsible for global warming**. Experts fear that the thaw and the melt will also release the long-dormant bacteria and viruses that were trapped in the permafrost and can potentially give rise to diseases. The best-known example of this is the permafrost thaw leading to an anthrax outbreak in Siberia in 2016, where nearly 2,00,000 reindeer succumbed.
 - A study titled 'A possible relation between Arctic sea ice and late season Indian Summer Monsoon Rainfall extremes' published in 2021 by a group of Indian and Norwegian scientists found that **the reduced sea ice in the Barents-Kara sea region can lead to extreme rainfall events in the latter half of the monsoons — in September and October.**
 - The changes in the atmospheric circulation due to diminishing sea ice combined with the warm temperatures in the Arabian Sea contribute to enhanced moisture and drive **extreme rainfall events**.
 - **Hence option (c) is the correct answer.**

Q 17.B

- **The advent of European Powers in India and the Establishment of their First Factories:**
 - **Portugal:**
 - ✓ **Arrival:** 1498 - Vasco da Gama reached Calicut, becoming the first European to arrive in India by sea.
 - ✓ **First Factory:** 1500 - Established in Calicut with the permission of the Zamorin, the local Hindu ruler. Hence pair 1 is correctly matched.
 - ✓ **Significance:** Initiated Portuguese dominance in Indian Ocean trade, controlling spice routes and establishing forts along the Malabar Coast.
 - **Dutch:**
 - ✓ **Arrival:** 1595 - Cornelis de Houtman led a Dutch fleet to Banten, marking their entry into the spice trade.
 - ✓ **First Factory:** 1605 - Established in Masulipatnam, Andhra Pradesh, under the Vijayanagara Empire. Hence pair 2 is correctly matched.
 - ✓ **Significance:** Contested Portuguese dominance, established trade partnerships with various Indian kingdoms, and developed commercial ventures across the Coromandel Coast.
 - **France:**
 - ✓ **Arrival:** 1604 - The French East India Company was founded during the reign of Henry IV.
 - ✓ **First Factory:** 1668 - Established in Surat, Gujarat, under Mughal Emperor Aurangzeb's permission. Hence pair 3 is not correctly matched.
 - ✓ **Second Factory and Significance:** 1673 - Pondicherry, in Tamil Nadu, became their key stronghold and administrative center, laying the foundation for French colonial ambitions in South India.

Q 18.A

- In Union Budget 2022-23, the Finance Minister Nirmala Sitharaman had announced that sovereign green bonds will be issued for mobilising resources for 'green projects'.
- **Green bonds are issued by companies, countries and multilateral organisations to exclusively fund projects that have positive environmental or climate benefits and provide investors with fixed**

income payments. The projects can include renewable energy, clean transportation and green buildings, among others.

- **Features of the SGrBs:**
 - **Issuance Method** –SGrBs will be issued through Uniform Price Auction (a public sale in which a fixed number of similar things are sold at the same price).
 - **Eligibility for Repurchase Transactions (Repo)** – SGrBs will be eligible for Repurchase Transactions (Repo). SGrBs will also be reckoned as eligible investment for Statutory Liquidity Ratio (SLR) purpose. **Hence statement 1 is correct.**
 - **Tradability** – SGrBs will be eligible for trading in the secondary market.
 - **Investment by Non-residents** – SGrBs will be designated as specified securities under the ‘Fully Accessible Route’ for investment in Government Securities by non-residents.
- **Eligible Projects:**
 - All eligible green expenditures will include public expenditure undertaken by the government in the form of investment, subsidies, grants-in-aid, or tax foregone (or a combination of all or some of these) or select operational expenditures.
 - R&D expenditures in public sector projects that help in reducing the carbon intensity of the economy and enable country to meet its Sustainable Development Goals (SDGs) are also included in the framework. The eligible expenditures will be limited to government expenditures that occurred maximum 12 months prior to issuance of the green bonds.
 - **Sectors not included** – Nuclear power generation, landfill projects, alcohol/weapons/tobacco/gaming/palm oil industries and **hydropower plants larger than 25 MW have been excluded from the framework. Hence statement 2 is not correct.**
- **The proceeds from the green bonds issuance will be deposited in the Consolidated Fund of India (CFI)** in line with the regular treasury policy, and then funds from the CFI will be made available for the eligible green projects. **Hence statement 3 is not correct.**
- **Implementing Agency:**
 - The Ministry of Finance has constituted a **Green Finance Working Committee (GFWC)** including members from relevant ministries and chaired by the Chief Economic Advisor. The GFWC will meet at least twice a year to support the Ministry of Finance with selection and evaluation of projects and other work related to the Framework.

Q 19.B

- Recently, a critically endangered white-bellied heron, with an estimated 250 individuals in the world was spotted in the Kamlang Tiger Reserve in Arunachal Pradesh’s Lohit district.
- **White-bellied heron:**
 - The white-bellied heron is mainly dark greyish with contrasting white throat, belly and vent, white-streaked scapulars, fore neck and upper breast.
 - **Both females and males have two lace-like white plumes on the back of their necks.**
 - The species, *Ardea insignis*, is found in the eastern Himalayan foothills of **Bhutan, Northeast India to the hills of Bangladesh, north Myanmar, and west central Myanmar. Hence statement 1 is not correct.**
 - According to the IUCN, **the heron is critically endangered** due to its extremely small and rapidly declining population. Their population is expected to decline further as a result of the loss and degradation of lowland forests and wetlands. **Hence statement 3 is correct.**
 - The species is mainly found near small or large rivers, usually with sand or gravel bars, adjacent to the subtropical or tropical broadleaved forest. They are also spotted in lowlands up to at least 1,500 metres, and lakes near wet grasslands.
 - Mainly found in inaccessible and undistributed areas, **the birds are generally solitary.** However, they may aggregate into small flocks and family groups during winter. **Hence statement 2 is correct.**

Q 20.C

- **Flex-fuel vehicles (FFV)** are those vehicles that have internal combustion engines that can run on flexible fuel. This fuel contains a combination of **petrol and ethanol (not diesel)**. In fact, the engine can even run with **100% of Ethanol** content. **Hence, statement 1 is not correct and statement 2 is correct.**
- **Flex Fuel Strong Hybrid Electric Vehicles (FFV-SHEV)** is a term for **full hybrid vehicles**, which have the capability to run solely on either electric or **flex modes**. Mild hybrid variants also exist, but they cannot run purely on one of these modes and use the secondary mode merely as a supplement to the main mode of propulsion. **Hence, statement 3 is correct.**

- In 2023, Union Minister of Road Transport and Highways, Mr. Nitin Gadkari, launched a **100% ethanol-fueled variant** of Toyota's Innova car. This car is the **world's first BS-VI (Stage-II) electrified flex-fuel vehicle**. Hence, **statement 4 is correct**.

Q 21.A

- **Secondary Market** refers to a market where securities are traded after being initially offered to the public in the primary market and/or listed on the Stock Exchange. Majority of the trading is done in the secondary market. Secondary market comprises of equity markets and the debt markets.
- Following are the main financial products/instruments dealt in the secondary market:
 - **Equity Shares:** An equity share, commonly referred to as ordinary share also represents the form of fractional ownership in which a shareholder, as a fractional owner, undertakes the maximum entrepreneurial risk associated with a business venture. The holders of such shares are members of the company and have voting rights.
 - ✓ **Rights Issue / Rights Shares:** The issue of new securities to existing shareholders at a ratio to those already held. **Hence statement 1 is not correct.**
 - ✓ **Bonus Shares:** Shares issued by the companies to their shareholders free of cost by capitalization of accumulated reserves from the profits earned in the earlier years. **Hence statement 3 is not correct.**
 - ✓ **Debentures:** Bonds issued by a company bearing a fixed rate of interest usually payable half yearly on specific dates and principal amount repayable on particular date on redemption of the debentures. Debentures are normally secured / charged against the asset of the company in favour of debenture holder. **Hence statement 2 is correct.**
 - ✓ **Bond:** A negotiable certificate evidencing indebtedness. It is normally unsecured. A debt security is generally issued by a company, municipality or government agency. A bond investor lends money to the issuer and in exchange, the issuer promises to repay the loan amount on a specified maturity date.
 - **Zero Coupon Bond:** Bond issued at a discount and repaid at a face value. No periodic interest is paid. **The difference between the issue price and redemption price represents the return to the holder (Zero interest but positive returns).** The buyer of these bonds receives only one payment, at the maturity of the bond. **Hence statement 4 is not correct.**
 - **Convertible Bond:** A bond giving the investor the option to convert the bond into equity at a fixed conversion price.

Q 22.A

- Lok Adalat, meaning 'People's Court' is one of the ADR (Alternative Dispute Redressal) mechanisms.
- **They are based on Gandhian principles and aim to settle disputes through arbitration at the grassroots level. Hence statement 1 is correct.**
- **They were given statutory status under the Legal Services Authorities Act, 1987** which aims to constitute legal service authorities to provide free legal services to the weaker sections of the society according to Article 39 A of the Indian Constitution.
- **Lok Adalat is presided over by a sitting or a retired judicial officer as Chairman with two other members usually a lawyer and a social worker. Hence statement 2 is correct.**
- No fee is paid by the parties. A strict rule of Civil Procedural Court and evidence is not applied.
- Decision is by informal sitting and binding on the parties and **no appeal lies against the order of the Lok Adalat. Hence statement 3 is not correct.**

Q 23.A

- **Opportunity cost is commonly defined as the next best alternative.** Also, known as the alternative cost, it is the loss of gain which could have been gained if another alternative was chosen. It can also be explained as the loss of benefit due to a change in choice. **Hence statement 1 is correct.**
- The calculation of opportunity cost has a wide range of applications. Most prominently being used in product planning decisions, the concept of opportunity cost is relevant in many other business scenarios. The calculation method is used when prices paid to factor services are determined and also to calculate economic rent, which is the difference between the actual return to factor services and their supply price.
- **The calculation of opportunity cost is not only applicable to the producers. The consumers also use the method of opportunity cost to weigh different consumption bundles among each other. Hence statement 2 is not correct.**

Q 24.D

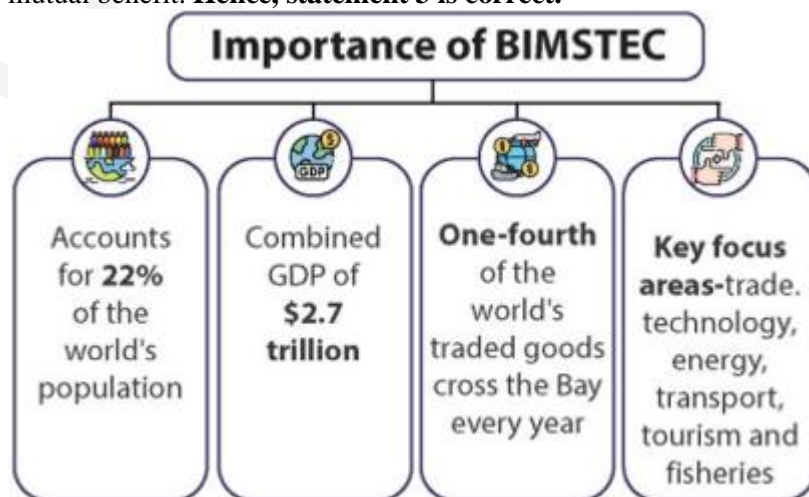
- **Ethanol Blending** is the process of **mixing ethanol with petrol or gasoline**. This burns less fossil fuel while running vehicles.
- **E20** fuel is a blend of **20% ethanol and 80% petrol or gasoline**.
- It was **launched by the Prime Minister** of India in February 2023 in Bengaluru. This pilot covers at least 15 cities and will be rolled out across the country in a phased manner. The Union Minister of Petroleum and Natural Gas highlighted that E20 will soon be available at 1,000 outlets of oil marketing companies (OMCs) nationwide.
- The Indian government has advanced its target to achieve **20% ethanol blending in petrol from 2030 to 2025**.
- Hence option (d) is the correct answer.

Q 25.A

- **Recent Context: The United Nation Development Program (UNDP)** has developed an open-source software which allows countries to effectively manage national data and processes for trading carbon credits. **Hence statement 1 is not correct.**
- The software, called the National Carbon Registry, has recently been accredited as a digital public good (DPG). As a DPG, the registry uses open-source code, which allows countries to replicate and adapt the information to fit their own needs and contexts. The registry's modules, software and technical documentation can be reused and tailored by countries, which could potentially reduce production costs and implementation timelines. **Hence statement 2 is correct and 3 is not correct.**
- It can be integrated with national measurement, reporting and verification (MRV) systems to meet international reporting requirements.
- It will promote the development of the Carbon Market by facilitating the trading of carbon credits.
 - Article 6 of the Paris Agreement allows countries to voluntarily cooperate with each other to achieve emission reduction targets set out in their Nationally Determined Contributions (NDCs)

Q 26.B

- Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) Foreign Ministers' Meet concluded in Thailand. India has participated in the first-ever Foreign Ministers' meeting of BIMSTEC in Bangkok, Thailand.
- Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) is a regional organisation established in 1997 with the signing of the Bangkok Declaration. **Hence, statement 1 is correct.**
- Its secretariat is in Dhaka, Bangladesh.
- Initially, it was established as BIST-EC with four countries: Bangladesh, India, Sri Lanka and Thailand. It was named BIMSTEC in 2004 after Myanmar (1997), Nepal (2004), and Bhutan (2004) joined it. **Hence, statement 2 is not correct.**
- The founding principles of BIMSTEC are based on respect for the principles of sovereign equality, territorial integrity, political independence, no interference in internal affairs, peaceful coexistence, and mutual benefit. **Hence, statement 3 is correct.**



- Hence, option (b) is the correct answer.

