

Q.1)

Ans) b

Exp) Option b is the correct answer.

A **keystone species** is an organism that helps define an entire ecosystem. Without its keystone species, the ecosystem would be dramatically different or cease to exist altogether.

**Statement 1 is incorrect:**

**Keystone species** is an organism that helps hold the system together. **Keystone species** exists in **marine ecosystem**. Without its keystone species, ecosystems would look very different. Some ecosystems might not be able to adapt to environmental changes if their keystone species disappeared. **The starfish is a keystone species in the marine life.** It maintains the ecosystem in the deep waters. It is a predator that feeds on mussel.

**Statement 2 is correct: Keystone species have low functional redundancy.** This means that if the species were to disappear from the ecosystem, no other species would be able to fill its ecological niche. The ecosystem would be forced to radically change, allowing new and possibly invasive species to populate the habitat.

**Statement 3 is incorrect: A keystone species is often, but not always, a predator.** Just a few predators can control the distribution and population of large numbers of prey species. The entire concept of keystone species was founded on research surrounding the influence of a marine predator on its environment.

Another example of a predator acting as a keystone species is the presence of gray wolves in the Greater Yellowstone Ecosystem.

**Elephants are non-predatory keystone species.**

Source: [https://www.nationalgeographic.org/article/role-keystone-species-ecosystem/#:~:text=12th%20Grade-](https://www.nationalgeographic.org/article/role-keystone-species-ecosystem/#:~:text=12th%20Grade-,A%20keystone%20species%20is%20an%20organism%20that%20helps%20define%20an,species%20have%20low%20functional%20redundancy.)

,A%20keystone%20species%20is%20an%20organism%20that%20helps%20define%20an,species%20have%20low%20functional%20redundancy.

Q.2)

Ans) d

Exp) Option d is the correct answer.

The Biodiversity Beyond National Jurisdiction (BBNJ) Treaty, also known as the “Treaty of the High Seas”, is an international agreement on the conservation and **sustainable use of marine biological diversity of areas beyond national jurisdiction**, currently under negotiation at the United Nations.

**Statement 1 is correct:** The BBNJ Treaty is being developed within the framework of **the United Convention on the Law of the Sea (UNCLOS)**. UNCLOS is the main international agreement governing human activities at sea.

**Statement 2 is correct:** The “BBNJ Treaty”, also known as the “Treaty of the High Seas”, is an **international agreement on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction**.

**Statement 3 is correct: BBNJ encompasses the high seas, beyond the exclusive economic zones or national waters of countries.** According to International Union for Conservation of Nature (IUCN), these areas account for “almost half of the Earth’s surface.” These areas are hardly regulated and also least understood or explored for its biodiversity – only 1 per cent of these areas are under protection.

Source: [https://ec.europa.eu/oceans-and-fisheries/ocean/international-ocean-governance/protecting-ocean-time-action\\_en](https://ec.europa.eu/oceans-and-fisheries/ocean/international-ocean-governance/protecting-ocean-time-action_en)

<https://www.downtoearth.org.in/news/wildlife-biodiversity/20-years-of-talks-later-half-the-earth-s-surface-area-to-have-binding-environment-treaty-81986>

<https://blog.forumias.com/biological-diversity-in-areas-beyond-national-jurisdictionbbnj-treaty-20-years-of-talks-later-half-the-earths-surface-area-to-have-binding-environment-treaty/>

Q.3)

Ans) d

Exp) Option d is the correct answer.

The Inter Tropical Convergence Zone (ITCZ) sometimes called the monsoon trough is a low-pressure zone located at the equator where trade winds converge, and so, it is a zone where air tends to ascend.

**Statement 1 and 3 are correct.** In July, ITCZ is located around **20 degrees north – 25-degree north** latitudes (over the Gangetic plains) which **encourages the development of thermal low over north and North West** India. Due to the **shift of ITCZ** the trade winds of the southern hemisphere cross the equator between **40 degree and 60-degree E** longitudes and start blowing from southern to northern due to the Coriolis force. It's the **southwest monsoon**. In winter, the ITCZ moves southward and so the reversal of winds from northeast to south and southwest takes place. They are called **northeast monsoons**.

**Statement 2 is correct.** The monsoon has tendency to have 'breaks' in rainfall, during which very less or no rainfall occurs. The monsoon rains take place only for a few days at a time. They are interspersed with rainless intervals. These breaks in monsoon are related to the northward movement of the monsoon trough. This happens when the Monsoon trough shifts to the foothills of Himalayas, which leads to sharp decrease in rainfall over most parts of the country but increase along the Himalayas and parts of Northeast India and Southern Peninsula.

**Source:** <https://gpm.nasa.gov/resources/faq/what-difference-between-tropical-storm-and-tropical-depression#:~:text=A%20tropical%20depression%20forms%20when,39%20mph%20and%2073%20mph.https://egyankosh.ac.in/bitstream/123456789/46759/1/Unit-14.pdf>

<https://www.magadhuniversity.ac.in/download/econtent/pdf/Mechanism%20of%20Indian%20Monsoon.pdf>

Q.4)

Ans) c

Exp) Option c is the correct answer

Fiscal consolidation refers to the ways and means of narrowing the fiscal deficit.

**Statement 1 is correct.** **Fiscal consolidation** aims at reducing government deficits and debt accumulation. The Fiscal Responsibility and Budget Management (FRBM) Act gives the **targets for fiscal consolidation in India**.

**Statement 2 is correct.** A country's public debt is considered sustainable if the government is able to meet all its current and future payment obligations. Timely payments help in preventing extra payments in the form of interests. Thus, ensuring sustainability of debt will help in fiscal consolidation path.

**Statement 3 is incorrect.** Tax expenditure is revenue forgone due to tax concessions and exemptions. **High tax expenditure affects tax revenues and hence leads to higher fiscal deficits.**

**Statement 4 is incorrect.** Although Off-budget liabilities are not incorporated in the calculation of fiscal deficit, **they are included in the calculation of government debt**. Thus, higher and increasing off-budget borrowings will increase government debt.

**Statement 5 is correct.** GST has widened the tax base. **A wider tax base improves revenue collections**. This will help reduce revenue deficit and thus promote fiscal consolidation.

Statement 6 is correct. Direct Benefit Transfer of government subsidies will help plug subsidy leaks. This will save money and thus will help in fiscal consolidation

Q.5)

Ans) d

Exp) Option d is the correct answer.

**Statement 1 is correct:** The COP is the **supreme decision-making body** of the Convention. All States that are Parties to the Convention are represented at the COP, at which they review the implementation of the Convention and any other legal instruments that the COP adopts and **take decisions necessary to promote the effective implementation of the Convention**, including institutional and administrative arrangements.

**Statement 2 is correct:** UNFCCC COP meet has been held in India only once. **UNFCCC COP-8 in 2002 was held in New Delhi, India.**

**Statement 3 is correct:** A 'ratchet mechanism' is an informal term used to describe the requirement that countries will **revise** and communicate their emission targets - known as **nationally determined contributions (NDCs)** - **every five years** as part of the Paris Climate Agreement. The ratchet mechanism requires countries to spell out their plans for 2025 to 2030. This creates the opportunity for the world to potentially put itself on a course to stay below 2 C. The term comes from the idea that countries will be expected to promise **more action every five years** in an effort to reduce global warming and the effects of climate change.

Source: <https://unfccc.int/process/bodies/supreme-bodies/conference-of-the-parties-cop>

<https://www.metoffice.gov.uk/weather/climate/cop/what-is-cop>

<https://pubs.iied.org/sites/default/files/pdfs/migrate/17385IIED.pdf> (Pg. 10)

<https://grist.org/climate-energy/heres-what-you-need-to-know-about-the-new-paris-climate-agreement/>

<https://www.nationalworld.com/news/environment/what-is-the-ratchet-mechanism-paris-climate-agreement-concept-explained-ahead-of-cop26-3434610>

<https://blog.forumias.com/unfccc-summits/>

Q.6)

Ans) d

Exp) Option d is the correct answer.

The 'Making Peace with Nature' report was released by the **United Nations Environment Programme (UNEP)** ahead of the fifth session of the **UN Environment Assembly (UNEA-5)**. UNEP has produced this report to synthesize the latest findings of the global environmental assessments (including the Intergovernmental Panel on Climate Change (IPCC), The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), GEO and many others), and translate the science for policymakers. The synthesis report explains **how climate change, biodiversity loss and pollution add up to three self-inflicted planetary emergencies** that are closely interconnected and put the well-being of current and future generations at unacceptable risk. The report is **co-funded by the European Union and the Norwegian Ministry of Environment**.

Source: <https://www.unep.org/interactive/making-peace-with-nature/>

<https://www.unep.org/interactive/making-peace-with-nature/#:~:text=The%20%E2%80%9CMaking%20Peace%20With%20Nature,change%2C%20biodiversity>

%20loss%20and%20pollution.&text=Achieving%20transformative%20change%20and%20reaching,everyone%20to%20play%20a%20role.

Q.7)

Ans) d

Exp) Option d is the correct answer.

**Statement 1 is correct:** Faint Galaxies are called low surface brightness galaxies or ultra-diffuse galaxies and have a surface brightness that is at least ten times fainter than the surrounding night sky.

**Statement 2 is incorrect:** Such faint galaxies may account for up to **15% of the mass of the universe**. However, they are difficult to detect because of their inherent low luminosities. As optical telescopes get more powerful, researchers are able to detect more of such extremely faint galaxies.

**Statement 3 is correct:** Indian astronomers have **recently discovered a Faint Galaxy named UVIT J2022** that remained hidden until now. It was discovered while studying a known galaxy, NGC6902A. This faint galaxy is in the Milky Way's neighbourhood situated 136 million light-years away. It remained undetected because it lay in front of a much brighter galaxy that is further away. Moreover, it is extremely faint – about ten times fainter than the surrounding night sky.

Source: <https://indianexpress.com/article/cities/delhi/indian-researchers-discover-faint-galaxy-136-light-years-away-7849176/>

<https://blog.forumias.com/hidden-in-plain-sight-faint-galaxy-discovered-in-our-local-universe/#:~:text=hidden%20until%20now,-,What%20are%20Faint%20Galaxies%3F,the%20mass%20of%20the%20universe.>

Q.8)

Ans) a

Exp) Option a is the correct answer.

**Statement 1 is correct:** Baluchari sarees are produced mainly in **Murshidabad, West Bengal**. It depicts **ancient stories on its border and pallu**. **Silk threads are extensively used** in these sarees. The main feature of the Baluchari Sari is the arrangement of design in palloo by maintaining the corner and cross border perfectly in boxes. '**Jala**' **technique was originally followed** by Baluchari weavers in earlier days.

**Statement 2 is correct:** Uppada Jamdani Saree are produced mainly in **Andhra Pradesh**. Finest silk along with pure zari are used as raw materials for these sarees. The Uppada saris are **woven by the local handloom weavers with jamdani technique** with pure cotton, gold or silver zari. In jamdani technique of handloom weaving, the **motif appears same on front and reverse side of the sari** and it is **woven by hand**.

**Statement 3 is incorrect:** Tanchoi brocades saree are mainly produced in **Varanasi**. It is a **kind of Banarasi saree** where **weaving technique involves a single or double warp** and two to five colors on the weft on Silk fabric. Tanchoi Silk was said to have been brought to India through Chinese traders in 19<sup>th</sup> century which was later adapted by Indian weavers. The material used for weaving of "Tanchoi Saree / Dress material" is twisted two fold mulberry silk yarn, **locally called "Katan" in both warp and weft**.

Source: Indian Culture, Nitin Singhania, 3<sup>rd</sup> Edition, Chapter-3, Indian Handicrafts

<https://vikaspedia.in/social-welfare/entrepreneurship/indian-handloom/baluchari-silk-saree>

<https://www.thehindu.com/news/national/andhra-pradesh/of-uppada-and-the-weaving-skills-of-girls/article33111275.ece>

<https://vikaspedia.in/social-welfare/entrepreneurship/indian-handloom/tanchoi-saree-and-silk-dress-material>



Q.9)

Ans) b

Exp) Option b is the correct answer.

**Statement 1 is incorrect:** Sea surface temperature (SST) gives information only about the thin upper layer of the ocean and **does not reflect the thermal energy available in the upper ocean**. The variations in the upper ocean thermal energy conditions are mainly responsible for summer monsoon activity. The heat content of the upper ocean creates more impact on monsoon than sea surface temperature, which is restricted to the skin of the ocean. The SST is restricted to a few millimetres of the top ocean layer and is largely **influenced by strong winds, evaporation, or thick clouds**.

**Statement 2 is correct:** Ocean mean temperature (OMT) is measured up to a depth of 26 degree C isotherm. **OMT performs better than SST** because **OMT better represents the upper ocean thermal energy conditions**. And the variations in the upper ocean thermal energy conditions are mainly responsible for the summer monsoon. In addition, **SST also exhibits large temperature fluctuations compared with OMT** of the upper layer, leading to more noise that causes lower correlations with summer monsoon rainfall. The ocean mean temperature variations are **more stable and consistent and have lower spatial and temporal spread**.

**Statement 3 is incorrect:** Sea surface temperature (SST), and not the ocean mean temperature (OMT), is routinely used for predicting whether the total amount of rainfall that India receives during the monsoon season will be less or more than the long-term mean of 887.5 mm.

Source: <https://www.thehindu.com/sci-tech/science/ocean-mean-temperature-can-better-predict-indian-summer-monsoon/article24842963.ece>

Q.10)

Ans) b

Exp) Option b is the correct answer.

**Statement 1 is correct.** In the age of the Rig Veda, **differentiation based on occupations** had started but this division was **not very sharp**. We hear of a family in which a member says, "I am a poet, my father is a physician and My mother is grinder. Earning livelihood through different means we live together..."

**Statement 2 is correct.** Society was **largely tribal and egalitarian** since economy was pastoral and not food producing, so, the scope for collecting regular tributes from the people was very limited. Thus, tribal elements in the society were stronger and social divisions based on collection of taxes or accumulation of landed property was absent.

**Statement 3 is correct.** Tribal society was divided into three groups – warriors, priests and the people. **The fourth division called the shudras appeared towards the end of Rig Vedic period. It is mentioned for the first time in the tenth book of the Rig Veda.**

**Statement 4 is incorrect.** Ashramas or four stages of life were **not well-established** during Rig Vedic times. In the post-Vedic texts we hear of **four Ashramas- Brahmachari, grihastha, vanaprastha and sannyasin**. Only the first three are mentioned in the later Vedic texts; **the fourth stage had not been well established in later Vedic times though ascetic life was not unknown**.

Source: Old XIth NCERT Ancient India chapter 8&9, page no-74-76, 85

Q.11)

Ans) d

Exp) Option d is the correct answer.

The International Court of Justice (ICJ), the principal judicial organ of the United Nations (UN) has issued a provision measure i.e., an order to Russia to immediately suspend its military operations in Ukraine.

The International Court of Justice was **established in 1945** by the same **constitutive instrument as the Security Council, the UN Charter**, to act as the principal judicial organ of the UN.

**Statement 1 is correct:** The judgments delivered by the International Court of Justice is final and binding on the parties to a case. No appeal lies before any other authority against the judgements of the court. At the most, a judgement may be subject to interpretation or revision (upon the discovery of a new fact) by the court itself.