Q 27.D

- **The administration of the Vijayanagara Empire, spanning the 14th to 17th centuries in South India, was characterized by a centralized system.**
- The king was the ultimate authority in the kingdom. He was also the supreme commander of the army.
- He was assisted by several high-ranking officers. **The chief minister was known as the Mahapradhani. He led several lower-ranking officers, like Dalavay (commander), Vassal (guard of the palace), Rayasam (secretary/accountant), Adaippam (personal attendant), and Kariya-karta (executive agents).**
- **The empire was divided into rajyas or provinces, each governed by a governor known as "Pradhani."**
- The pradhani was either a royal member or a military officer not related to the royal family. **The pradhani had his own revenue accountants and military to assist in his administration.**
- **Within each rajya, there were smaller administrative divisions like nadu, sima, sthala, kampana, etc.** The lowest unit was of course the village.
- **Hence option (d) is the correct answer.**

Q 28.B

- **Smart Dust involves tiny, often millimeter-sized, wireless sensors equipped with various functionalities, including sensing and communication capabilities.**
 - **These miniature devices are designed to be dispersed in the environment, collecting data and communicating with each other or a central system.**
 - The term "dust" reflects the small size and the potential for widespread deployment, resembling the dispersion of dust particles.
- Smart Dust particles are extremely small, typically in the millimeter or even micrometer range. This allows them to be easily dispersed and integrated into various environments.
- Smart Dust devices are equipped with sensors that can capture data related to temperature, humidity, light, sound, motion, and other environmental factors depending on their specific application.
- Smart Dust particles are capable of wireless communication with each other or with a central control system. This communication enables them to share data, coordinate actions, and transmit information to a remote location.
- Due to their small size, Smart Dust devices often rely on energy-efficient technologies and may use energy harvesting methods such as solar power or vibration energy to extend their operational life.
- Smart Dust has various potential applications, including environmental monitoring, industrial sensing, healthcare, military surveillance, and more. For example, in environmental monitoring, Smart Dust particles could be dispersed to collect data on air quality or pollution levels.
- **Hence option (b) is the correct answer.**

Q 29.B

- **In economics, capital inflow is the amount of capital coming into a country, for example in the form of foreign investment.**
- **Surging capital inflows includes a tendency for the domestic currency to gain in value i.e. appreciation of domestic currency.** Capital inflows results in a buildup of foreign exchange reserves and with this, the demand for domestic currency increases. **Hence option 1 is correct.**
- With appreciation of domestic currency, exports become expensive and imports become cheaper. This undermines the competitiveness of export industry. **Hence option 2 is correct.**
- **Capital inflows result in a buildup of foreign exchange reserves.** As these reserves are used to buy domestic currency, the domestic monetary base expands without a corresponding increase in production: **too much money begins to chase too few goods and services. This gives rise to inflation. Hence option 3 is not correct.**

Q 30.A

- **The SWAMITVA scheme was launched on the National Panchayati Raj Day (April 24) in 2020.**
- **The SWAMITVA Scheme is a flagship scheme of the Ministry of Panchayati Raj. Hence statement 1 is correct.**
 - **SVAMITVA (Survey of Villages and Mapping with Improved Technology in Village Areas) scheme is a collaborative effort of the Ministry of Panchayati Raj, State Panchayati Raj Departments, State Revenue Departments and Survey of India.**
 - **Its aim:**

- ✓ to provide an integrated property validation solution for rural India.
- ✓ it is a scheme for mapping the land parcels in rural inhabited areas using drone technology and Continuously Operating Reference Station (CORS). The mapping will be done across the country in a phase-wisemanner over a period of four years - from 2020 to 2024.
- **It aims to provide a record of ownership of residential land to rural households in India.** The scheme aims to provide the 'Record of Rights' to village household owners possessing houses in inhabited areas, free of cost. **Hence statement 2 is not correct.**
- **It empowers rural households by providing them with the necessary documentation to avail of loans and other benefits** from banks and to improve the living conditions of rural households.
- **Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY) scheme aims to provide skill development training to rural youth and make them employable.** The DDU-GKY also provides financial assistance to the trainees to help them cover the cost of living during the training period.

Q 31.A

- An abiotic factor is a non-living part of an ecosystem that shapes its environment. In a terrestrial ecosystem, examples might include temperature, light, and water. In a marine ecosystem, abiotic factors would include salinity and ocean currents. Abiotic and biotic factors work together to create a unique ecosystem.
- A lot of abiotic factors determine the survival of an organism. But one single factor can limit the range of an organism. This single factor is called a limiting factor. For example, seeds do not germinate quickly in evergreen rainforests despite good rains and luxuriant vegetation. This is because the surface soil is heavily leached (nutrients washed away) by running water. Here, the inferior surface soil is the limiting factor that limits the germination of seeds. Likewise, germinated saplings may not survive due to a lack of light because of the dense canopy. Here, the absence of light (shade) is the limiting factor. **Hence option (a) is the correct answer.**

Q 32.B

- **Article 352** of the Constitution details about **National emergency** in India. Such an emergency was declared in India in the **1962 war (China war)**, **1971 war (Pakistan war)**, and **1975 internal disturbance** (declared by Fakhruddin Ali Ahmed). Hence, **statement 1 is not correct.**
- **Article 360** of the Indian Constitution empowers the **President** to invoke a **financial emergency**. The Financial emergency has **never been proclaimed in India** since independence, thanks to various fiscal and monetary policy measures even during the time of distress. **Hence, statement 2 is correct.**
- **Article 356 and Article 365** detail about **State emergencies**. The **President's rule** was first imposed in India in **Punjab on June 20, 1951**. This was done in order to control the intense infighting within the Punjab Congress. The President's rule, which was supposed to be enforced in the rarest of the rare situations, has since been used even for the Central Government to have its way in the states. **Hence, statement 3 is correct.**

Q 33.B

- **The term "discouraged worker" refers to an individual in the labor force who has stopped actively searching for employment due to the belief or perception that there are no suitable job opportunities available.**
 - Discouraged workers are individuals who have become pessimistic about their chances of finding employment, often because they have experienced long periods of unemployment without success.
- Key features about discouraged workers:
 - **Active Job Search:** In the standard definition of unemployment, individuals are considered unemployed if they are actively seeking employment but have not found a job. Discouraged workers, however, have withdrawn from the active job search process.
 - **Perception of Limited Opportunities:** Discouraged workers often feel that the job market is unfavorable, and they may have faced repeated rejections or been unable to secure suitable employment for an extended period. This perception leads them to stop looking for work temporarily.
 - **Exclusion from Unemployment Statistics:** Discouraged workers are typically excluded from the official unemployment rate. The unemployment rate, as reported by statistical agencies, may not capture the full extent of labor market challenges if a significant number of individuals have become discouraged.
 - **Potential Return to the Labor Force:** While discouraged workers are not actively seeking employment at a particular moment, they may re-enter the job market when economic conditions

improve, and they perceive better opportunities. When they resume their job search, they may again be classified as unemployed.

- Understanding discouraged workers provides insights into the nuances of the labor market, beyond just the official unemployment rate. It highlights the impact of perceptions and individual experiences on workforce participation. Policymakers and economists consider the presence of discouraged workers as part of a broader analysis of labor market dynamics and challenges.
- **Hence option (b) is the correct answer.**

Q 34.B

- The world is divided into multiple time zones to account for the variation in solar time as you move east or west across the globe. Each time zone represents a region where the local time is the same. Time zones are typically defined based on lines of longitude, with each zone having a standard time offset from Coordinated Universal Time (UTC).
- List of the countries with more than 1 time zone.
 - **France** (13)
 - Russia (11)
 - **USA** (11)
 - Australia (9)
 - United Kingdom (9)
 - Canada (6)
 - Denmark (5)
 - New Zealand (5)
 - Brazil (4)
 - Mexico (4)
 - Chile (3)
 - Indonesia (3)
 - Kiribati (3)
 - DR Congo (2)
 - Ecuador (2)
 - Kazakhstan (2)
 - Micronesia (2)
 - Mongolia (2)
 - Netherlands (2)
 - Papua New Guinea (2)
 - Portugal (2)
 - South Africa (2)
 - Spain (2)
- **China has only one time zone.**
- **Hence option (b) is the correct answer.**

Q 35.C

- **Recent context:** Marine biologists said that a huge clam that was on the verge of extinction has made a comeback, with a surge in numbers in waters off Croatia.
- Pinna nobilis is a large species of Mediterranean clam, a marine bivalve mollusc in the family Pinnidae.
Hence option (c) is the correct answer.
 - The clams, whose shells can grow as much as 1.2 m across, play an important ecological role by filtering sea water and allowing other organisms to flourish.
 - It attaches itself to rocks using a strong byssus composed of many silk-like threads which used to be made into cloth.
 - The animal secretes these fibres from its byssus gland; they consist of keratin and other proteins and may be as long as 6 cm (2.4 in). The inside of the shell is lined with brilliant mother-of-pearl.
 - As with other members of its genus, Pinna nobilis hosts symbiotic shrimp which live inside its shell.
 - This species is endemic to the Mediterranean Sea and it is relatively fragile to pollution and shell damage.
 - The clam, known as the noble pen shell or pinna nobilis, started dying out as a deadly pathogen spread in parts of the Mediterranean around 2016.
 - Conservation status IUCN: Critically endangered.

Q 36.D

- The **Great Sandy Desert** is an interim Australian bioregion, located in the northeast of Western Australia straddling the Pilbara and southern Kimberley regions and extending east into the Northern Territory.
- The **Mojave Desert** is an arid region of the United States situated in Southern California and extending into parts of Nevada, Arizona, and Utah. It is the smallest, driest and hottest of North America's four major deserts (Mojave, Great Basin, Chihuahuan, and Sonoran). With an area of around 124,000 km², the Mojave Desert is roughly the size of Greece.
- **Rub' Al Khali**, also known as "The Empty Quarter", is part of the Arabian Desert. It is a vast erg (sand sea) that covers an area of around a quarter of a million square miles. Rub' Al Khali covers parts of Saudi Arabia, Oman, the United Arab Emirates, and Yemen.
- The **Taklamakan Desert** is one of the world's largest sandy deserts. It is located in the Xinjiang Uygur Autonomous Region in western China. The desert has an elevation of between 800 and 1500 meters and is mostly surrounded by mountain ranges. To its northeast lies the Gobi Desert.
- Hence option (d) is the correct answer.

Q 37.C

- **Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013:**
 - "Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013 (MS Act, 2013)" manual scavenging is a prohibited activity in the country with effect from 6.12.2013.
 - No person or agency can engage or employ any person for manual scavenging from the above date.
 - Any person or agency who engages any person for manual scavenging in violation of the provisions of the MS Act, 2013 is punishable under Section 8 of the above Act, **with imprisonment up to 2 years or a fine up to Rs. One Lakh or both. Hence statement 1 is correct.**
- **Definition of Manual Scavenger in the Act:**
 - "Manual scavenger" means a person engaged or employed, by an individual or a local authority or an agency or a contractor, for manually cleaning, carrying, disposing of, or otherwise handling in any manner, human excreta in an insanitary latrine or in an open drain or pit into which the human excreta from the insanitary latrines is disposed of, or on a railway track or in such other spaces or premises, as the Central Government or a State Government may notify.
 - As per the Act:
 - ✓ a person engaged or employed to clean excreta with the help of such devices and using such protective gear, as the Central Government may notify on this behalf, shall not be deemed to be a 'manual scavenger'.
 - ✓ It says if a person is employed as a manual scavenger and the employer provides the government-notified equipment and protective gear, such a person is not treated as a Manual Scavenger and the employer is not punishable under the act. **Hence statement 2 is correct.**

Q 38.B

- **Removal of Judges**
 - A judge of a high court can be removed from his office by an order of the President. Hence, statement 1 is correct.
 - The President can issue the removal order only after an address by the Parliament has been presented to him in the same session for such removal. Hence, statement 2 is correct.
 - The address must be supported by a special majority of each House of Parliament (i.e., a majority of the total membership of that House and a majority of not less than two-thirds of the members of that House present and voting). Hence, statement 3 is correct.
 - The grounds for removal are two: proved misbehaviour or incapacity.
 - Thus, a judge of a high court can be removed in the same manner and on the same grounds as a judge of the Supreme Court.
 - The Judges Enquiry Act (1968) regulates the procedure relating to the removal of a judge of a high court by the process of impeachment:
 - ✓ A removal motion signed by 100 members (in the case of Lok Sabha) or 50 members (in the case of Rajya Sabha) is to be given to the Speaker/Chairman.
 - ✓ The Speaker/Chairman may admit the motion or refuse to admit it.
 - ✓ If it is admitted, then the Speaker/Chairman is to constitute a three-member committee to investigate into the charges.
 - ✓ The committee should consist of (a) the chief justice or a judge of the Supreme Court, (b) a chief justice of a high court, and (c) a distinguished jurist.

- ✓ If the committee finds the judge to be guilty of misbehaviour or suffering from an incapacity, the House can take up the consideration of the motion.
- ✓ After the motion is passed by each House of Parliament by a special majority, an address is presented to the president for removal of the judge.
- ✓ Finally, the president passes an order removing the judge.
- ✓ From the above, it is clear that the procedure for the impeachment of a judge of a high court is the same as that for a judge of the Supreme Court.
- ✓ It is interesting to know that no judge of a high court has been impeached so far.

Q 39.B

- **Niche:**
 - An organism's ecological niche consists of its **interactions with its community and the environmental conditions needed for it to stay alive**. An organism's role in its community can be as a predator, a prey, or even a scavenger. Each organism has a role in its environment, and **therefore each organism has an ecological niche**.
 - **Interactions:** It involves all the organism's relationships with **both living (biotic) and non-living (abiotic) components of its environment**. This includes interactions with food sources, predators, competitors, and even seemingly inert factors like temperature and light. **Hence statement 1 is not correct.**
- **Niche Specialization and Competition**
 - **Specialization:**
 - ✓ Different organisms occupy different niches, often with varying degrees of specialization. **The ecological niche is smaller at the lower level of the trophic level. For example, bees only collect honey from flowers. The ecological niche is large at the upper level of the trophic level. Hence statement 2 is correct. For example:**
 - **Lower trophic levels:** Bees, despite occupying a lower level as herbivores, have a relatively narrow niche focused on collecting nectar and pollen from specific flower types. This niche specialization is driven by their unique body adaptations and foraging behavior.
 - **Higher trophic levels:** Lions, apex predators at the top of the food chain, have a broader niche, consuming various herbivores like deer and zebras. However, even within this seemingly broad niche, lions might specialize in hunting specific prey depending on their location and prey availability.
 - **Competition:**
 - ✓ When two species share the same niche, intense competition arises, often leading to one species outcompeting the other and ultimately excluding it from that niche.
 - **Uniqueness:**
 - ✓ Each living species holds a unique ecological niche, a testament to the remarkable diversity of life and its adaptations.
- **The Complexities of the Niche**
 - **The flow of energy:** Niches play a crucial role in the flow of energy through the food chain, as organisms consume others and pass on energy to higher levels.
 - **Niche replacement:**
 - ✓ **If a niche becomes vacant due to extinction or migration, another species with similar capabilities may take its place**, ensuring the continued functioning of the ecosystem. Once a niche is left vacant, other organisms can fill that position.
 - ✓ **For example**, when the Tarpan, a small wild horse found mainly in southern Russia, became extinct in the early 1900s, its niche was filled by a small horse breed, the Konik (Figure below). Often this occurs as a new species evolves to occupy the **vacant niche. Hence statement 3 is correct.**
 - **Adaptation and resilience:**
 - ✓ Organisms often adapt their niches to survive, expanding their range or developing specialized roles to avoid competition. This adaptability is essential for long-term survival in a changing environment.
 - **Fundamental vs. realized niche:**
 - ✓ The "fundamental niche" represents an organism's potential niche, encompassing all resources it could utilize. However, "limiting factors" like competition or predators restrict the organism's actual niche, the "realized niche," to a smaller subset of resources it can successfully access.