**Statement 2 is correct:** The ruling and the decisions of the International Court of Justice can be enforced by **United Nations Security Council**. In case of non-compliance with ICJ rulings, it is the responsibility of the UN Security Council (UNSC) to make arrangements for compliance

**Statement 3 is incorrect:** Its jurisdiction extends to U.N Member states. It can give advisory opinions to UN bodies. However, it cannot try individuals for international crimes. It is the International Criminal Court which can try individuals for international crimes.

Source: ICJ has ordered an end to invasion of Ukraine. This matters -ForumIAS Blog

What is the role of International Court of Justice? |ForumIAS Blog <https://www.icj-cij.org/en/how-the-court-works>

Q.12)

Ans) c

**Exp) Option c is the correct answer.**

The uncanny valley is a common **unsettling feeling people experience when androids (humanoid robots)** and audio/visual simulations **closely resemble humans** in many respects but are not quite convincingly realistic. The phenomenon is a consideration in a number of areas of design including robotics, video game art, training simulators and 3-D animation. Depending on the intent, a designer may want to avoid the uncanny valley or exploit it to elicit a particular response.

Source: <https://indianexpress.com/article/technology/science/robots-gaze-can-affect-the-human-brain-7487355/>

<https://www.techtarget.com/whatis/definition/uncanny-valley>

Q.13)

Ans) d

**Exp) Option d is the correct answer.**

Normally, temperature decreases with increase in elevation. It is called normal lapse rate. At times, the situations are reversed and the normal lapse rate is inverted. It is called Inversion of temperature. It is a reversal of the normal behaviour of temperature in the troposphere. Under this meteorological phenomenon a layer of warm air lies over the cold air layer.

**Statement 1 is correct:** At long winter nights, the **loss of heat by terrestrial radiation** from the ground surface during night may **exceed the amount of incoming solar radiation**. Thus, the **ground surface becomes too cold**. Surface temperature inversion develops when air is cooled by contact with a colder surface.

**Statement 2 is incorrect:** **Temperature inversion** condition requires **slow or no movement of air**. It results in no transfer or mixing of heat in the lower layers of the atmosphere.

**Statement 3 is correct:** **Snow covered ground surface** results in maximum loss of heat through reflection of incoming solar radiation. Snow being bad conductor of heat retards the flow of heat from the ground

surface lying below the snow layers to the lower atmosphere. This develops appropriate condition for temperature inversion.

Source: Human Geography: The Land - Pradeep Sharma - Google Books  
chapter-9 (ncert.nic.in)

Q.14)

Ans) d

Exp) Option d is the correct answer.

The **Periyar Tiger Reserve (PTR)** is trying to **reintroduce an abandoned nine-month-old cub into the wild**, after rearing it in 'captivity' for two years. This issue has once again brought the controversial concept of 're-wilding' of abandoned or injured animals under the lens. Reintroduction of the animal species into the wild after a certain time when it appears that the animal is capable of surviving in the wild independently. This is what is known as 'Re-wilding'.

**The challenges associated with re-wilding are:**

- 1) A **species reintroduction program** is often an **expensive undertaking**. According to this PBS article, "the most expensive captive program ever was the California condor reintroduction program, which has cost over 35 million dollars since 1987." **Thus, Option 1 is correct.**
- 2) Some animal species are **hard to breed in captivity**. Thus, re-wilding process is difficult due to reducing population of the animal species. Example: Giant Panda and Cheetah.
- 3) Species born in captivity are **not able to learn from their parents the knowledge they need to survive in the wild**. Skills like catching prey, finding shelter and responding to predators must be taught to captive bred populations before reintroduction. **Thus, Option 2 is correct.**
- 4) Even if a species is bred successfully in captivity and even if it learns to survive in the wild on its own, **there is the concern that a single event, such as a hurricane, drought or disease could decimate the newly reintroduced population**. It is described as "single event catastrophes." **Thus, Option 3 is correct.**
- 5) **The process of re-wilding** of a wild animal after rearing it in captivity is very complicated and fraught with risks. **For example**, there have been cases of captivity-reared animals, especially carnivores, attacking human beings after being introduced in the wild. **Thus, Option 4 is correct.**

Source: An Introduction to Species Reintroduction • The National Wildlife Federation Blog : The National Wildlife Federation Blog (nwf.org)

Explained: The 're-wilding' of wild animals, and the challenges it involves -ForumIAS Blog

Q.15)

Ans) d

Exp) Option d is the correct answer.

Though the Indian National Movement was largely non-violent, a small revolutionary movement did emerge in the early decades of the 20th century. The idea was to strike terror in the hearts of the rulers, arouse people and remove the fear of authority from their minds. The revolutionaries intended to inspire the people by appealing to their patriotism, especially the idealistic youth who would finally drive the British out.

**Option a is incorrect:** The ideology of revolutionaries was inspired from the path of the **Irish nationalists and Russian Nihilists** in the short term- the path of heroic action or revolutionary terrorism. A number of them also came **under the influence of Socialism**. In 1924, the Hindustan Republican Association was

formed with the aim of organising armed revolution against the British. Thus, the revolutionaries did possess an ideology and were clear in their aims and objectives.

**Option b is incorrect:** The strategy of revolutionaries did change in 1920s but it did not create any confusion amongst members of the revolutionary groups. So, this cannot be ruled out as the reason for the failure of the revolutionaries.

**Option c is incorrect:** Even though Indian National Congress opposed the non-violent activities of revolutionaries, but **INC never supported severe repressive and measures initiated by the British** against revolutionary leaders.

**Option d is correct:** The revolutionaries **could not sustain their activities** because **they failed to get a consistent and active support of the people** and **failed to develop a base among the Indian masses**. Moreover, their use of violence as a political weapon gave a justification to the British to counter them by using more violence. The revolutionaries failed in achieving their long-term goal of armed mass revolution against the British.

Source: Block-4.pdf (egyankosh.ac.in)

Q.16)

Ans) b

**Exp) Option b is the correct answer.**

OECMs are an important means to accelerate progress towards the **Aichi 2020** (Convention on Biological Diversity's) conservation targets and was made integral to the **post-2020 global biodiversity framework**.

**Statement 1 correct.** Other effective area-based conservation measures (OECMs) are a conservation designation or status for areas that are achieving the **effective in-situ conservation** of biodiversity **outside of protected areas**.

**Statement 2 correct.** The OECM tag is given by the **International Union for Conservation of Nature (IUCN)** to areas that are **not protected** but support rich biodiversity.

**Statement 3 incorrect.** The OECM tag does **not bring any legal, financial or management implications** but designates the area as a biodiversity hotspot on the international map.

**Statement 4 correct.** The **Aravalli Biodiversity Park in Gurugram, Haryana** was declared India's first "other effective area-based conservation measures" (OECM) site.

Source: <https://www.iucn.org/commissions/world-commission-protected-areas/our-work/oecms>

<https://www.hindustantimes.com/cities/gurugram-news/aravalli-biodiversity-park-in-gurugram-declared-as-india-s-first-oecm-site-101643834401345.html>

<https://www.iucn.org/theme/protected-areas/about>

Q.17)

Ans) d

**Exp) Option d is the correct answer.**

There are three main categories of fats: saturated fats, unsaturated fats, and trans fats. All fats are made up of carbon, hydrogen, and oxygen molecules. For decades, researchers have said that saturated fat in a person's diet can cause potential harm. Recommendations have typically pointed to a "low fat" diet as the best way to reduce the risk for heart disease and other cardiovascular diseases.

**Statement 1 is incorrect:** The **difference between saturated and unsaturated fat** lies in the number of double bonds in the fatty acid chain., while in unsaturated fatty acids there is at least one double bond in the fatty acid chain. **Saturated fatty acids lack double bonds between the individual carbon atoms.**



**Statement 2 is incorrect:** Saturated fats are mainly found in **animal products and tropical oils**. Foods like butter, palm and coconut oils, cheese, and **red meat have high amounts of saturated fat**.