Q 40.B

- **Business Reform Action Plan (BRAP)** is an initiative by the Department for Promotion of Industry and Internal Trade (DPIIT) under the Ministry of Commerce and Industry.
- BRAP is a comprehensive package of reforms aimed at improving the ease of doing business in India.
- The BRAP is **based on the World Bank's Ease of Doing Business report**, which ranks countries according to their ease of doing business. It aims to improve India's ranking in the Doing Business report by implementing reforms that will make it easier for businesses to start and operate in India.
- **Hence option (b) is the correct answer.**

Q 41.D

- The Constitution makes a provision for the establishment of a **Joint State Public Service Commission (JSPSC)** for two or more states. The **chairman and members of a JSPSC are appointed by the president**. They hold office for a term of six years or until they attain the age of 62 years, whichever is earlier.
- The **Finance Commission** consists of a chairman and four other members to be **appointed by the president**. They hold office for such a period as specified by the president in his order. They are eligible for reappointment.
- The **National Human Rights Commission** is a multi-member body consisting of a chairperson and five members. The **chairperson and members are appointed by the president** on the recommendations of a six-member committee consisting of the prime minister as its head, the Speaker of the Lok Sabha, the Deputy Chairman of the Rajya Sabha, leaders of the Opposition in both the Houses of Parliament and the Central home minister. Further, a sitting judge of the Supreme Court or a sitting chief justice of a high court can be appointed only after consultation with the chief justice of India.
- The **Central Vigilance Commission** is a multi-member body consisting of a Central Vigilance Commissioner (chairperson) and not more than two Vigilance commissioners. They are **appointed by the president by warrant under his hand and seal** on the recommendation of a three-member committee consisting of the prime minister as its head, the Union minister of home affairs and the Leader of the Opposition in the Lok Sabha.
- Article 350-B contains the following provisions:
 - There should be a **Special Officer for Linguistic Minorities. He is to be appointed by the President of India.**
 - It would be the duty of the Special Officer to investigate all matters relating to the safeguards provided for linguistic minorities under the Constitution.
- **Hence option (d) is the correct answer.**

Q 42.C

- **All three sensors—accelerometer, gyroscope, and barometer—are commonly used in fitness trackers for various functionalities.**
- **Accelerometer:** This sensor is used to measure acceleration, enabling the detection of movement and changes in velocity. In fitness trackers, accelerometers are commonly employed to track activities like walking, running, and cycling, providing data on steps taken, distance covered, and overall motion.
- **Gyroscope:** Gyroscopes measure angular velocity, allowing the detection of orientation changes and rotational movements. In fitness trackers, gyroscopes can be used to enhance the accuracy of activity tracking by detecting specific movements and gestures, such as the rotation of the wrist during exercises.
- **Barometer:** While not as common as accelerometers and gyroscopes, barometers are also used in some fitness trackers. Barometers measure atmospheric pressure, and changes in pressure can indicate changes in altitude. This feature is often utilized to estimate elevation changes during activities like climbing stairs or hiking.
- **Hence option (c) is the correct answer.**

Q 43.D

- India follows the First-past-the-post system of elections for the parliamentary, assembly, and panchayat elections. This method is also called the Plurality System. This is the method of election prescribed by our Constitution. The salient features of the system are as given below:
- The entire country is divided into small geographical units called constituencies. Each constituency elects one representative. Voters vote for a single candidate and not for a party. **Hence, options (a) and (b) are correct.**

- The candidate who secures the highest number of votes in that constituency is declared elected. It is important to note that in this system whoever has more votes than all other candidates, is declared elected. The winning candidate need not secure a majority of the votes. **Hence, statement (c) is correct.**
- **A party may get more seats than votes in the legislature in the FPTP system. In the proportional representation system, Every party gets seats in the legislature in proportion to the percentage of votes that it gets. Hence, statement (d) is not correct.**

Q 44.C

- **Indian Councils Act of 1909 or Morley- Minto Reforms:**
 - The elective principle was recognized for the non-official membership of the councils in India. Indians were allowed to participate in the election of various legislative councils, though based on class and community. For the first time, **separate electorates for Muslims for election to the central council were established.**
 - The number of elected members in the Imperial Legislative Council and the Provincial Legislative Councils was increased. In the provincial councils, a **non-official majority was introduced** but maintained an official majority in the Central Legislative Council. **Hence statement 1 is correct.**
 - **Reservation of Seats:**
 - ✓ According to Sumit Sarkar, in the Imperial Legislative Council, of the total 69 members, 37 were to be the officials and of the 32 non-officials, 5 were to be nominated.
 - ✓ Of the 27 elected non-officials, **8 seats were reserved for the Muslims under separate electorates** (only Muslims could vote here for the Muslim candidates), **while 4 seats were reserved for the British capitalists, 2 for the landlords,** and 13 seats came under the general electorate. **Hence statement 3 is correct**
 - **The elected members were to be indirectly elected.** The local bodies were to elect an electoral college, which in turn would elect members of provincial legislatures, who, in turn, would elect members of the central legislature.
 - **Besides separate electorates for the Muslims, representation in excess of the strength of their population was accorded to the Muslims. Also, the income qualification for Muslim voters was kept lower than that for Hindus. Hence statement 2 is correct.**
 - Powers of legislatures—both at the center and in provinces—were enlarged and the legislatures could now pass resolutions (which may or may not be accepted), ask questions and supplementary, and vote separate items in the budget, though the budget as a whole could not be voted upon.
 - **One Indian was to be appointed to the viceroy's executive council (Satyendra Sinha was the first Indian to be appointed in 1909).**

Q 45.A

- A Special Economic Zone (SEZ) is a geographically demarcated area that has its own economic regulations that are more liberal than a country's typical economic laws. The goal of an SEZ is to attract foreign investment and promote exports.
- **The Special Economic Zones (SEZ) Act, of 2005 is a statutory legislation that provides the legal framework for the establishment and operation of SEZ in India. Hence statement 1 is correct.**
- The Act also sets out the requirements for establishing and operating an SEZ, including the types of activities that can be carried out in an SEZ, the incentives and benefits that are available to SEZ units, and the procedures for setting up and operating an SEZ.
- **The SEZs in India are deemed to be foreign territory for trade operations. This means that goods imported into an SEZ do not require an import license. However, goods imported into an SEZ must be for export or for use in the SEZ. Hence statement 2 is not correct.**
- **Domestic sales made by SEZ in India are subject to full customs duty because they are considered to be exports.** This is because goods produced in an SEZ are not subject to the same import duties and taxes as goods produced in the rest of India. This policy is designed to ensure that SEZs do not become a way for businesses to avoid paying import duties and taxes. It also helps to protect domestic businesses from unfair competition. **Hence statement 3 is not correct.**

Q 46.B

- The capital account, on a national level, represents the balance of payments for a country. The capital account keeps track of the net change in a nation's assets and liabilities during a year.
- Under the Capital Account of India, both equity and debt flows are covered. Equity flows comprise Foreign Direct Investment (FDI) Portfolio Investment.

- Foreign Direct Investment (FDI) is the investment through equity instruments by a person resident outside India
 - in an unlisted Indian company; Foreign Investment in an unlisted company irrespective of threshold limit may be treated as FDI. Hence option 4 is correct.
 - in 10 percent or more of the post-issue paid-up equity capital on a fully diluted basis of a listed Indian company.
- Foreign portfolio investment of 10 percent or more through eligible instruments made in an Indian-listed company would be treated as FDI. Hence option 3 is correct.
- Non-convertible/ optionally convertible/ partially convertible debentures, funds for which have been received shall be treated as debt (not investment) and shall conform to External Commercial Borrowing (ECB) guidelines framed under Foreign Exchange Management (Borrowing and Lending in Foreign Exchange) Regulations, 2018, as amended from time to time. Hence option 2 is not correct.
- Deposits in both the NRI accounts- NRO (Non-Resident Ordinary Rupee Account) and Foreign Currency Non-Resident Bank Account [FCNR(B)] are parts of India's external debt. Hence option 1 is not correct.
- Hence option (b) is the correct answer.

Q 47.C

- The Speaker is elected by the Lok Sabha from amongst its members (as soon as may be, after its first sitting).
- Whenever the office of the Speaker falls vacant, the Lok Sabha elects another member to fill the vacancy. The date of election of the Speaker is fixed by the President.
- It should be noted here that, whenever the Lok Sabha is dissolved, the Speaker does not vacate his office and continues till the newly-elected Lok Sabha meets. Hence, statement 1 is correct.
- He appoints the chairman of all the parliamentary committees of the Lok Sabha and supervises their functioning. Hence, statement 2 is correct.
- He is the chairman of the Business Advisory Committee, the Rules Committee, and the General Purpose Committee.
- He is given a very high position in the order of precedence. He is placed at seventh rank, along with the Chief Justice of India.
- This means he has a higher rank than all cabinet ministers, except the Prime Minister or Deputy Prime Minister. Hence, statement 3 is correct.

Q 48.A

- **Seven Summits: The highest mountains on each continent**
 - A sporting challenge is to climb the highest mountains on each continent. However, there is a problem in defining the limits.
 - The following list goes back to the American Dick Bass. Also known, however, is a slightly different list of the Seven Summits by the Italian Reinhold Messner, who considers Mont Blanc (4,810 m) to be the highest European mountain and Puncak Jaya in Indonesia (4,884 m) to be the highest Australian mountain.

Continent	Peak	Height	Mountain range	Countries
Africa	Kibo	5,895 m	Kilimanjaro	Tanzania
Asia	Mount Everest	8,848 m	Himalayas	Nepal, China
Antarctica	Mount Vinson	4,892 m	Sentinel Range	-
Australia	Mount Kosciuszko	2,228 m	Great Dividing Range	Australia
Europe	Elbrus	5,642 m	Caucasus Mountains	Russia
North America	Denali	6,190 m	Alaska Range	United States (Alaska)
South America	Aconcagua	6,962 m	Andes	Argentina

- Hence option (a) is the correct answer.

Q 49.D

- **Project TAMARA**
 - Development and Commercialization of Intelligent Water Body Management System (IWMS)- TAMARA.
 - It is a smart aeration system enhanced with sensors and IoT-based technology to manage water quality. Hence option (d) is the correct answer.
 - This modern approach not only improves existing methods of treating water and wastewater but also ensures that water bodies and aquaculture ponds stay clean and healthy for everyone.

Q 50.B

- In the year 2018-19, the Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying launched the Fisheries and Aquaculture Infrastructure Development Fund (FIDF) with a total fund size of Rs 7522.48 crore with the aim to achieve a sustainable growth of 8-9 percent, in a move to augment the country's fish production to the level of about 20 million tonnes by 2022-23. FIDF operates in all the states and Union Territories. **Hence, statements 1 and 2 are correct.**
- The objectives of FIDF include:
 - Creation and modernization of capture & culture fisheries infrastructure
 - Creation of Marine Aquaculture Infrastructure
 - Creation and modernization of Inland Fisheries Infrastructure
 - Reduce post-harvest losses and improve domestic marketing facilities through infrastructure support
 - To bridge the resource gap and facilitate the completion of ongoing infrastructure projects.
- **The modes of financial assistance are loans up to 80% of the estimated/actual project cost and Up to 3% per annum of interest subvention. The Nodal implementing agency is the National Fisheries Development Board (NFDB), Hyderabad. NABARD acts as a Nodal loaning entity for State/union territory projects. Hence, statement 3 is not correct.**

Q 51.A

- **Doctrine of Pith and Substance:**
 - The Constitution of India has divided the extent of legislative powers between the Centre and states by way of the Seventh Schedule. This schedule consists of, Union, State, and Concurrent Lists of the Indian Constitution.
 - **This doctrine has become the basis of many Supreme Court judgments to determine the scope of legislative powers between the Union and the States.**
 - Every time the question of overlapping or encroachment arises the doctrine of Pith and substance gives clarity to the subject matter and in which list it belongs.
 - **This doctrine is observed to provide ease to the otherwise rigid federal structure which distributes the powers between Central and state governments. Hence statement 1 is correct.**
- **Meaning of the Doctrine**
 - **Pith denotes the true nature or essence of something and Substance means the most important or essential part of something.**
 - The definition of this doctrine states, that within their respective spheres, the state and the union legislatures are made supreme, they should not encroach upon the sphere demarcated for the other. **Hence statement 2 is not correct. (The doctrine of colorable legislation implies what cannot be done directly should not be done indirectly.)**
 - This doctrine says that when there is a question of determining whether a particular law relates to a particular subject the court looks to the substance of the matter.
 - If the substance of the matter lies within one of the 3 lists, then the incidental encroachment by law on other lists does not make it invalid because they are said to be intra vires.
- **Features of Doctrine**
 - This doctrine comes into application **when the subject matter between 2 lists seems to be conflicting.**
 - The doctrine pulls out the true nature and character of the matter to bifurcate it into its appropriate list.
 - It is applied when legislation made by of the legislatures is challenged or trespassed by other legislatures.
- **Landmark Judgment**
 - **State of Bombay Vs. F.N. Balsara** was a case in which the Bombay Prohibition Act was challenged on the grounds that the prohibition of liquor on the borders was a matter of the Central Government. The act was held valid by the court because it was in its pith and substance and fell under the State List though it was impacting the import of liquor.