**Statement 3 is incorrect:** Saturated fats **increases the risk of heart diseases**. Replacing saturated fats with unsaturated fats in the diet has been shown to lower bad cholesterol which is one of the risk factors in the development of heart disease.

Source: What are Saturated and Unsaturated Fats? (pro-activ.com)

Facts about saturated fats: MedlinePlus Medical Encyclopedia

Q.18)

Ans) c

Exp) Option c is the correct answer.

This question is based on the article “Jahangirpuri | 1985 Supreme Court order on pavement dwellers could stall NDMC demolition drive” published in The Hindu on 23 April, 2022.

In the initial phase, the courts regarded **Right to livelihood as exclusive to the right to life**. But the view underwent modifications and the definition of the word ‘life’ started to be taken as broad and expansive.

**Right to livelihood started to be taken into account after the Board of trustee’s case**. The case explicitly enunciated that ‘life’ does not merely presage animal existence or continued drudgery through life. Where the outcome of a departmental inquiry is likely to affect the reputation or livelihood of a person, some of the final graces of human civilization which make life worth living would be jeopardized.

The Supreme Court in **Olga Tellis v. Bombay Municipal Corporation**, popularly known as the “Pavement Dwellers Case” a five-judge bench of the Court now **implied that ‘right to livelihood’ is borne out of the ‘right to life (Article 21)’**, as no person can live without the means of living, that is, the means of Livelihood.

Source: Jahangirpuri | 1985 Supreme Court order on pavement dwellers could stall NDMC eviction - The Hindu

Extended Jurisprudence of Article 21 w.r.t Right to Livelihood (ipleaders.in)

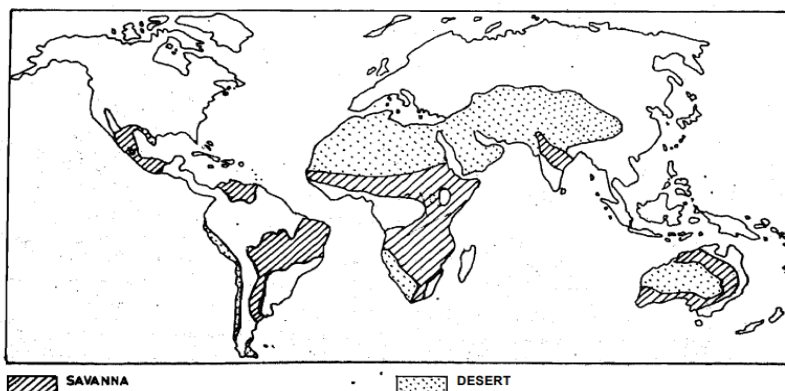
Q.19)

Ans) d

Exp) Option d is the correct answer.

**Statement 1 is incorrect:** The tundra is a tree-less biome found in the Northern and Southern most region of world adjoining the ice bound poles. The typical animals found here are reindeer, arctic fox, polar bear, snowy owl, lemming, arctic hare, and ptarmigan. **Reptiles and amphibians are almost absent**.

**Statement 2 is incorrect:** Deserts are arid areas with annual rainfall lower than 25 cm. This is a region with high evaporation potential and hence available water also becomes quickly saline. Some deserts **are found on the western edges of continents**. They are caused by **cold ocean currents**, which run along the coast. They cool the air and make it harder for the air to hold moisture.



**Statement 3 is correct:** The Savanna biome is among the largest of the earth's biotic systems spread over vast regions of Africa, America and Australia. **The annual rainfall here is mostly concentrated in summer season.** It is characterised by an alternate hot, rainy season and cool, dry season.

**Statement 4 is correct:** In the equatorial region or the Tropical Rainforests, **both diurnal and annual range of temperature will be low as it experiences high temperatures all year round.**

Source: Unit-12.pdf (egyankosh.ac.in)

Q.20)

Ans) c

Exp) Option c is the correct answer.

**Option a is incorrect:** **Biotic interchange** is the process by which **species from one biota invade another biota**, usually due to the disappearance of a previously impassable barrier. The Trans-Suez Interchange is a human-induced biotic interchange between the Mediterranean and the Red Sea due to the construction of the Suez Canal.

**Option b is incorrect:** **Phytoextraction** is a process by which plants accumulate contaminants into the roots and above ground shoots or leaves. It is a subprocess of phytoremediation in which plants remove dangerous elements or compounds from soil or water, most usually heavy metals, metals that have a high density and may be toxic to organisms even at relatively low concentrations

**Option c is correct:** **Biotic homogenization** is the process by which **two or more spatially distributed ecological communities become increasingly similar over time**. This process may be genetic, taxonomic, or functional, and it **leads to a loss of beta ( $\beta$ ) diversity**. Alpha diversity refers to diversity within a community: it addresses how many species are present. A community with high  $\alpha$  diversity has many species present. Beta diversity compares multiple communities. For there to be high  $\beta$  diversity, two communities would have to have high  $\alpha$  diversity but have different, unique species compositions.

**Option d is incorrect:** **Edge Effect** is the process relating to changing population or community structures that **occur at the boundary of two or more habitats**. Areas with small habitat fragments exhibit especially pronounced edge effects that may extend throughout the range. As the edge effects increase, the boundary habitat allows for greater biodiversity.

Source: Wikipedia

Q.21)

Ans) b

Exp) Option b is the correct answer.

Muhammad Tughluq had divided his territories in the Deccan into four provinces. Bahman Shah kept that arrangement as it was except that he appointed his own officers everywhere. Muhammad Shah I divided the kingdom into four Atrafs (provinces) whose capitals were Daultabad, Berar, Bidar and Gulbarga respectively.

**Statement 1 is incorrect.** The kingdom was divided into **provinces called Atrafs**. Provinces or Atrafs were divided into Sarkars and Sarkars were divided into Paraganas for the convenience of administration. The lowest unit of the administration was the village.

**Statement 2 is correct:** Provincial governors appointed in each of these provinces were called Tarfdars. They had extensive administrative and military powers. Tarfdar collected revenue from his province, organised the provincial army and **appointed all civil and military officers of his province**. Sometimes Tarfdars were appointed ministers of the king as well.

**Statement 3 is correct.** Mahmud Gawan carried out many internal reforms and attempted to put an end to the strife in the nobility. **In order to curb the military power of the tarafdar**, Gawan ordered that only one fort of each province was to be under the direct control of the provincial tarafdar. The remaining forts of the province were placed under a Qiladar or commander of the forts. The Qiladar was appointed by the central Government. However, soon after his death, the governors declared their independence and the Bahamani kingdom broke up

Source: <https://www.historydiscussion.net/history-of-india/medieval-age/administration-of-india-under-the-bahmani-kingdom-indian-history/6589>

[https://nios.ac.in/media/documents/SrSec315NEW/315\\_History\\_Eng/315\\_History\\_Eng\\_Lesson11.pdf](https://nios.ac.in/media/documents/SrSec315NEW/315_History_Eng/315_History_Eng_Lesson11.pdf) page-182

Q.22)

Ans) c

Exp) Option c is the correct answer.

**Statement 1 is incorrect:** System of Rice Intensification (SRI) emerged in the 1980's as a synthesis of locally advantageous rice production practices encountered in Madagascar by Fr Henri de Laulanie. SRI is a combination of several practices those include changes in **nursery management, time of transplanting, water and weed management (and not using genetically modified varieties of rice)**. It emphasizes altering of certain agronomic practices of the conventional way of rice cultivation. It relies on the principle of 'More with Less'. In this method, rice yield increases with less water and with reduction in chemical inputs.

**Statement 2 is incorrect:** Aquaponics is a combination of aquaculture and hydroponics (which is growing plants without soil). It involves growing of plants in soil-less environment. Therefore, **it's not susceptible to soil-borne diseases**. Aquaponics is the sustainable method of raising both fish and vegetables.

**Statement 3 is correct:** Zero tillage is the process where the crop seed will be sown through drillers without prior land preparation and disturbing the soil where previous crop stubbles are present. **No tillage reduces the compaction of the soil and reduces the water loss by runoff and prevent soil erosion.**

**Statement 4 is correct:** Crop-rotation is the method of **growing of different crops on a piece of land in a pre-planned succession**. The principle of crop rotation is to utilise the available resources to the fullest extent in order to harvest the maximum in a unit land without affecting the soil health. Ex- Rice-Red Gram -Banana. This practice **controls insects and diseases, increases soil fertility and decreases soil erosion**. Growing of mixed crop along with livestock operations have several advantages:

- 1) Growing crops only on more level land and pastures or forages on steeper slopes will reduce soil erosion.
- 2) Pasture and leguminous forage crops in rotation enhance soil quality and reduce erosion; livestock manure, in turn, contributes to soil fertility.
- 3) Livestock can buffer the negative impacts of low rainfall periods by consuming crop residue that in "plant only" systems would have been considered crop failures.

Source: Environment, Shankar IAS, Chapter-24, Agriculture, Pg. 283, 285, 293

<https://www.nios.ac.in/media/documents/333courseE/21.pdf> (Pg. 113-114)

Q.23)

Ans) a

Exp) Option a is the correct answer.

Heavy mineral is a mineral with a density that is greater than 2.9 g/cm<sup>3</sup>, most commonly referring to dense components of siliciclastic sediments.

**Statement 1 is correct.** Rutile is the most abundant **naturally-occurring** form of titanium dioxide. Titanium dioxide occurs in **polymorphic forms** as rutile, anatase (octahedrite) and brookite.

**Statement 2 is correct.** Rutile is often concentrated by **stream and wave action** in "**heavy mineral sands**" that exist in both onshore and offshore deposits. The mineral sand includes heavy minerals such as titanium and rare earths that have high specific gravity (density of minerals)

**Statement 3 is correct.** In the recent research spearheaded by Thomas Zack (of the Department of Earth Sciences, at University of Gothenburg), a new method of laser ablation was identified which allows rock and mineral researchers to use rutile for in-depth analysis of specimens. This Microanalysis of tiny specimens of rutile can be used to **decipher the timing and conditions of petrological processes**.

**Statement 4 is incorrect.** The world reserves of rutile are 46 million tonnes in terms of Titanium dioxide content. Major rutile reserves are located in **Australia with 27 million tonnes (59%)**, followed by India with 7.4 million tonnes (16%), South Africa with 6.8 million tonnes (15%) and Ukraine with 2.5 million tonnes (5%).

Source: [https://ibm.gov.in/writereaddata/files/11182021153046Ilmenite\\_Rutile\\_2020.pdf](https://ibm.gov.in/writereaddata/files/11182021153046Ilmenite_Rutile_2020.pdf)

<https://indianexpress.com/article/business/companies/policy-intervention-will-give-fillip-to-nascent-heavy-mineral-industry-v-v-mineral/>

<https://www.irocks.com/rutile-mineral-of-many-uses>

Q.24)

Ans) d

Exp) Option d is the correct answer.

Marine heatwaves are periods of extremely high temperatures in the ocean. According to the Intergovernmental Panel on Climate Change (IPCC) report, by 2100 Marine Heatwaves (MHWs) will occur as many as 50 times as often as in pre-industrial times.

**Statement 1 is correct.** Marine heat waves (MHW) are caused by an increase in the **heat content of oceans**, especially in the upper layers. The recent study by Indian Institute of Tropical Meteorology (IITM), Pune, found that increase in marine heat waves was due to rapid warming in the Indian Ocean and **strong El Nino events**.

**Statement 2 is correct.** The marine heatwaves largely affect the climatic conditions in India. Marine heatwaves in the **Western Indian Ocean** and the **Bay of Bengal** increased **drying conditions** over the central



Indian subcontinent. Correspondingly, there is a significant **increase in the rainfall** over **south peninsular India** in response to the heatwaves in the north Bay of Bengal.

**Statement 3 is correct.** The rise in oceanic temperature due to Marine heatwaves (MHWs) causes coral bleaching, seagrass destruction, and loss of kelp forests, affecting the fisheries sector adversely. It is not the only threat to marine ecosystems; often **they occur alongside other stressors such as ocean acidification, deoxygenation, and overfishing**. In such cases, MHWs not only further damage habitats, but also **increase the risk of deoxygenation and acidification**.

Source: <https://www.thehindu.com/news/national/marine-heatwaves-rising-around-india-says-study/article38393806.ece>

<https://www.iucn.org/resources/issues-briefs/marine-heatwaves>

<https://www.downtoearth.org.in/news/climate-change/frequent-marine-heatwaves-in-indian-ocean-disrupt-india-s-monsoon-patterns-81379>

Q.25)

Ans) c

Exp) Option c is the correct answer.

**Option 1,3 and 5 are incorrect: Honnavara, Bhatkal, Mangalore, Barakur, Ankola were the ports of the vijayanagara empire.** According to Abdur Razzak, there were 300 ports on both the coasts in the Vijayanagar empire and the external trade carried out through the ports by the Merchants and traders of their Period. The western sea ports related to Vijayanagar were divided into three groups such as (1) Konkan group (2) Tulunadu group and (3) Malabar group. The konkan group of Ports Consist of Mirjan, **Honovar, Bhatkal**, Basrur, Bakanur, Mangalore and Kumbola and the Malabar group of ports consisted of a greater number of ports as many as 25 lying between Mount Delhi in the North and Cape Comrin in South. The Chief seaports of this group were Cannanore, Dharmapattanam, **Calicut**, Cochin and Quilon. Likewise, the Eastern coast ports are divided into (1) The Coromandal group and (2) Telingana group. The Cormandel group included Nagapatnam, Tirupamalai Raja Patnam, Tranquebar, Portonova, Devanam Patnam, Mailapur and pulicat.<sup>12</sup> The Telingana group consists of only two ports such as Motupalli and Masuli Patnam.

**Option 2 and 4 are correct: During Gupta period, there was a flourishing external and internal trade.** The trade was carried both by land and rivers. During this period the wealth of the Roman Empire reached India through the ports of Kalyan, **Chaul**, Broach, and Cambay in Western India. **Tamralipti was an important port in Bengal. It carried on trade with China, Lanka, Java and Sumatra.**

Source: <https://blog.forumias.com/ports-for-foreign-trade-during-ancient-times/>

<https://www.marineinsight.com/ports/7-oldest-sea-ports-of-india/>

Ancient and medieval india by poonam dalal dahiya. Page no-312

<https://euroasiapub.org/wp-content/uploads/2019/07/4ESS-june-19-THE-TRADE-AND-TRADE-GUILDS-6736.pdf>

Q.26)

Ans) b

Exp) Option b is the correct answer.

The group of monuments at Mahabalipuram is a group of sanctuaries, founded by the Pallava kings, carved out of rock along the Coromandel coast in the 7th and 8th centuries. It has been given the status of World heritage Site by UNESCO.

**Statement 1 is incorrect:** The group of monuments at Mahabalipuram were **made by many successive generations** of kings of the **Pallava dynasty** of South India between the **6th and 8th centuries CE**. The **monolithic temples** and **rock cut cave temples** are attributed to the reign of **Narasimhavarman I**, also called '**mamalla**', after whom the architectural style was named. However, the **structural temples**, like the **Shore Temple** at Mahabalipuram are **attributed** to his **successor Narasimhavarman II "Rajasimha"**. **On the other hand**, **Brihadishvara Temple** was built by **Chola emperor Rajaraja I** between 1003 and 1010 AD.