Q 52.A

- **Lala Lajpat Rai** was one of the greatest freedom fighters of India who believed in **extremist** ideology. He was popularly known as '**Punjab Kesari**', i.e., the **Lion of Punjab**, due to Ferozepur, Punjab being his birthplace and his personality being as fierce as that of a lion. **Hence, statement 1 is correct.**
- He was a firm believer in **Hinduism**, so in support of his belief, he **joined the Lahore Arya Samaj** as well as the **Hindu Mahasabha**. **Hence, statement 2 is correct.**
- He had joined the **Indian National Congress (INC)** and participated in many political agitations in Punjab. Because of his activities, he was **deported to Burma** in 1907.

- In **1921**, he founded the **Servants of the People Society** in **Lahore** to **enlist and train national missionaries** for the service of the motherland. It is their duty to work for the educational, cultural, social, economic, and political advancement of the country under the supervision of society. **Hence, statement 3 is correct.**
- He **supported the non-cooperation movement of Gandhi** at the Nagpur session of the Congress in **1920** and also actively **protested against the Rowlatt Act and the Jallianwala Bagh massacre** that followed. But the **cause of his death** was the police violence during the **Anti-Simon Commission Protest in 1928**. He was brutally lathi-charged by Superintendent of Police, **James Scott** and within a few weeks, succumbed to his injuries. **Hence, statement 4 is not correct.**

Q 53.D

- **Fundamental Rights available to both citizens and foreigners (except enemy aliens):**
 - **Equality before the law and equal protection of laws (Article 14).** Hence, option 2 is correct.
 - Protection in respect of conviction for offences (Article 20).
 - **Protection of life and personal liberty (Article 21).** Hence, option 1 is correct.
 - Right to elementary education (Article 21A).
 - **Protection against arrest and detention in certain cases (Article 22).** Hence, option 4 is correct.
 - Prohibition of traffic in human beings and forced labor (Article 23).
 - Prohibition of employment of children in factories etc., (Article 24).
 - Freedom of conscience and free profession, practice, and propagation of religion (Article 25).
 - **Freedom to manage religious affairs (Article 26).** Hence, option 3 is correct.
 - Freedom from payment of taxes for the promotion of any religion (Article 27).
 - Freedom from attending religious instruction or worship in certain educational institutions (Article 28)

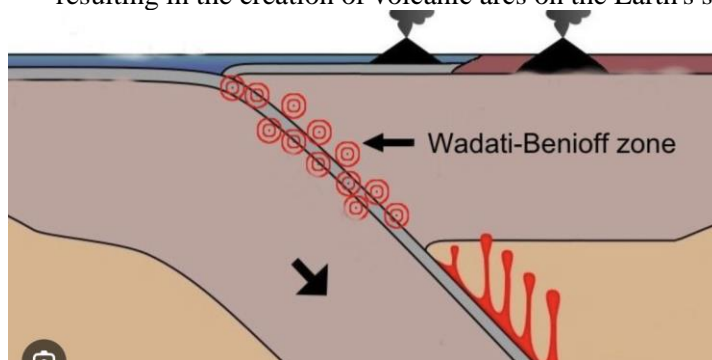
Q 54.A

- **The Constitution of India specifies some of the privileges. These are**
 - freedom of speech in Parliament;
 - **immunity to a member from any proceedings in any court in respect of anything said or any vote given by him in Parliament or any committee thereof;**
 - immunity to a person from proceedings in any court in respect of the publication by or under the authority of either House of Parliament of any report, paper, votes or proceedings.
 - Courts are prohibited from inquiring into the validity of any proceedings in Parliament on the ground of an alleged irregularity of procedure.
 - No officer or Member of Parliament empowered to regulate procedure or the conduct of business or to maintain order in Parliament can be subject to a court's jurisdiction in respect of exercise by him of those powers.
 - No person can be liable to any civil or criminal proceedings in any court for publication in a newspaper of a substantially true report of any proceedings of either House of Parliament unless the publication is proved to have been made with malice.
- **Statutory provision**
 - Apart from the privileges as specified in the Constitution, **the Code of Civil Procedure, 1908, provides for freedom from arrest and detention of members under civil process during the continuance of the meeting of the House** or of a committee thereof and forty days before its commencement and forty days after its conclusion.
- **Privileges based on Rules of Procedure and precedents:**
 - The Chairman has a right to receive immediate information of the arrest, detention, conviction, imprisonment and release of a member on a criminal charge or for a criminal offence.
 - **Members or officers of the House cannot be compelled to give evidence or to produce documents in courts of law, relating to the proceedings of the House without the permission of the House.**
 - Members or officers of the House cannot be compelled to attend as witnesses before the other House or a House of a State Legislature or a committee thereof without the permission of the House and without the consent of the member whose attendance is required.

Q 55.C

- **The Wadati-Benioff Zone, also known as the Benioff Zone or simply the subduction zone,** is a crucial concept in the field of plate tectonics and seismology. It is primarily associated with the following key characteristics:

- The Wadati-Benioff Zone represents the region within the Earth where one tectonic plate is subducting (descending) beneath another tectonic plate. **This process occurs at convergent plate boundaries where two plates are moving towards each other. Hence statement 1 is correct.**
- One of the most significant features of the Wadati-Benioff Zone is its association with seismic activity. As the subducting plate sinks into the Earth's mantle, it generates intense pressure and stress within the rocks.
 - This stress is released in the form of earthquakes along an inclined plane that extends into the mantle.
 - These earthquakes are typically deep-focus earthquakes, meaning they originate at significant depths within the Earth, often ranging from 100 to over 700 kilometers (62 to 435 miles) below the Earth's surface.
- **The Wadati-Benioff Zone is directly linked to the formation of deep-sea trenches.** As the oceanic plate is subducted, it descends into the mantle, creating a trench on the ocean floor. Deep-sea trenches are typically located adjacent to subduction zones. **Hence statement 2 is correct.**
- In addition to earthquakes and deep-sea trenches, volcanic activity is often associated with the Wadati-Benioff Zone. As the subducting plate sinks into the mantle, it can melt, leading to the formation of magma.
 - This magma, which is less dense than the surrounding rock, rises through the overlying plate, resulting in the creation of volcanic arcs on the Earth's surface.



- **Hence option (c) is the correct answer.**

Q 56.B

- House Sparrow is a kind of **bird** which is **found throughout the country**. It is widespread across the world, inhabiting every continent except Antarctica, China, and Japan. It is native to Eurasia and North Africa.
- Scientific Name- *Passer domesticus*
- Its IUCN Conservation Status is "**Least Concern**" (and not **Vulnerable**). **Hence, statement 2 is not correct.**
- It is the **State bird of Bihar and Delhi**. **Hence, statement 1 is correct.**
- It is known to stay **close to human habitations** and is therefore among the most commonly found bird species in urban cities. In fact, its presence suggests a healthy urban ecosystem. This is why it is called an **indicator species**. **Hence, statement 3 is correct.**

Q 57.D

- The Union Territory was formed in 1956 and it was named Lakshadweep in 1973.
- "Lakshadweep, **the group of 36 islands** is known for its exotic and sun-kissed beaches and lush green landscape. The name Lakshadweep in Malayalam and Sanskrit means 'a hundred thousand islands'."
- India's smallest Union Territory Lakshadweep is an archipelago consisting of 36 islands with an area of 32 sq km.
- **It is a uni-district Union Territory and comprises of 12 atolls, three reefs, five submerged banks and ten inhabited islands. Hence, statement 1 is correct.**
- The islands have a total area of 32 sq km. The capital is Kavaratti and it is also the principal town of the UT.
- **All Islands are 220 to 440 km away from the coastal city of Kochi in Kerala, in the emerald Arabian Sea. Hence, statement 2 is correct.**
- The natural landscapes, the sandy beaches, abundance of flora and fauna and the absence of a rushed lifestyle enhance the mystique of Lakshadweep.
- **Only BSNL and Airtel provide telecommunication services to Lakshadweep Islands. Hence, statement 3 is correct.**

- BSNL provides connectivity in all 10 inhabited islands where as Airtel provides connectivity to the Kavaratti and Agatti islands.
- **Entry to Lakshadweep islands is restricted. One requires an entry permit issued by the Lakshadweep Administration to visit these islands. Hence, statement 4 is correct.**
- **Therefore, option (d) is correct.**

Q 58.A

- **A group of civil society organizations, Solidarity for African Women's Rights Coalition; Human rights organization Equality Now and advocacy platform Make Every Woman Count released the landmark report, 20 Years of the Maputo Protocol: Where are we now?**
- In July 2003, the African Union (AU) adopted the Maputo Protocol. It remains one of the most important, comprehensive and progressive legal frameworks for women's rights the world has ever seen. Twenty years later, it remains a crucial instrument in safeguarding the fundamental human rights of women and girls across Africa.
- **Of the 55 member states, 44 have ratified or acceded to the Protocol on gender equality, becoming one of the most ratified instruments in the AU. Hence, option (a) is the correct answer.**

Q 59.C

- Landing on the moon has been a difficult feat, but it has been accomplished by both manned and unmanned spacecraft. **The very first nation to reach the surface of the moon was the USSR (now Russia), whose unmanned spacecraft Luna 2 impacted the moon's surface on 12 September 1959.**
- **Countries That Have Successfully Landed on the Moon:**
 - **Russia** The first country to successfully land on the moon (1959), soft-land on the moon (1966), and successfully retrieve samples from the moon on an unmanned mission (1970).
 - **United States** First soft-landed a few months after Russia in 1966. As of 2022, has 11 soft landings (most in the world) and is the only country to land humans on the moon (six times/12 people in all, 1969-1972).
 - **China** China's Chang'e 3 lander touched down on 14 Dec. 2013, marking the first moon landing since the USSR's Luna 24 in 1976. Chang'e 4 completed the first soft landing on the dark side of the moon on 3 Jan. 2019.
 - **India** Designed to impact rather than soft-land, India's probe Chandrayaan-1 reached the lunar surface on 22 Oct. 2008, making India the seventh country to successfully impact the moon. On August 23, 2023, the Chandrayaan-3 orbiter successfully deployed its Vikram lander and its cargo, the Pragyan rover, which touched down near the moon's South Pole. India thus became the fourth country to successfully soft-land on the moon.
 - **Japan** landed its Smart Lander for Investigating the Moon, or SLIM, craft on the surface of the Moon on Jan. 20, 2024. It's Japan's first lunar landing – making it only the fifth country in the world to successfully land on the Moon.
- **Hence option (c) is the correct answer.**

Q 60.C

- Plant growth and geographic distribution (where the plant can grow) are greatly affected by the environment. If any environmental factor is less than ideal, it limits a plant's growth and/or distribution. For example, only plants adapted to limited amounts of water can live in deserts.
- **Effect of Abiotic Components on Terrestrial Autotrophs:**
 - **Light:**
 - ✓ Extremely high-intensity favours root growth more than shoot growth, resulting in increased transpiration, short stem, and smaller, thicker leaves. On the other hand, low-intensity light retards growth, flowering, and fruiting.
 - ✓ Reductions in light intensity could affect carbon balance of plant because the carbohydrate demand increases while its production decreases: rates of physiological processes rise while the photosynthetic yield reduces. When the light intensity is less than the minimum, the plants cease to grow due to the accumulation of CO₂. **Hence statement 1 is correct.**
 - ✓ Of the visible part of the spectrum, only red and blue are effective in photosynthesis. Plants grown in blue light are small; red light results in the elongation of cells (etiolated plants). Plants grown in ultraviolet light are dwarf.
 - **Frost:**
 - ✓ Frost results in freezing the soil moisture. The plants are killed due to increased transpiration when their roots cannot supply moisture. Water in the intercellular spaces of the plant gets frozen

into ice. This results in an increased concentration of salts and dehydration of cells. **Hence statement 2 is correct.**

- ✓ Also, frost leads to canker formation (various plant diseases with similar symptoms are caused by different fungi, bacteria, and viruses).
- Temperature:
 - ✓ High-temperature results in the death of plants due to coagulation of protoplasmic proteins (some bacteria can survive high temperatures because of their protoplasmic proteins that do not coagulate at normally high temperatures). **Hence statement 3 is correct.**
 - ✓ High temperature disturbs the balance between respiration and photosynthesis. It also results in the desiccation of plant tissues and depletion of moisture.

Q 61.B

- **Zones of the Marine Realm:**
 - **Imagine the ocean as a layer cake, with distinct ecological zones stacked upon each other.**
 - ✓ **Epipelagic zone:** The sunlit surface layer, teeming with phytoplankton and zooplankton, forms the base of the marine food web.
 - ✓ **Mesopelagic zone:** The dimly lit twilight zone, inhabited by diverse fish and invertebrates, including bioluminescent creatures.
 - ✓ **Bathypelagic zone:** The deep, dark zone frequented by filter feeders and scavengers, relying on nutrients sinking from above.
 - ✓ **Benthic zone:** The ocean floor, encompassing sediments and the creatures that call it home.
- **Key features of the Benthic zone:**
 - The benthic zone, though often unseen and seemingly barren, plays a vital role in the marine ecosystem:
 - ✓ **Nutrient Cycling:**
 - Organic matter, like dead organisms and fallen plankton, rains down from above, reaching the benthic realm. Here, an army of decomposers, including bacteria, worms, and crustaceans, break it down.
 - **This decomposition releases vital nutrients like nitrogen and phosphorus back into the water column,** fueling the growth of phytoplankton in the epipelagic zone, and restarting the cycle. **Hence statement 2 is correct.**
 - ✓ **Primary Production in the Benthos:**
 - While the benthic zone contributes to primary production through seagrasses, macroalgae, and chemosynthesis, it's not the major source in most marine ecosystems. **Phytoplankton in the sunlit epipelagic zone dominates primary production, capturing light energy to fuel the base of the food web. Hence statement 1 is not correct.**
 - **While not the main source of primary production in the ocean,** the benthic zone also harbors some unique producers. Marine plants like seagrasses and macroalgae, rooted in the sediment, contribute to primary production in shallow coastal areas.
 - Additionally, **chemosynthetic bacteria** thrive near hydrothermal vents and cold seeps, utilizing the energy from chemicals like hydrogen sulfide to produce organic matter.
 - ✓ **Biodiversity Hotspot:**
 - The benthic zone boasts an incredible diversity of life forms, from microscopic organisms to giant tubeworms and bottom-dwelling fish.
 - These creatures have adapted to the unique conditions on the seafloor, forming complex food webs and playing various ecological roles, including predation, filtering, and burrowing.
 - ✓ **Water Quality Guardian:**
 - Benthic organisms like mussels and clams act as natural filters, removing suspended particles and pollutants from the water.
 - They are also sensitive to changes in water quality, serving as indicators of environmental health.

Q 62.B

- **Lidar, which stands for Light Detection and Ranging, is a remote sensing technology that uses laser light to measure distances and create detailed, three-dimensional maps of the environment. Lidar systems are commonly used in a variety of applications across different industries.**
- Lidar systems emit laser pulses, often in the form of laser beams or laser scanning, toward the target area.
- Lidar calculates distances by measuring the time it takes for the emitted laser pulses to travel to the target and back. This is known as time-of-flight measurement.

- Lidar produces high-resolution, detailed maps of the surveyed area, providing precise information about the location and elevation of objects.
- Lidar plays a crucial role in the navigation and obstacle detection systems of autonomous vehicles, such as self-driving cars and drones, providing real-time 3D mapping of the surroundings.
- **LiDAR technology can be used to profile clouds by measuring the time it takes for laser pulses to travel to the cloud and back. This information helps in studying cloud properties and structure.**
- **LiDAR can measure the velocity of a target by utilizing the Doppler effect. The frequency shift in the reflected laser light provides information about the velocity of the target.**
- **LiDAR signals can be affected by interference from other sources, such as ambient light or other LiDAR systems operating in the vicinity. Signal interference can impact the accuracy of LiDAR measurements.**
- **Hence option (b) is the correct answer.**

Q 63.C

- **Moderate Phase(1885-1905)**
 - For a period the congress had support from British administrators and between 1885-1905, its leaders were known as moderates.
 - These **moderates believed in the fairness of the British and their justice methods** and used peaceful methods to make their demand. **Hence statement 1 is correct.**
 - **Their demands included expanding legislative councils**, providing more opportunities for Indians in civil services, granting more power to local bodies, **reducing land revenues**, and protecting peasants from unjust landlords. **Hence statement 3 is correct.**
- **Methods used by Moderates:**
 - They used petitions, resolutions, meetings, pamphlets, and memoranda to present their demands.
 - **They confined their political activities to the educated classes only. Hence statement 2 is correct.**
 - The aim was to attain political rights and self-government stage by stage.

Q 64.B

- **Indian forests produce about 5,000 species of wood, of which about 450 are commercially valuable. Both hard and soft woods are obtained from Indian forests. Hardwoods include important species such as Teak, Mahogany, Logwood, Iron-wood, Ebony, Sal, Greenheart, Kikar, Semal, etc. These woods are used for furniture, wagons, tools, etc.**
- **Softwoods include Deodar, Poplar, Pine, Fir, Cedar, Balsam, etc. They are light, strong, fairly durable and easy to work and as such are very useful for construction timbers. They also provide useful raw materials for making paper pulp. Hence, option (b) is the correct answer.**
- It is interesting to note that 70 percent of hardwood is burnt as fuel and only 30 percent is used in industries while 70 percent of softwood is used in industries and only 30 percent is burnt as fuel.

Q 65.B

- The Government of India Act, of 1919 had a provision that a commission would be appointed ten years from the date to study the progress of the governance scheme and suggest new steps. An all-white, seven-member Indian Statutory Commission, popularly known as the Simon Commission (after the name of its chairman, Sir John Simon), was set up by the British government under Stanley Baldwin's prime ministership on November 8, 1927.
- **Although constitutional reforms were due only in 1929, the Conservative government, then in power in Britain, feared defeat by the Labour Party. Thus it was established during the Conservative party rule in Britain. Hence, statement 1 is not correct.**
- The Indian response to the Simon Commission was immediate and nearly unanimous. What angered the Indians most was the exclusion of Indians from the commission and the basic notion behind the exclusion that foreigners would discuss and decide upon India's fitness for self-government.
- **The Congress session in Madras (December 1927) meeting under the presidency of M.A. Ansari decided to boycott the commission "at every stage and in every form". The liberals of the Hindu Maha Sabha and the majority faction of the Muslim League under Jinnah decided to support the Congress call of the boycott. Hence, statements 2 and 3 are correct.**

Q 66.B

- **Cooperatives:**
 - Cooperatives are organizations formed at the grassroots level by people to harness the power of collective bargaining in the marketplace.
 - This can mean different kinds of arrangements, such as using a common resource or sharing capital, to derive a common gain that would otherwise be difficult for an individual producer to get.
 - In agriculture, cooperative dairies, sugar mills, spinning mills, etc. are formed with the pooled resources of farmers who wish to process their produce.
- **Cooperatives are a state subject:**
 - Cooperatives are a **state subject under the Constitution**, meaning they come under the state government's jurisdiction. **Hence statement 1 is not correct.**
 - However, there are many societies whose members and areas of operation are spread across more than one state. For example, most sugar mills along the districts on the Karnataka-Maharashtra border procure cane from both states.
- **Multi-State Co-operative Societies:**
 - **The Multi-State Co-operative Societies Act (MSCS) of 2002** — was enacted by the central government for the management of the Cooperatives with more than one state of operation. **Hence statement 2 is correct.**
 - Their board of directors has representation from all states they operate in.
 - Administrative and financial control of these societies is with the **central registrar**, with the law making it clear that no state government official can wield any control over them.
- **Recent Developments**
 - Cooperation was a division of the Ministry of Agriculture at the time. However, the government established a separate Ministry of Cooperation in July 2021.
 - By way of the 97th Constitutional Amendment Act of 2011, Section IXB was added to the Constitution. It is now necessary to revise the Act in light of the addition of Part IXB.
 - The constitutional domain of States in **regulating cooperative societies** was **upheld by the Supreme Court** last year when it struck down a part of the 97th Constitution Amendment. The court held that the Centre required the ratification of the Amendment by 50% of the state legislatures as it sought to give a framework for State legislation on cooperative societies.
 - Supreme Court upheld only the part of the amendment that related to MSCSs, for which **Parliament was competent to enact laws.**

Q 67.A

- The Pallava dynasty, reigning over South India from the 3rd to the 9th century CE, played a crucial role in advancing the field of temple architecture. Notably, rulers such as Mahendravarman I, Narasimhavarman I (Mamalla), and Rajasimha (Narasimhavarman II) earned recognition for their support of the arts and the creation of intricate temples. Here's a brief overview of the temples associated with the Pallava dynasty:
 - **Introduction of Rock-Cut Architecture:** The Pallavas were pioneers in the use of rock-cut architecture for temple construction. Mamallapuram (also known as Mahabalipuram) stands as a remarkable example, showcasing monolithic rock-cut structures like the famous **Rathas (chariot-shaped temples) and the Shore Temple**. These structures are UNESCO World Heritage Sites and exemplify the early experimentation with rock-cut temple architecture.
 - **Kailasanatha Temple:** The Kailasanatha Temple at Kanchipuram, **built by Rajasimha (Narasimhavarman II)**, is a classic example of Pallava architecture. Constructed in the 8th century, it is dedicated to Lord Shiva. The temple follows the traditional Dravidian style with a pyramidal tower (shikhara) above the main sanctum and features intricate carvings depicting various Hindu deities.
 - **Varaha Cave Temple:** Another significant example of Pallava architecture in Mamallapuram is the Varaha Cave Temple. Carved out of a single rock, this cave temple is known for its stunning bas-relief sculptures, including a large carving of Lord Vishnu in his Varaha (boar) incarnation.
 - **Mahabalipuram Shore Temple:** The **Shore Temple at Mamallapuram is one of the oldest structural stone temples in South India**. Constructed during the reign of Narasimhavarman II, it is dedicated to Lord Shiva. The temple complex includes two shrines, a pyramidal tower, and a captivating coastal location.
 - **Rajasimha's Mamandur Rock-Cut Temple:** Rajasimha's influence extended beyond Mamallapuram. He also commissioned the construction of a rock-cut temple at Mamandur, displaying intricate carvings and reliefs.

- **Development of Mandapa Architecture:** Pallava temples often featured mandapas (pillared halls) with intricately carved pillars. These halls served as spaces for congregational gatherings and cultural events, showcasing the Pallavas' commitment to art and culture.
- **Symbolic Depictions:** Pallava temples often featured intricate carvings and sculptures depicting scenes from Hindu mythology. The Pallava rulers used temple architecture as a means to convey political power and religious devotion, showcasing their connection with divine authority. The Pallava dynasty's architectural legacy significantly influenced the subsequent development of Dravidian temple architecture in South India. Their innovative use of rock-cut structures and intricate carvings left an indelible mark on the cultural and artistic heritage of the region.
- **Pattadakal temple:** Pattadakal, a UNESCO World Heritage site in Karnataka, India, is renowned for its group of exquisite temples. Dating back to the 7th and 8th centuries, these temples showcase a harmonious blend of Northern and Southern Indian architectural styles. **The Virupaksha Temple, one of the main attractions, stands as a masterpiece with intricately carved panels illustrating Hindu mythology. Pattadakal is a testimony to the rich cultural and artistic legacy of the Chalukya dynasty,** leaving visitors captivated by its architectural grandeur and historical significance.
- **Airavatesvara Temple:** The Airavatesvara Temple, located in Darasuram, Tamil Nadu, is a UNESCO World Heritage Site known for its stunning Chola architecture. Built in the 12th century by Rajaraja Chola II, the temple is dedicated to Lord Shiva. Its intricate carvings, delicate sculptures, and well-preserved structures, including the unique stone chariot, make the Airavatesvara Temple a captivating representation of the Chola dynasty's artistic prowess and devotion to religion.
- **Hence option (a) is the correct answer.**

Q 68.C

- Neolithic sites in ancient human history are **characterized by the transition from a nomadic lifestyle based on hunting and gathering to a settled or sedentary lifestyle associated with agriculture.** The Neolithic period, also known as the New Stone Age, witnessed a significant shift in human societies.
- **The use of iron tools and weapons became more prominent in subsequent periods, particularly during the Iron Age, which followed the Neolithic period.** In the Neolithic era, stone tools were more prevalent. **Hence option (a) is not correct.**
- **The Paleolithic era was characterized by a nomadic lifestyle and dependence on hunting and gathering for sustenance. The Neolithic era represents a shift towards settled communities and the domestication of plants and animals. Hence option (b) is not correct.**
- Neolithic communities started practicing agriculture, leading to a more settled way of life. The domestication of plants and animals marked a significant advancement, allowing communities to establish permanent settlements.
- **Monumental architecture and city planning became more pronounced in later periods, particularly during the rise of urban civilizations.** The Neolithic period, while witnessing the development of settled communities, did not typically exhibit large-scale city planning or monumental architecture. **Hence option (d) is not correct.**
- Hence, the characteristic feature of Neolithic sites is the shift to a sedentary lifestyle, marked by the practice of agriculture, which laid the foundation for the development of more complex societies in subsequent periods.
- **Hence option (c) is the correct answer.**

Q 69.D

- Card tokenisation is the process of replacing a cardholder's actual card details with a unique token, which is a digital representation of the card. This token is then used to process transactions, rather than the cardholder's actual card details.
- Card tokenisation is voluntary under the RBI card tokenisation policy guidelines. This means that merchants and card issuers are not required to implement card tokenisation, but they may choose to do so if they wish. **Hence statement 1 is not correct.**
- Under the RBI's card tokenization policy, a customer can request for tokenization of their card on any number of devices. This is because the token is linked to the customer's card, not to the device. This means that a customer can use the same token to make payments on any device that he has authorized. **Hence statement 2 is not correct.**
- Card issuers have the right to refuse to tokenise a particular card based on their risk perception. If a card issuer refuses to tokenise a card, the cardholder will still be able to use their card for online transactions. However, they will need to enter their card details each time they make a purchase. **Hence statement 3 is not correct.**

Q 70.C

- The **Green Revolution** was an endeavour initiated by **Norman Borlaug** in the 1960s in order to **increase the amount of crop production per unit area**.
- In India, the Green Revolution was led by **Mr. M.S. Swaminathan**, which helped India go from a food-scarce to a food-sufficient nation.
- The Green Revolution made use of **High Yielding Variety (HYV) seeds**. These seeds need **excessive water** as compared to traditional seeds. Hence, to fulfill this water requirement, the Indian farmers tapped into the **groundwater** resources. Because of this, the **water table depleted pretty quickly**. Hence, **statement 1 is correct**.
- These HYV seeds also required the use of **chemical fertilizers** for their proper growth. The **excessive and improper** use of chemical fertilizers causes them to **dissolve in the water**. When this **run-off** water from the fields enters water bodies, it causes a spike in the nutrient content. This results in **algal blooms** and, hence, causes **eutrophication**. Hence, **statement 2 is correct**.
- The use of **excessive water** for irrigation in the field has caused **soil salination**. Further, **chemical fertilizers, pesticides, etc.** have caused **soil pollution**. Hence, **statement 3 is correct**.
- Due to the **green revolution** in India, **crop intensity has increased (not decreased)**, wherein the number of times a crop is planted per year in a given agricultural area has increased. The **present cropping intensity of 155%** has registered an increase of about 44% since independence. Hence, **statement 4 is not correct**.

Q 71.A

- **State of World Population Report - United Nations Population Fund (UNFPA):**
 - **The United Nations Population Fund (UNFPA)** is a UN agency dedicated to addressing issues related to population and reproductive health. It works to ensure that every pregnancy is wanted, every childbirth is safe, and every young person's potential is fulfilled.
 - **The "State of World Population Report" is an annual publication by UNFPA that provides data and insights on global population trends, reproductive health, and gender-related issues.** It focuses on critical aspects of global demographics and human development. Hence **pair 1 is correctly matched**.
- The "International Migration Outlook" is an annual publication by the **Organisation for Economic Co-operation and Development (OECD)**, not IOM. Hence **pair 2 is not correctly matched**.
 - **It provides data and analysis on international migration trends, policy developments, and their socioeconomic impacts in OECD countries**(Concerned about OECD members). This report is a valuable resource for understanding global migration patterns and their effects on host countries.
 - The Organisation for Economic Co-operation and Development (OECD) is an international organization focused on economic development and cooperation among its member countries. India is not a member of the OECD.
- **The Global Gender Gap Report is produced by the World Economic Forum (WEF).** Hence **pair 3 is not correctly matched**.
 - This annual report assesses gender disparities in various aspects, including economic participation and opportunities, educational attainment, health, and political empowerment. It aims to shed light on gender inequality and track progress in closing gender gaps.
- **International Organization for Migration (IOM):**
 - The International Organization for Migration (IOM) is part of the United Nations System as the leading inter-governmental organization promoting since 1951, humane and orderly migration for the benefit of all, with 175 member states and a presence in over 100 countries. **It publishes the World Migration Report.**
 - **World Migration Report:**
 - ✓ The flagship publication series of the International Organization for Migration, and it presents data and information on human migration together with analysis of complex and emerging migration issues. Released biennially, the World Migration Report 2022 is the eleventh edition in the series.