**Statement 2 is correct:** This monument site is **unique**, as it **shows all the stages of development of temple architecture in South India**. It has the **rock cut caves** of the earliest phase, followed by **monolithic temples**, called **Rathas** (the **Panch Pandava ratha**), and **finally structural temples of Dravidian style** with **Vimana, Garbhagriha and Gopuram**. Most other sites gave only one structure depicting only a particular phase of architectural development. For example, the **Brihadeeswara Temple** built by Cholas is only a structural temple.

**Statement 3 is correct:** Mahabalipuram is **famous** for its **open-air bas relief piece**. A huge natural boulder with a **cleft** through the **middle** has been **cleverly used to create a sculpture frame** depicting **themes from Mahabharata**, like **Arjuna's penance**. The **cleft** has been **used to depict the Descent of river Ganges**.

**Statement 4 is correct:** While **most Indian temples** have a **single shrine/ garbhagriha** to house the deities, the **Shore temple at Mahabalipuram** has **three shrines - two** dedicated to **Shiva**, facing **west and east**, and **one dedicated to Vishnu**, in the **centre**. This is a highly unique feature of the temple at Mahabalipuram.

Source: Class 11th NCERT Fine Arts, Ch-6, Pg-84, 85;

<https://whc.unesco.org/en/list/249/>

Q.27)

Ans) d

**Exp) Option d is the correct answer.**

Under the Companies Act, 2013, One Person Company (OPC) is a **separate legal entity** and will need to register for a **perpetual succession**. In India, it came into existence **in 2005** and was aimed at scaling the entrepreneurial spirit in India by making their contribution in the economy felt.

**Statement 1 is incorrect:** The Companies Act, 2013 provides that if the paid-up share capital limit of the OPC exceeds the prescribed limit (currently, Rs.50 lakh) or the average annual turnover of immediately preceding three consecutive financial years exceeds Rs.2 crore, then the company shall lose its status as an OPC. Thus, OPC shall be required to compulsorily convert to either to a private company or a public company.

**Statement 2 is incorrect:** **NRIs are now allowed to form a One Person Company in India**. Earlier, only Indian resident citizens were allowed to form one person companies in India. **Allowing NRIs to invest** through this route can encourage start-up's and small business to set up without the concerns of a larger compliance framework or minimum capital commitment.

**Statement 3 is correct:** **A person can be member in only one OPC**. Where a natural person, being member in One Person Company becomes a member in another OPC, he/she shall withdraw his membership from either of the OPCs within one hundred and eighty days

Knowledge Base:

**Other features of One Person Companies:**

- 1) The identity of an OPC is distinct from that of its owner and therefore the **owner will not be sued—only the company will.**

2) It has **limited liability**, where personal assets of the shareholders and directors remain protected in case of a default.

3) Unlike a sole proprietorship, OPCs **can raise equity funding** and are **eligible for government schemes**.

**Source:** <https://economictimes.indiatimes.com/small-biz/entrepreneurship/budget-2021-fm-announces-changes-in-small-companies-threshold-modifications-for-one-person-company/articleshow/80628453.cms?from=mdr>

<https://www.livemint.com/budget/news/budget-2021-single-person-companies-can-be-set-up-to-boost-startup-incorporation-11612168778411.html>

Q.28)

Ans) b

Exp) Option b is the correct answer.

**Option a is incorrect:** For the capital market, rolling settlement is the next big landmark, after dematerialization. A small beginning was made in December 1999 with rolling settlement introduced in 10 scripts. **A rolling settlement refers to a system in which trades outstanding at the end of the day have to be settled at the end of the settlement period.** In a T + 5 rolling settlement, for example, a transaction entered into on Monday has to be settled on the fifth working day after Monday i.e., on the following Monday. Similarly, a transaction entered into on Tuesday shall be settled the following Tuesday.

**Option b is correct:** The settlement system in specified securities providing for carry forward of transactions from one settlement day to another has been known as badla system. Here the charges paid for carry forward termed as badla charges. The amount of which depended upon the class of security, its quantity, the amount involved and the interest rate prevailing in the market at the time of the transaction. All along, it had been felt that this system led to excessive speculation and, at times, to certain malpractices like price rigging, evasion of margins, and non-reporting of transactions.

**Option c is incorrect:** Spot delivery contracts refers to the Such contracts which are settled on the spot i.e., the delivery and payment made on the day of the transaction itself or latest by the following day. This, however, has not been a common practice.

**Option d is incorrect:** Traditionally, trades have been settled by physical delivery of securities. This implies that the securities have to physically move from the seller to the seller's brokers, from seller's brokers to the buyer's broker (through the clearing house of the exchange or directly), and from buyer broker to the buyer. Then the buyer has to lodge the securities with the transfer agents of the company to get them transferred in his name, and the process of transfer would take 2 to 3 months.

Source: <https://www.egyankosh.ac.in/bitstream/123456789/12335/1/Unit-10.pdf>

Q.29)

Ans) c

Exp) Option c is the correct answer.

The National Bank for Financing Infrastructure and Development Act, 2021 aims to establish the National Bank for Financing Infrastructure and Development (NBFID) as the principal development financial institution (DFIs) for infrastructure financing. The details related to it are given below.

**Statement 1 is correct.** National Bank for Financing Infrastructure and Development (NBFID) will act as Development Financial Institution (DFI) and unlike banks, **DFIs do not accept deposits from people**. They source funds from the market, government, as well as multi-lateral institutions, and are often supported through government guarantees.

**Statement 2 is incorrect.** NBFID will be constituted as a corporate body. It will have an authorised share capital of **Rupees 1 lakh crore**. Initially, the central government will own 100% shares of the institution. However, subsequently, the **central government share may be reduced up to 26%**. It is because its share may be held by: (i) central government, (ii) multilateral institutions, (iii) sovereign wealth funds, (iv) pension funds, (v) insurers, (vi) financial institutions, (vii) banks, and (viii) any other institution prescribed by the central government.

**Statement 3 is correct.** . Developmental objectives include facilitating the development of the market for bonds, loans and derivatives for infrastructure financing.

**Statement 4 is correct. Source of funds:** NBFID may raise funds in the form of loans or otherwise both in **Indian rupees** and **foreign currencies**. NBFID is allowed to borrow money from: (i) central government, (ii) Reserve Bank of India (RBI), (iii) scheduled commercial banks, (iii) mutual funds, and (iv) multilateral institutions such as World Bank and Asian Development Bank. In addition, NBFID may secure money by the issue and sale of various financial instruments including bonds and debentures.

Source: <https://prsindia.org/billtrack/the-national-bank-for-financing-infrastructure-and-development-bill-2021>

Q.30)

Ans) b

Exp) Option b is the correct answer.

**Option a is incorrect:** Skimpflation is a situation where firms in response to higher costs reduce the quality of a good/service. Skimpflation means consumers get less for the same price. Skimpflation is related to inflation in that rising prices and costs in the economy lead to lower living standards for consumers. The difference is that although prices do not rise directly, you would effectively have to spend more to get the same service that you did before.

**Option b is correct: Shrinkflation is a combination of two words, “shrink” and “inflation”.** It is the practice of reducing the size of a product while maintaining its sticker price. **Shrinkflation is basically a form of hidden inflation.** The **main reason for shrinkflation is the Increase Production Costs** due to the increase in the various elements of production costs such as raw materials, labour, power cost, and so on. The manufacturers are compelled to follow shrinkflation as the increasing costs eat up their profit margin

- 1) Examples of Shrinkflation: Shrinkflation is done most commonly in the food and beverage sector, though it may occur in any industry:
- 2) The size of a chocolate bar is reduced from 60 grams to 55 grams, with no resultant decrease in price.
- 3) The pages of a notebook are changed from 1000 to 800 and the price remains unaltered.
- 4) The size of the cold drink bottle is dropped to 750ml from 800ml and no change in price is done.





**Option c is incorrect:** Stagflation is a term used by economists to define an economy that has inflation, a slow or stagnant economic growth rate, and a relatively high unemployment rate. Economic policymakers across the globe try to avoid stagflation at all costs. With stagflation, a country's citizens are affected by high rates of inflation and unemployment. High unemployment rates further contribute to the slowdown of a country's economy, causing the economic growth rate to fluctuate no more than a single percentage point above or below zero.

**Option d is incorrect:** Skewflation means the skewness of inflation among different sectors of the economy some sectors are facing huge inflation, some none and some deflation.

Source: [https://blog.forumias.com/shrinkflation-how-inflation-is-downsizing-some-of-your-favourite-foods/#What\\_is\\_Shrinkflation](https://blog.forumias.com/shrinkflation-how-inflation-is-downsizing-some-of-your-favourite-foods/#What_is_Shrinkflation)

<https://www.weforum.org/agenda/2022/03/how-companies-are-hiding-inflation-without-charging-you-more/>

<https://www.economicshelp.org/blog/glossary/skimpflation/>

<https://www.investopedia.com/ask/answers/09/inflation-vs-stagflation.asp>

Q.31)

Ans) a

**Exp) Option a is the correct answer.**

A Swiss Challenge is a method of bidding. It is often used in public projects, in which an interested party initiates a proposal for a contract or the bid for a project.

**Option a is correct:** In conventional methods of public procurement the **government first announces contracts** for requirements and **invites bids** from interested developers. On the other hand, in **Swiss Challenge method**, any developer interested in taking up a **particular project** can **initiate an offer** to the government, which will **start the bidding process** on that project.

**Option b is incorrect:** Although not announced publicly in the beginning, **once the first bid is made**, the **government** puts the **details of the proposed project**, as well as the **bid** offered by the **first applicant** in the **public domain**.

**Option c is incorrect:** Once the **first bid is made** and the **project details are made public**, the **bidding process** is **open to any and all developers** who are interested. They **can make better offers** in a type of reverse bidding process.

**Option d is incorrect:** One of the **biggest advantages** of this method is that there is the **option** of **continuous improvement of bid offer**. Suppose the initial developer A makes a bid for amount X. Now when the project is announced publicly, another developer **B makes a bid of Y which is lesser than X**. If the developer A agrees to offer a bid lower than Y, then this process continues, else B gets the project. This ensures that the government procures services for the least expense, and that it gets best deal. Hence **each bidder** gets to make **multiple (minimum 2) bids**.

**Knowledge Base:**

- 1) The initial developer has the right of first refusal.
- 2) The Swiss challenge method is not new and has been used in India by various states including Karnataka, Andhra Pradesh, Rajasthan, Madhya Pradesh, Bihar, Punjab and Gujarat for roads and housing projects.
- 3) In 2009, the Supreme Court approved the method for award of contracts.
- 4) This method can be applied to projects that are taken up on a PPP basis but can also be used to supplement PPP in sectors that are not covered under the PPP framework.

Source: <https://www.thehindubusinessline.com/opinion/columns/slate/all-you-wanted-to-know-about-swiss-challenge/article24194034.ece>

<https://www.livemint.com/Politics/HOCSnmCWarO4hpYglBsHBP/What-is-the-Swiss-Challenge-Method.html>

Q.32)

Ans) d

Exp) Option d is the correct answer.

Sovereign debt is debt created when a country borrows money and creates bonds in a currency other than its own. It is also called National Debt. Sovereign debt is at higher risk for sovereign default because the government cannot inflate or print its way out of the debt.

Sovereign default is the failure by a government to repay its national debts.

**Consequences of Sovereign Defaults**

- 1) First, and possibly worst, **the sovereign's currency will be devalued**, making it less acceptable to others. **(Hence, Statement 1 is correct)**
- 2) **It will make imported goods more expensive**, and in general hurting the economy of the defaulting country. On the other hand, goods and services in the defaulting country become cheaper for visitors **using other currencies which may lead to increases in exports and tourism**. **(Hence, Statement 2 is correct)**
- 3) The interest rates will increase exponentially on many mortgages, car loans, and student/business loans, resulting in substantially less disposable income to spend on goods and services, which could ultimately lead to a recession. **(Hence, Statement 3 is correct)**
- 4) The country becomes **less attractive to investors**, and it will become **difficult for the state to access new funds from the international bond market**. **(Hence, Statement 4 is incorrect)**

Source: <https://www.investopedia.com/terms/s/sovereign-default.asp>

<https://www.outlookindia.com/business/what-happens-when-a-country-defaults-on-its-debts-news-191946>

Q.33)

Ans) a

Exp) Option a is the correct answer.

**Pair 1 is correct:** The Latin phrase **ad valorem** means "**according to value**." So, all ad valorem taxes are based on the **assessed value** of the item being taxed. An example for ad valorem tax is imposition of 28% GST on luxury cars. Here, if the price of a car is Rs 10 lakh, the GST amount will be Rs 2.8 lakhs

**Pair 2 is correct:** **Tobin Tax** is a concept of taxing **spot transactions (speculative)** on **currencies in forex trading** on the stock market so as to **discourage speculation** and **promote currency stability** which is important for the real economy. The Tobin tax is sometimes referred to as the **Robin Hood tax**, as many see it as a way for governments to take small amounts of money from the people making large, short-term currency exchanges.

**Pair 3 is correct:** **Pigouvian Tax** or **Sin Tax** is a duty assessed on **businesses** that create **services or products** like **liquor, tobacco products, coal mining**, etc which have **adverse effects** on **society** like **environmental pollution, damage to public health**, etc, whose **price** of these **externalities** has **not been included** in the sale price of the product. A **carbon emissions tax** or a tax on plastic bags are examples of Pigouvian taxes.

**Pair 4 is incorrect:** **Transfer Tax** charge levied on the **transfer of ownership or title to property** from one individual or entity to another.

A **tax on capital gains** from sale of **long term financial instruments** is a **part** of **Long Term Capital Gains (LTCG) tax**.

Source: <https://www.investopedia.com/terms/a/advaloremntax.asp>

<https://www.investopedia.com/terms/t/tobin-tax.asp>

<https://www.investopedia.com/terms/p/pigoviantax.asp>.

<https://www.investopedia.com/terms/t/transfertax.asp>

**Q.34)**

**Ans) d**

**Exp) Option d is the correct answer.**

Bucharest Nine groups of countries are closely associated with the now dissolved Soviet Union. They are part of the European Union (EU) and North Atlantic Treaty Organisation (NATO).

**Statement a is incorrect.** **Islamic Military Alliance to Fight Terrorism (IMAFI)** is an alliance of Arab and Muslim states in the continents of Asia and Africa that is relevant for **regional security politics** and potentially conducive to addressing the growing **global threat of terrorism**.

**Statement b is incorrect.** **The Collective Security Treaty Organization** originates from the conclusion of the Collective Security Treaty, which was signed in Tashkent (Uzbekistan) on May 15, 1992 by the heads of Armenia, Kazakhstan, Kyrgyzstan, Russia, Tajikistan and Uzbekistan. Later, it was joined by Azerbaijan, Belarus and Georgia (1993). It plays an important role in maintaining close cooperation and understanding in the military-political field.

**Statement c is incorrect.** Shanghai Cooperation Organisation (SCO) is a Eurasian political, economic and military organisation for maintaining peace, security and stability in the region. Having begun as the Shanghai Five in 1996 by the leaders of China, Russia, Kazakhstan, Kyrgyzstan, and Tajikistan, it was rechristened as the SCO in 2001. The SCO entered into force on 19 September 2003.