Q 72.C

- In his **inaugural address to G20 leaders**, the Prime Minister, quoted the verse, "The welfare and happiness of humanity should always be ensured," adding that India gave this message to the world 2,000 years ago.

- The original quote reads, "**Hevam lokasa hita-sukhe ti, ath iyam naatisu hevam.**" The quote is a part of the **sixth edict**, inscribed on the **Topra Ashokan Pillar**, erected above the palace building at **Feroz Shah Kotla in Delhi**.
- **Sixth Major Rock Edict describes the welfare measures** and the King's desire to get informed about the conditions of the people constantly.
- **Hence, option (c) is the correct answer.**

Q 73.B

- The term "**Minority**" is not defined in the **Indian Constitution**. However, the **Constitution recognizes religious and linguistic minorities**. The Central Government has notified six religious minority communities viz. Muslim, Christian, Sikh, Buddhist, Parsi and Jain. **Hence statement 1 is correct.**
- In 2006, the **93rd Constitution Amendment Act inserted Clause (5) in Article 15** which enabled the State to create special provisions, such as reservations for the advancement of any backward classes of citizens like Scheduled Castes and Scheduled Tribes, in all aided or unaided educational institutes, **except minority educational institutes. Hence statement 2 is not correct.**
- The **National Commission for Minority Educational Institutions (NCMEI) Act** has been enacted to safeguard the educational rights of the minorities enshrined in Article 30(1) of the Constitution. The **Commission is a quasi-judicial body** and has been endowed with the powers of a Civil Court to discharge its functions under the Act.
- **The powers of the Commission** include deciding all questions relating to the status of any institution as a Minority Educational Institution (MEI). It also serves as an **appellate authority** in respect of disputes of Minority Status/ No Objection Certificate (NOC). The Commission has the power to **cancel the minority status of an educational institution granted by an Authority or Commission, on grounds laid down in the Act. Hence statement 3 is correct.**
- **No court (except the Supreme Court and a High Court** exercising jurisdiction under articles 226 and 227 of the Constitution) shall entertain any suit, application or other proceedings in respect of any order made by the Commission. **Hence statement 4 is not correct.**

Q 74.C

- **Hoysala temple architecture**
 - Hoysala temple architecture, a **distinctive style (Vesara style)** that emerged during the rule of the Hoysala dynasty in Southern India from the 11th to the 14th centuries, is celebrated for its intricate details, ornate carvings, and unique structural elements.
 - The Hoysalas, who were prolific builders and patrons of the arts, left an indelible mark on the Deccan region, particularly in present-day Karnataka
 - The Hoysalas primarily used soapstone (chloritic schist) as their primary building material. This soft stone allowed for intricate carving and detailing
- **General features of Hoysala Temple architecture:**
 - **Multiple shrines:** Hoysala temples are known for their complexity and multiple shrines, often housed within a single, larger structure. They typically have a central sanctum dedicated to the main deity, surrounded by smaller shrines for subsidiary deities and guardian figures. This arrangement reflects the Hoysalas' tolerance for different sects and their emphasis on a diverse spiritual experience.
 - **Star-shaped base:** While not all Hoysala temples have a star-shaped base, it is a distinctive and recurring feature in many prominent examples. This unique architectural element adds visual complexity and symbolism, often representing the cosmos or the sacred mandala. **Hence option 2 is correct.**
 - **Intricate carvings:** Hoysala temples are renowned for their exquisite and intricate carvings. Walls, pillars, ceilings, and even doorways are adorned with detailed sculptures depicting religious scenes, mythological figures, floral motifs, and geometric patterns. This elaborate artistic expression reflects the Hoysalas' mastery of stonework and their dedication to creating visually stunning temples. **Hence option 3 is correct.**
 - **Salabhanjika:** It is the peculiar feature of Hoysala sculpture. The origin of this mythical woman figure traces back its origin from the Buddhist sculpture. Salabhanjika or madanika is a mythical woman figure with stylized feminine characters who stands near a tree or grasping a branch of a tree. Sometimes, they are portrayed engaging in artistic activities like music, dance, etc. These sculpted figures are seen in each four brackets that are placed on the top of the pillars of Hoysala temples. Besides this, each side of the makartorana is heavily sculpted with figures of Salabhanjika. **Hence option 1 is correct.**

- **Makartorana:** It leads to the mantapa of the temples. It is made with sculpted images of Makara in lintel form overhead to the temple.
- **Mantapa:** Hoysala temples have features of both open (outer mantapa) and closed mantapa (inner mantapa). The ceilings of the mantapa are highly ornate bearing mythological figures and floral design.

Q 75.B

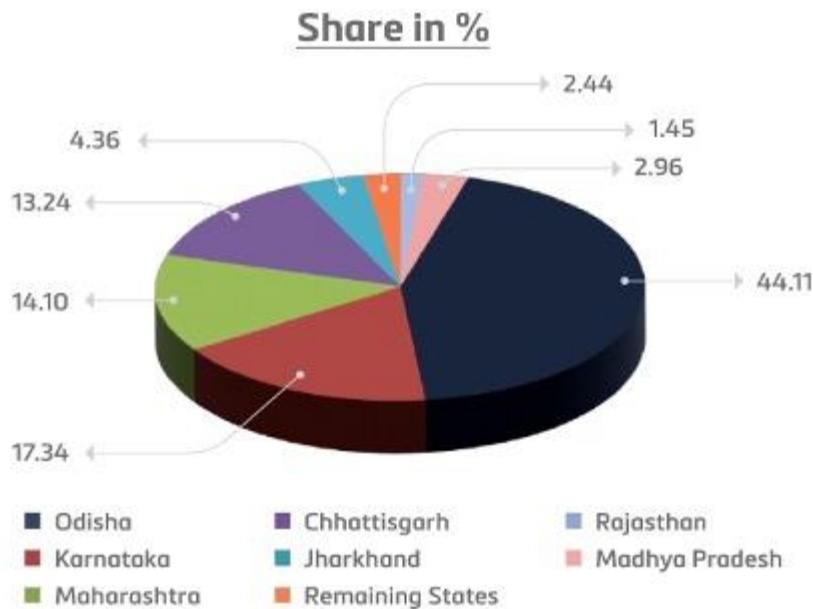
- **The Open Network for Digital Commerce (ONDC) is an open-source platform that will enable the seamless exchange of goods and services across multiple online and offline channels.**
 - It is designed to promote competition and innovation in the Indian e-commerce market and to make it easier for businesses of all sizes to participate in the digital economy.
 - It will enable local commerce across segments, such as mobility, grocery, food order and delivery, hotel booking and travel, among others, to be discovered and engaged by any network-enabled application.
- ONDC is an **initiative of the Department of Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce. Hence statement 1 is correct.**
- **It will enable transactions of any denomination,** thus making ONDC a truly 'open network for democratic commerce'. **Hence statement 2 is correct.**
- It is a pan-India, open, non-discriminatory, and secure framework for all entities involved in **the exchange of goods and services through electronic means. Hence statement 3 is not correct.**
- It is neither an aggregator application nor a hosting platform, and **all existing digital commerce applications and platforms can voluntarily choose to adopt and be a part of the ONDC network. Hence statement 4 is not correct.**
 - It will play a key role in developing the quality standards and certification framework for products and services sold on the ONDC platform. The QCI will also provide training and capacity-building support to businesses on how to comply with the quality standards and certification requirements.
- It comprises of buyer-side apps where consumers can place orders, seller-side apps that onboard merchants and display their listings, and logistics platforms that handle deliveries.

Q 76.A

- The Production Linked Incentive (PLI) Scheme for Large Scale Electronics Manufacturing was launched to boost domestic manufacturing of electronics products and components, and make India a global hub for electronics manufacturing.
- **The PLI Scheme is being implemented by the Ministry of Electronics and Information Technology (MeitY). Hence statement 1 is correct.**
- It is open to companies of all sizes, both Indian and foreign.
- The component scheme offers incentives to companies that invest in and manufacture components for electronic devices in India.
- **Eligibility under PLI Scheme shall not affect eligibility under any other scheme. Hence statement 2 is not correct.**
- **The scheme provides incentives to manufacturers on the basis of incremental sales. Hence statement 3 is not correct.**
- This means that manufacturers will only receive incentives for the sales that they make over and above their normal sales. The scheme provides incentive of 4% to 6% on incremental sales (over base year) of goods manufactured in India for a period of five (5) years subsequent to the base year.

Q 77.C

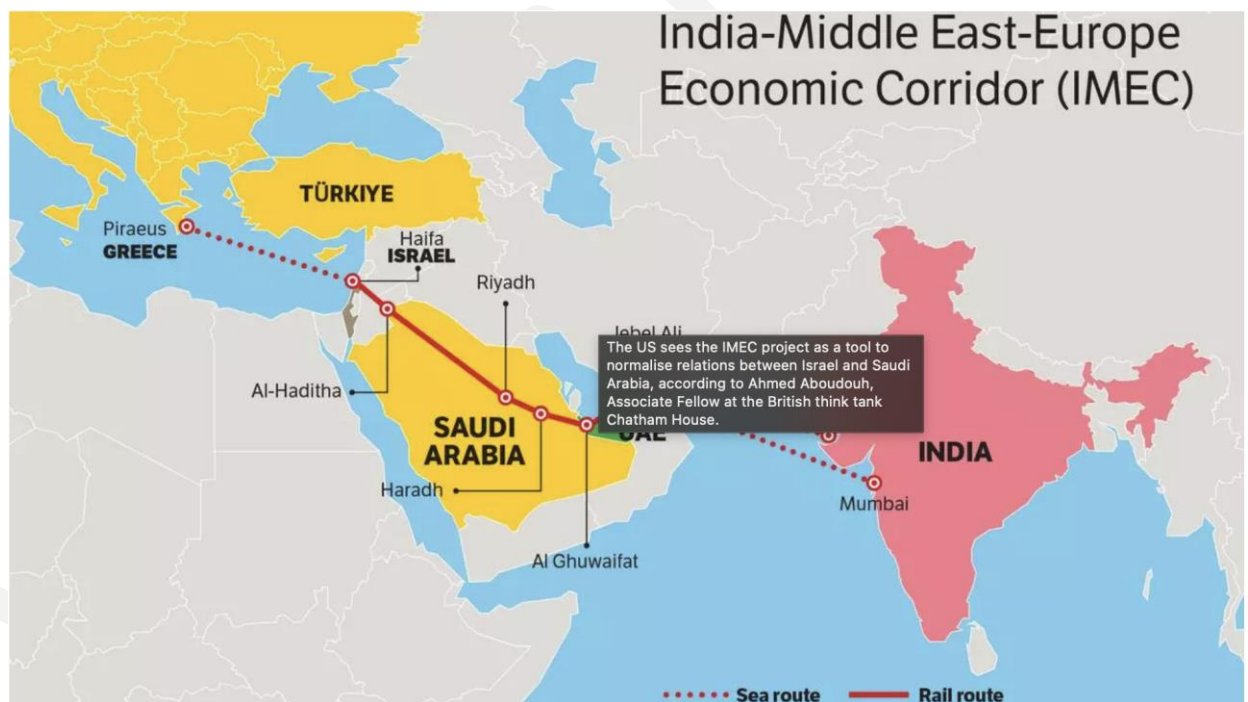
- **During the year 2021-22, mineral production was reported from 19 States of which the bulk of value of mineral production of about 97.04% was confined to 7 States only. Hence, statement 1 is correct.**
- **The order was Odisha with a share of 44.11% followed by Chhattisgarh (17.34%), Rajasthan (14.10%), Karnataka (13.24%), Jharkhand (4.36%), Madhya Pradesh (2.44%), and Maharashtra (1.45%) in the total value of mineral production. Hence, statement 2 is correct.**
- The remaining 12 States have a cumulative share of less than 3% of total value during the 2021-22. The contribution of States/Regions in the value of mineral production during 2021-22 is pictorially shown in Table:



- Therefore, option (c) is the correct answer.

Q 78.B

- During the G20 summit in New Delhi in September, world leaders unveiled plans for an India-Middle East-Europe Economic Corridor (IMEC). **Saudi Arabia, the European Union, India, the United Arab Emirates (UAE), France, Germany, Italy, and the United States** all signed a Memorandum of Understanding, committing to work together to advance the project.



- The project's physical infrastructure includes railway lines connecting the UAE to Israel via Saudi Arabia and Jordan, as well as electric cables to enhance digital connectivity and pipes for clean hydrogen export.
- The United States is pushing for IMEC as a counter to the Chinese Belt Road Initiative (BRI). However, China already has considerable influence along the proposed route of IMEC. An important link in IMEC is the Greek port of Piraeus—the largest port in Eastern Europe—which will receive cargo coming from the Haifa port in Israel.
- IMEC offers a plethora of potential economic benefits both regionally and internationally, especially by cutting costs and increasing the speed of cargo shipment. However, to achieve such goals, potential political challenges to the project have to be addressed. China has already expanded its influence in the region, and it is not clear that the United States will be able to counter it.
- Hence option (b) is the correct answer.

Q 79.C

- Artificial intelligence (AI) is a wide-ranging branch of computer science concerned with building smart machines capable of performing tasks that typically require human intelligence. While AI is an interdisciplinary science with multiple approaches, advancements in machine learning and deep learning, in particular, are creating a paradigm shift in virtually every sector of the tech industry.
- The term artificial intelligence was coined in 1956, but AI has become more popular today thanks to increased data volumes, advanced algorithms, and improvements in computing power and storage.
- **Some of the concepts in Artificial intelligence technology are:**
 - **Algorithm:** A set of rules or instructions that tell a machine what to do with the data input into the system.
 - **Deep Learning:** A method of machine learning that lets computers learn in a way that mimics a human brain, by analyzing lots of information and classifying that information. Deep learning relies on a neural network. Hence, pair 1 is correctly matched.
 - **Hallucination:** A situation where an AI system produces fabricated, nonsensical, or inaccurate information. The wrong information is presented with confidence, which can make it difficult for the human user to know whether the answer is reliable.
 - **Large Language Model (LLM):** A computer program that has been trained on massive amounts of text data such as books, articles, website content, etc. **An LLM is designed to understand and generate human-like text based on the patterns and information it has learned from its training.** LLMs use natural language processing (NLP) techniques to learn to recognize patterns and identify relationships between words. Understanding those relationships helps LLMs generate responses that sound human—it's the type of model that powers AI chatbots such as ChatGPT. **Hence, pair 3 is correctly matched.**
 - **Machine Learning (ML):** A type of artificial intelligence that uses algorithms that allow machines to learn and adapt from evidence (often historical data), without being explicitly programmed to learn that particular thing.
 - **Natural Language Processing (NLP):** The ability of machines to use algorithms to analyze large quantities of text, allowing the machines to simulate human conversation and to understand and work with human language. Hence, pair 2 is correctly matched.
 - **Neural Network:** A deep learning technique that loosely mimics the structure of a human brain. Just as the brain has interconnected neurons, a neural network has tiny interconnected nodes that work together to process information. Neural networks improve with feedback and training.
 - **Token:** The building block of text that a chatbot uses to process and generate a response. For example, the sentence "How are you today?" might be separated into the following tokens: ("How," "are," "you," "today," "?"). Tokenization helps the chatbot understand the structure and meaning of the input.

Q 80.A

- The Delhi Sultanate, established in 1206, was a series of Muslim dynasties ruling from Delhi between the 13th and 16th centuries. Beginning with the **Slave Dynasty**, it included the **Khilji, Tughlaq, and Sayyid dynasties**. The period saw a cultural synthesis, reflected in art and architecture, such as the Qutub Minar. Internal conflicts, invasions, and the rise of regional powers led to the Sultanate's decline, ultimately replaced by the Mughal Empire in 1526.
- **Various sources for the Study of Delhi Sultanate**
 - **Al-Beruni: Tarikh-Al-Hind** (Indian Philosophy and Religion written in Arabic). **Hence pair 2 is correctly matched.**
 - **Minhaj us Siraj: Tabaqat-i-Nasiri** (1260) (World Islamic History written in Arabic). **Hence pair 3 is not correctly matched.**
 - **Ziauddin Barani: Tarikh-i-Firoz Shahi** (1357) History of Delhi Sultanate up to Firuz Zughlaq. **Hence pair 1 is not correctly matched.**
 - **Amir Khusrau: Mifta Ul Futuh** (Victories of Jalal-ud-din Khalji); **Khazain Ul Futuh** (Victories of Allauddin Khalji - Texts in Persian).
 - **Tughlaq Nama** (History of Tughlaq dynasty in Persian).
 - **Shams-i-Siraj Afif: Tarikh i Firuz Shahi** (after Barani's account of Delhi Sultanate in Persian).
 - **Ghulam Yahya Bin Ahmad: Tarikh-I Mubarak Shahi** (Written in Persian during the reign of Sayyid ruler Mubarak Shah)
 - **Ferishta: History of the Muslim Rule in India** (Persian)
- **Hence option (a) is the correct answer.**

Q 81.D

- **The polar vortex is a large-scale, upper-level low-pressure system** characterized by strong winds circulating near the Earth's poles, both in the Arctic and Antarctic regions. It is a natural and persistent atmospheric phenomenon that plays a crucial role in controlling the distribution and movement of cold air masses.
 - **The Polar Vortex is not a high-pressure system; it is a large area of low-pressure and cold air that surrounds both of Earth's poles. It is a persistent, upper-level low-pressure area.**
 - The Polar Vortex does not disappear by summer. While it weakens and becomes less prominent during the summer months, it does not completely disappear. It undergoes seasonal variations and becomes more defined during the winter.
 - ✓ **Hence statement 1 is not correct.**
 - **It always exists near the poles but weakens in summer and strengthens in winter. Thus it only weakens but doesn't disappear in summer.**
 - ✓ **Hence statement 2 is not correct.**
- The term "vortex" refers to the counter-clockwise flow of air that helps keep the colder air near the Poles. Many times during winter in the northern hemisphere, the polar vortex will expand, sending cold air southward with the jet stream. This occurs fairly regularly during wintertime and is often associated with large outbreaks of Arctic air in the United States.
- There are several things the polar vortex is NOT. Polar vortices are not something new. The term "polar vortex" has only recently been popularized, bringing attention to a weather feature that has always been present. It is also not a feature that exists at the Earth's surface. Weather forecasters examine the polar vortex by looking at conditions tens of thousands of feet up in the atmosphere

Q 82.B

- **The primary cause of the mirage phenomenon in deserts is the total internal reflection of light. This occurs due to temperature gradients in the air, especially when the air near the ground is much hotter than the air above.**
- **Total internal reflection is a phenomenon that occurs at the boundary between two mediums, such that if the incident angle in the first medium is greater than the critical angle, then all the light is reflected back into that medium.**
- In desert environments, the ground can become extremely hot, especially during the day. This intense heating causes the air near the ground to become much hotter than the air at higher altitudes.
- The temperature difference between the hot air near the ground and the cooler air above creates a gradient in the air's refractive index. The refractive index of air changes with temperature; as air temperature increases, its refractive index decreases.
- When light passes through air layers with different refractive indices, it bends. The bending of light is more pronounced when there is a steep temperature gradient, creating a bending or refracting effect.
- Thus, a ray of light successively bends away from the normal and undergoes total internal reflection, if the angle of incidence for the air near the ground exceeds the critical angle. To a distant observer, the light appears to be coming from somewhere below the ground. The observer naturally assumes that light is being reflected from the ground, say, by a pool of water near the tall object. Such inverted images of distant tall objects cause an optical illusion to the observer. This phenomenon is called mirage. This type of mirage is especially common in hot deserts.
- **Diffraction of light** is a phenomenon that occurs when light encounters an obstacle or aperture and bends around it, spreading out in different directions. This phenomenon is a characteristic behavior of waves, including light waves, and it can be observed when light encounters small openings, edges, or obstacles in its path.
- **Dispersion of light** is a phenomenon where different wavelengths of light are separated or spread out, typically when light passes through a medium with varying refractive indices for different colors. The most common example of dispersion is the formation of a spectrum when white light passes through a prism.
- **Hence option (b) is the correct answer.**

Q 83.A

- The Preamble to the Indian Constitution is based on the 'Objectives Resolution', drafted and moved by Pandit Nehru on 13th December 1946, **and adopted by the Constituent Assembly on January 22, 1947.**

- The Preamble reveals four ingredients or components:
 - Source of authority of the Constitution: The Preamble states that the Constitution derives its authority from the people of India.
 - Nature of Indian State: It declares India to be of a sovereign, socialist, secular democratic, and republican polity.
 - Objectives of the Constitution: It specifies justice, liberty, equality, and fraternity as the objectives.
 - Date of adoption of the Constitution: It stipulates November 26, 1949 as the date.
- The Preamble of the Constitution has been **amended only once so far**- 42nd Constitutional Amendment, 1976. The amendment added three new words—Socialist, Secular, and Integrity—to the Preamble. **Hence statement 1 is correct and statement 2 is not correct.**

Q 84.A

- **The Sea of Okhotsk** is a marginal sea of the western Pacific Ocean. It is located between Russia's Kamchatka Peninsula on the east, the Kuril Islands on the southeast, Japan's island of Hokkaido on the south, the island of Sakhalin along the west, and a stretch of eastern Siberian coast along the west and north.
- **The Sea of Japan** is the marginal sea between the Japanese archipelago, Sakhalin, the Korean Peninsula, and the mainland of the Russian Far East. The Japanese archipelago separates the sea from the Pacific Ocean.
- **The Arafura Sea** lies west of the Pacific Ocean, overlying the continental shelf between Australia and Western New Guinea, which is the Indonesian part of the Island of New Guinea.
- **The Weddell Sea** is part of the Southern Ocean and contains the Weddell Gyre. Its land boundaries are defined by the bay formed from the coasts of Coats Land and the Antarctic Peninsula. The easternmost point is Cape Norvegia at Princess Martha Coast, Queen Maud Land.



- Hence option (a) is the correct answer.

Q 85.A

- **What are geoglyphs?**
 - **Geoglyphs are a form of prehistoric rock art, created on the surface of laterite plateaus (Sada in Marathi).** They are made by removing a part of the rock surface through an incision, picking, carving, or abrading. They can be in the form of rock paintings, etchings, cup marks, and ring marks. **Hence statement 1 is correct.**
 - The UNESCO listing mentions “Konkan geoglyphs.” **However, elsewhere, the term petroglyph (literally, “rock symbol/character”) is also used.** As per the UNESCO listing, petroglyphs and geoglyphs share similarities as both require the skills of removing parts or engraving a symbol on the rock surface



- **What is the significance of Ratnagiri's prehistoric rock art?**
 - Clusters of geoglyphs are spread across the Konkan coastline in Maharashtra and Goa, spanning around 900 km. Porous laterite rock, which lends itself to such carving, is found on a large scale across the entire region.
 - Ratnagiri district has more than 1,500 pieces of such art, also called "Katal Shilpa," spread across 70 sites.
 - **UNESCO's tentative world heritage list mentions seven sites with petroglyphs in Ratnagiri district** — Ukshi, Jambharun, Kasheli, Rundhe Tali, Devihsol, Barsu and Devache Gothane, one in Sindhudurg district –Kudopi village, and nine sites at Phansamal in Goa. **Hence statement 2 is not correct.**

Q 86.A

- The **Gross Domestic Product (GDP) Deflator** is an economics indicator that measures the average changes in prices of all goods and services produced within an economy.
- GDP Deflator **compares the nominal GDP** (which is calculated using current prices) **with the real GDP** (which is calculated using constant prices from a base year) to gauge the overall price level changes within the economy.
- **The Consumer Price Index (CPI) in India measures the average change in prices of a fixed basket of goods and services consumed by households over time.** It measures the Inflation rate in India and is commonly used by policymakers, economists, and market analysts to monitor price changes and evaluate the effectiveness of Monetary policy.
- Although at first glance it may seem that CPI and GDP Deflator measure the same thing, there are a few **key differences**.
 - The first is that GDP Deflator includes only domestic goods and not anything that is imported. This is different because the CPI includes anything bought by consumers including foreign goods. **Hence statement 1 is correct.**
 - The second difference is that the GDP Deflator is computed using a basket of goods which can change over time, but CPI considers a fixed basket of goods. **Hence statement 2 is not correct.**

Q 87.A

- **Recent Context:** The paintbrush swift butterfly has been photographed and documented for the first time in Himachal Pradesh's Chamba district. **Hence statement 2 is not correct.**
 - The State is home to 25% of the butterfly species found in India; 120 species of butterflies have been documented by the Wild Bhattiyat Project initiated by the State Forest Department in 2022.
- **Paintbrush Swift Butterfly:**
 - It is a butterfly species of the Hesperidae family.
 - The species has never been photographed in Himachal Pradesh since its discovery in 1878.
 - This is the first time that we have photographed and documented it.
 - It was first described by lepidopterist Frederic Moore more than 145 years ago.
 - It is identified based on two separated spots in the upper forewing cell.
 - The species' larvae feed on bamboo and some other grass species.
 - Habitat: Its habitat is distributed in northeast, central and south India, and rare in Uttarakhand. **Hence statement 1 is not correct.**
 - Conservation status: This species is legally protected in India under Schedule IV of the Wildlife (Protection) Act, 1972. **Hence statement 3 is correct.**
- In April, 2023, a **butterfly subspecies (Caltoris bromus sadasiva)** from the fringes of Akkulam and Vembanad lakes in Kerala has been discovered.

- It belongs to the skipper butterfly family of Lepidoptera (moths and butterflies).
- It is the first documented subspecies of the **Bromus swift** (Caltoris bromus) butterfly in the Western Ghats and Peninsular India.

Q 88.D

- **To absorb extra liquidity from banks by means of interest payments, the Standing Deposit Facility is a collateral-free liquidity absorption mechanism implemented by the RBI. Hence statement 1 is not correct.**
- This concept, first proposed in the Urjit Patel committee report in 2014, could soon become part of the central bank's liquidity management toolkit.
- **It is the floor of the LAF (Liquidity Adjustment Facility) corridor, replacing the previously fixed rate reverse repo;** it is a monetary policy instrument to absorb liquidity without any collateral. SDF rate is higher, at 3.75%, versus Reverse Repo rate, which is at 3.35%, providing banks a greater incentive to use the SDF window to park their excess money.
 - The LAF corridor represents the gap between the repo and reverse repo rates.
- The central bank employs reverse repo rate and SDF to remove excess liquidity from the system. In contrast to SDF, reverse repo operations require the RBI to deposit collateral in the form of government assets in order to borrow money from commercial banks.
- **Under the current liquidity system, the Reserve Bank has discretion over liquidity absorption through reverse repos, open market operations, and the cash reserve ratio. SDF, on the other hand, will allow banks to store surplus liquidity with the Reserve Bank at their discretion. Hence Statement 2 is not correct.**
- Deposits under the SDF will **not be included as balances eligible for the cash reserve ratio (CRR)** under the RBI Act of 1934, **but will be counted as an eligible asset for the statutory liquidity ratio (SLR)** under the Banking Regulation Act of 1949. **Hence statement 3 is not correct.**

Q 89.A

- **Vehicle-to-Everything (V2X) communication refers to the communication between a vehicle and various entities in its environment. This communication can take several forms, including Vehicle-to-Vehicle (V2V), Vehicle-to-Infrastructure (V2I), Vehicle-to-Pedestrian (V2P), and more.**
- In V2V communication, vehicles exchange information with each other. This can include data about the vehicle's speed, direction, location, and other relevant parameters. V2V communication is crucial for enabling cooperative systems that can enhance safety, such as collision avoidance and cooperative adaptive cruise control.
- V2I communication involves the exchange of information between vehicles and roadside infrastructure. This can include traffic signals, road signs, and other elements of the transportation infrastructure. V2I communication enables vehicles to receive real-time information about traffic conditions, road hazards, and other relevant data.
- V2P communication allows vehicles to communicate with pedestrians or their mobile devices. This can be used to alert pedestrians of an approaching vehicle, especially in situations where the pedestrian might not be visible to the driver.
- V2N communication involves vehicles interacting with a broader network. This can include accessing cloud-based services, receiving over-the-air updates, and contributing to the overall traffic management system.
- The ultimate goal of V2X communication is to create a connected and cooperative transportation environment, where vehicles and infrastructure work together to enhance safety, efficiency, and overall mobility on the road.
- **Hence option (a) is the correct answer.**

Q 90.B

- **A Non-Banking Financial Company (NBFC) is a company registered under the Companies Act, 1956 engaged in the business of loans and advances, acquisition of shares/stocks/bonds/debentures/securities issued by Government or local authority or other marketable securities of a like nature, leasing, hire-purchase, insurance business, chit business but does not include any institution whose principal business is that of agriculture activity, industrial activity, purchase or sale of any goods (other than securities) or providing any services and sale/purchase/construction of immovable property. Hence statement 1 is correct.**

- NBFCs lend and make investments and hence their activities are akin to that of banks; however there are a few differences as given below:
 - NBFC cannot accept demand deposits;
 - **NBFCs do not form part of the payment and settlement system and cannot issue cheques drawn on itself;**
 - deposit insurance facility of Deposit Insurance and Credit Guarantee Corporation is not available to depositors of NBFCs, unlike in case of banks. **Hence statement 2 is correct.**
 - **NBFCs whose asset size is of ₹ 500 cr or more as per last audited balance sheet are considered as systemically important NBFCs.** The rationale for such classification is that the activities of such NBFCs will have a bearing on the financial stability of the overall economy. **Hence statement 3 is not correct.**

Q 91.C

- **Estivation/Aestivation is a biological phenomenon whereby the animal enters a long period of dormancy, or inactivity, in response to high temperature or maybe even drought-like conditions.**
- It is a survival strategy that helps the animal conserve energy and water in a difficult time. **Hence statement 1 is correct.**
 - For example, the West African lungfish burrows into the mud of a drying water body and secretes a cocoon of mucus around itself during a drought. Desert tortoises dig burrows and retreat into them in hot summer months. Many land snails seal themselves in their shells with a mucous plug, and stay inactive until the conditions outside improve.
- During aestivation, the animal often seeks shelter in a cool underground burrow, crevice or cocoon, where it will remain in a state of reduced metabolic activity, which in turn reduces the rate at which the body consumes energy. **Hence statement 2 is correct.**
- It can also be a way to avoid desiccation (extreme dryness of the skin) and also lower the risk of being preyed on by a predator.
 - **Estivation is summer dormancy**, that is, long-term torpor during summer for survival of hot and dry periods. Many desert plants survive extended periods of high temperature and low rainfall. Some survive as desiccated seeds (5%–10% water content), particularly annual species, but some survive desiccation as adults. These “resurrection” plants, such as the Rose of Jericho (*Selaginella*), can desiccate to about 5% water content during dry periods, but survive and “come back to life” after rain. Pincushion lilies similarly re-activate by regenerating from buds after rain.
- For example, the West African lungfish burrows into the mud of a drying water body and secretes a cocoon of mucus around itself during a drought. Desert tortoises dig burrows and retreat into them in hot summer months. Many land snails seal themselves in their shells with a mucous plug, and stay inactive until the conditions outside improve.

Q 92.C

- A social audit is a formal or official evaluation of any organization's social responsibilities for projects or endeavors that they are involved in.
- The original MGNREG Act had provisions for social audit, **though the auditing standards laid down by the Comptroller and Auditor General** were issued only on December 19, 2016. According to them, every Social Audit Unit is entitled to funds equivalent to 0.5% of the MNREGA expenditure incurred by the State in the previous year. The audit involves quality checks of infrastructure created under the MNREGA, financial misappropriation in wages, and checking for any procedural deviations. **Hence statement 1 is correct.**
- Section 17 of the MGNREG Act mandates the conduct of Social Audits, however, **no clear mechanism** of how to conduct a Social Audit has been indicated in the Act.
- Society for Social Audit Accountability and Transparency has been constituted by the State Governments. It is mandated to conduct effective and impartial social audits for developmental Schemes and programs of both the Government of India and the State Government. **Hence statement 2 is correct.**

Q 93.A

- **Aravipuram Movement**
 - It was launched by **Sri Narayana Guru** on Shivaratri day of 1888. On that day, Sri Narayana Guru defied the religious restrictions traditionally placed on the **Ezhava community** and consecrated an idol of Shiva at Aravipuram. **Hence pair 1 is not correctly matched.**

- Sri Narayana Guru, born in a low-caste Ezhava family, had studied Sanskrit, Malayalam, Tamil and astrology. The Aravipuram Pratistha was a historic event, because a member of a lower caste, forbidden from entering the temple, had himself consecrated the Shiva image in a temple. On the wall of the temple, Sri Narayana Guru inscribed the words: “Devoid of the dividing walls of caste or race, or hatred of rival faith, we all live here in brotherhood.”
- **Nair Movement:**
 - It was started in 1861 in the state of Travancore under the leadership of **C. V. Raman Pillai, K. Rama Krishna Pillai, and M. Padmanabha Pillai**, against the domination of Nambudri Brahmins and non-Malayali Brahmins (Tamil and Maratha). Nair or Nayar refers to a group of Hindu castes. **Hence pair 2 is not correctly matched.**
 - It was an anti-Brahminical movement.
 - In 1891, C. V. Raman Pillai formed the Malayali Memorial against the Brahmin's predominance in government jobs. After 1900, the movement continued under the strong leadership of K. Rama Krishna Pillai and M. Padmanabha Pillai.
 - In 1941, M. Padmanabha Pillai founded the Nair Service Society, which worked for the socio-political advancement of the Nairs.
- **Mahar Movement :**
 - It was a caste movement that took place in Maharashtra in 1924 **under the leadership of Dr B. R. Ambedkar. Hence pair 3 is correctly matched.**
 - The Movement stood for the upliftment of the untouchables or depressed classes and brought the untouchable castes onto a single platform.
 - It also conveyed a degree of awareness and unity among lower castes, enabling them to form a separate political party and a system of education, including schools, colleges, and hostels.

Q 94.B

- **Sohgaura Copper Plate:** The earliest known copper-plate, known as the Sohgaura copper-plate, is a Mauryan record that mentions **famine relief efforts**. It is one of the very few pre-Ashoka Brahmi inscriptions found in Gorakhpur district of Uttar Pradesh.
- **Kanganahalli Inscriptions:** Located in Gulbarga district of Karnataka, this site contains a Mahastupa of 75 ft diameter along with various sculptural slabs. A prominent one being the portrait slab of King Ashoka and his queen attended by two chauri bearers. To confirm that it is Ashoka, the sculptural slab also contains a single line label “**Ranyo Ashoka**” in Brahmi script of the Satavahana period.
- **Kalsi Inscription:** Kalsi town is known for its heritage importance. It is a small town located between Chakrata and Dehradun on the banks of **Yamuna river**. The site of Ashoka's inscriptions at Kalsi is singularly unique as it is the only place in North India where the great Mauryan emperor has inscribed the set of the 14 rock edicts. The language of these edicts is Prakrit and the script is Brahmi. The Rock edict was written around 450 BC and is made of quartz which is 8 ft broad and 10 ft long.
 - These rock edicts **reflect Asoka's human approach in his internal administration** when he converted himself to Buddhism. It also reflects the **policies for the commitment to non-violence and restriction of war**. The inscription also tells about his life when he took the path of spirituality.
- **Rummindei Pillar Edicts (Lumbini):** These inscriptions, written in Brahmi script, come under the Minor Pillar Inscriptions. These contain inscriptions recording their dedication. The inscriptions mention **Ashoka's visit to Lumbini (Rummindei)**, Rupandehi district, Nepal, the birthplace of Lord Buddha. Ashoka exempted Lumbini from paying tax, and fixed its contribution of grain at one – eighth.
- **Hence option (b) is the correct answer.**

Q 95.D

- **Article 123 of the Constitution empowers the President to promulgate ordinances during the recess of Parliament.** These ordinances have the same force and effect as an act of Parliament but are like temporary laws. **Hence, statement 1 is not correct.**
- The ordinance-making power is the most important legislative power of the President. It has been vested in him to deal with unforeseen or urgent matters.
- **His ordinance-making power is coextensive as regards all matters except duration, with the law-making powers of the Parliament.** This has two implications:
 - **An ordinance can be issued only on those subjects on which the Parliament can make laws.**
 - An ordinance is subject to the same constitutional limitation as an act of Parliament. Hence, an ordinance cannot abridge or take away any of the fundamental rights.

- Every ordinance issued by the President during the recess of Parliament must be laid before both the Houses of Parliament when it reassembles. **If the ordinance is approved by both the Houses, it becomes an act.** If Parliament takes no action at all, the ordinance ceases to operate on the expiry of six weeks from the reassembly of Parliament.
- ✓ The ordinance may also cease to operate even earlier than the prescribed six weeks, if both the Houses of Parliament pass resolutions disapproving it. If the Houses of Parliament are summoned to reassemble on different dates, the period of six weeks is calculated from the later of those dates.
- ✓ This means that the **maximum life of an ordinance can be six months and six weeks, in case of non-approval by the Parliament** (six months being the maximum gap between the two sessions of Parliament).
- ✓ **Thus, the ordinance-making power is not coextensive as regards to the duration with the law-making powers of the Parliament. Hence, statement 2 is not correct.**

Q 96.C

- The Ministry of Health and Family Welfare announced a **National Suicide Prevention Strategy in 2022**. It is the first of its kind in the country, with time-bound action plans and multi-sectoral collaborations.
- Features of the strategy:
 - It aims to reduce suicide mortality in the country by **10 per cent by 2030. Hence, statement 1 is not correct.**
 - Its objective includes integrating a **mental well-being curriculum** in all educational institutions. **Hence, statement 2 is correct.**
 - It seeks to establish **psychiatric outpatient departments** through the **District Mental Health Programme** in all districts. **Hence, statement 3 is correct.**
 - It envisages to develop guidelines for **responsible media reporting** of suicides and **restricting access to means of suicide. Hence, statement 4 is correct.**
- National Suicide Prevention Strategy is in line with the **WHO's South East-Asia Region Strategy** for suicide prevention, however, it says it will remain **true to India's cultural and social milieu.**

Q 97.A

- **Advancing Net Zero Status Report** is released by **World Green Building Council (WorldGBC)**, the report highlights action being taken now to decarbonise the built environment.
- The report showcases breakthrough action from across the GBC network, including the 35 GBCs participating in WorldGBC's global Advancing Net Zero programme, 175 signatories to the Net Zero Carbon Buildings Commitment (the Commitment), the wider GBCs network, partners and more.
- In addition, the report also highlights collaborative efforts from the market that support WorldGBC's mission to achieve 100% net zero carbon buildings by 2050.
- **Hence option (a) is the correct answer.**

Q 98.D

- **Recent Context:** The Union Ministry of Environment, Forest and Climate Change has organised a Country-Led Initiative (CLI) event as part of the United Nations Forum on Forests (UNFF) from 26-28 October, 2023 at the Forest Research Institute (FRI), Dehradun, Uttarakhand.
- **United Nations Forum on Forests (UNFF) promotes the management, conservation, and sustainable development of all types of forests. Hence statement 1 is correct.**
 - **It was established in 2000 by the UN Economic and Social Council of the United Nations (ECOSOC). Hence statement 2 is correct.**
 - The Forum meets annually at the UN Headquarters in New York, bringing together representatives of all member states and forest-related agencies for high-level dialogue on technical matters in odd years and policy matters in even years.
 - The forum has universal membership, and is composed of all Member States of the United Nations and specialized agencies. **Hence statement 3 is correct.**
 - India holds the distinction of being a founding member of UNFF. **Hence statement 4 is correct.**
- **Country-Led Initiative (CLI):** The CLI's primary goal is to contribute to the discussions of UNFF regarding the implementation of Sustainable Forest Management and the UN Strategic Plan for Forests.
 - **UN General Assembly adopted the first-ever UN Strategic Plan for Forests for the period of 2017-2030.** This Strategic Plan serves as a global framework for actions at all levels to achieve the sustainable management of all types of forests, including trees outside forests, and to combat deforestation and forest degradation.

Q 99.B

- **A Digital Twin is a comprehensive and dynamic digital representation or model of a physical object, system, or process. This representation is created by integrating real-time data from the physical entity with its virtual counterpart.**
 - The primary goal is to mimic the real-world object or system as accurately as possible, enabling real-time monitoring, analysis, and simulation.
- **A Digital Twin is essentially a detailed digital copy of a physical entity, be it a machine, a product, a building, or an entire system. This digital replica is not a static representation but evolves and updates in real-time based on data collected from the physical counterpart.**
- To maintain accuracy, a Digital Twin relies on a continuous flow of data from sensors, IoT devices, and other sources embedded in the physical object. This data includes information about the object's current state, performance metrics, environmental conditions, and more.
- The Digital Twin allows for simulation and analysis of the physical object's behavior under various conditions. Engineers and operators can use the virtual model to predict performance, identify potential issues, and optimize processes without directly interacting with the physical entity.
- With real-time data streaming into the Digital Twin, operators can closely monitor the status of the physical object. This enables proactive maintenance, rapid response to anomalies, and better-informed decision-making.
- Digital Twins are not limited to a single phase of an object's lifecycle. They cover the entire lifecycle from design and development to operation and maintenance. This holistic view facilitates improvements in design, efficiency, and sustainability.
- Digital Twin is a powerful concept that leverages the integration of real-world data and advanced modeling to create a virtual representation, providing insights, optimization opportunities, and improved decision-making for the physical entity it mirrors.
- **Hence option (b) is the correct answer.**

Q 100.B

- **Heliophytes**
 - **Heliophytes are sunstroke plants, and they adapt to habitats with very intense solar radiation due to their own structure and metabolism. Hence statement 1 is not correct.**
 - These plants are common in rocks, meadows, mountain pastures, open terrain, and grasslands, which are exposed to the sun.
 - A few examples of such plants are **mint, thyme, white clover, roses, ling, mullein, and soft velcro. Hence statement 3 is correct.**
 - **A special feature of heliophytes is the presence of coarse tiny leaves with waxy and hairy protection.** This coating acts against excessive light radiation and water loss. **Hence statement 2 is correct.**
 - Heliophytes also have a high light compensation point. This feature requires a higher illumination intensity for an effective adaption of carbon dioxide.
- **Sciophytes**
 - Sciophytes are a type of **plant that requires a lower light compensation point.** Therefore, they are known as **shade-loving trees or shade plants.**
 - They have large photosynthetic units. They reach their saturation level when exposed to 20 % of sunlight.
 - Sciophytes have the ability to adapt to reduced light intensity or partial sun.
 - A few examples of sciophytes include black pepper, cacao, coffee, and ginger.

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