**Statement d is correct.** The "**Bucharest Nine**" founded on **November 4, 2015** is a group of nine NATO countries in Eastern Europe that became part of the US-led military alliance after the end of the Cold War. The countries included are-Romania and Poland, Hungary, Bulgaria, the Czech Republic, Slovakia, and the three Baltic republics of Estonia, Latvia, and Lithuania.

Source: <https://www.un.org/en/development/devagenda/population.shtml>

<https://en.odkb-csto.org/25years/>

<https://doaj.org/article/00b5e6436c7c40b7a03cefee14569698>

<https://indianexpress.com/article/explained/everyday-explainers/bucharest-nine-nato-countries-eastern-europe-explained-7836360/>

[http://eng.sectsc.org/about\\_sco/](http://eng.sectsc.org/about_sco/)

<https://www.business-standard.com/about/what-is-sco>

**Q.35)**

**Ans) d**

**Exp) Option d is the correct answer.**

A 'strategic relationship' involves a shared understanding between the two or more states involved on the nature of threats in the environment and the place of their collective power in helping mitigate the threats. These are not alliance and hence, give more flexibility to states that seek to pool complementary potentials of partnered states for mutual benefits.

**Option d is correct:** India has signed strategic partnership with more than 30 countries including USA, UK, Japan, France, China, etc. It suits India's non-aligned approach to international politics.

**Statement 1 is correct.** India and Japan established diplomatic relations in 1952. The two countries entered into 'Global Partnership' in 2000, which was upgraded to 'Strategic and Global Partnership' in 2006. The relationship was further upgraded to **Special Strategic and Global Partnership in 2014**.

**Statement 2 is correct.** India-U.S. share a "global strategic partnership", based on shared democratic values and increasing **convergence of interests** on bilateral, regional and global issues. The bilateral cooperation between two countries is broad-based and multi-sectoral, covering trade and investment, defence and security, education, science and technology, cyber security, high-technology, civil nuclear energy, space technology and applications, clean energy, environment, agriculture and health.

**Statement 3 is correct.** India and Rwanda in 2017 agreed to **raise the level of bilateral cooperation to a strategic partnership**. India has repeatedly extended line of credit to bring development in this country. Rwanda also signed the International Solar Alliance during the 2017 meeting.

**Statement 4 is correct.** Bilateral Relations between India and Israel started right after the creation of the State of Israel in 1948 and reached its peak with the establishment of full diplomatic relations in 1992. In 2017, during the first-ever visit by an Indian Prime Minister to Israel, the **relationship was upgraded to strategic partnership**.

**Statement 5 is correct.** **India-Vietnam Comprehensive Strategic Partnership was established in 2016**. India has always considered Vietnam as an important pillar of India's Act East Policy and Indo-Pacific Vision. Both the countries have also agreed to enhance defence partnership between the two countries.

Source:

<https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1817046&msclkid=c8b35b65bd4411ecadcd176263c53c03>

<https://pib.gov.in/PressReleasePage.aspx?PRID=1767855>

[https://www.business-standard.com/article/news-ians/india-rwanda-become-strategic-partners-117011000718\\_1.html](https://www.business-standard.com/article/news-ians/india-rwanda-become-strategic-partners-117011000718_1.html)

[https://www.mea.gov.in/Portal/ForeignRelation/India-Japan\\_Bilateral\\_Brief\\_feb\\_2020.pdf](https://www.mea.gov.in/Portal/ForeignRelation/India-Japan_Bilateral_Brief_feb_2020.pdf)

[https://www.mea.gov.in/Portal/ForeignRelation/India\\_US\\_brief.pdf](https://www.mea.gov.in/Portal/ForeignRelation/India_US_brief.pdf)

<https://idsa.in/askanexpert/What-is-the-function-of-strategic-partnerships>

Q.36)

Ans) d

Exp) Option d is the correct answer.

**Pair 1 is correct: Solomon Islands** are a group of islands in **Solomon Sea, northeast to Australia and east of Papua New Guinea**. It is a small **Pacific Island (in south west Pacific)**, which was traditionally under the influence of Australia, depending on it for its security needs. However, it was **recently in news** as **China** has been making overtures to this island in order to strengthen its presence in the region and establish its hegemony. This has created tensions with both Australia and the USA who are China's competitors for strategic power.





**Pair 2 is correct:** The **Chagos** is an **archipelago** in the **Indian Ocean**, further **south of the Maldives**. It is claimed by **Britain** as its **overseas territory**. It has a **joint military base** with the **USA**, on the archipelago's **largest island Diego Garcia**. It is seen **regularly in news** as **Mauritius** claims this to be its sovereign territory illegally occupied by Britain, while Britain denies these claims. The **International Court of Justice** asked the **United Kingdom** has to **bring to an end** its administration of the Chagos Archipelago. However, **Britain** has thus far **refused to withdraw**. **India supports Mauritius'** claims internationally.



**Pair 3 is correct:** **Cayman Islands** is an island group and **overseas territory** of the **United Kingdom** in the **Caribbean Sea**. They lie to the **south east of North America**. They are **situated on the edge of two tectonic plates**, and often witness earthquake activity. They were in the news as a **destination for money laundering** through the creation of **shell companies**. It is a **low tax jurisdiction** with **lax corporate laws**. Individuals often create inactive dummy companies here and use these to round trip their black money and invest it in the Indian economy, thus laundering it as legal money.



Source: <https://epaper.thehindu.com/Home/MShareArticle?OrgId=GE19KS20T.1&imageview=0>

<https://www.worldatlas.com/maps/solomon-islands>

<https://www.deccanherald.com/opinion/the-chagos-archipelago-between-british-colonial-past-american-interests-and-mauritian-sovereignty-1092459.html>

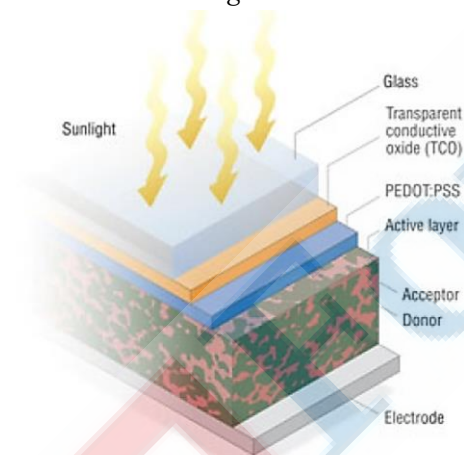
<https://indianexpress.com/article/india/offshore-trusts-first-in-searches-tied-to-probe-in-pandora-papers-7839563/>

Q.37)

Ans) a

Exp) Option a is the correct answer.

Organic Photovoltaic cells (OPV cells) are one of the emerging photovoltaic (PV) technologies and are classified as third-generation solar cells with organic polymer material as the light absorbing layer.



**Statement 1 and 2 are correct:** Organic PV cells use an **organic (carbon containing) polymer** instead of an **inorganic substrate like silicon** to make the **layer of light absorbing semiconductor** in the PV cells. But other than the material used, the mechanism of energy generation remains the same. Sun's radiation **strikes electrons** in the organic material of the cell and **cause excitation**, thus causing a **flow of electrons** and **creating electricity**. The usage of organic compounds helps **lower the cost** of manufacturing PV cells as they are much **cheaper** than inorganic PV cells.

**Statement 3 is incorrect:** The **upper limit of energy efficiency** of a **conventional PV cell** made of **silicon** is around **25-30%**, whereas that of **organic PV cells** has been found to be a **maximum of 18%** upto now. Therefore, the **energy efficiency of OPV cells is lower** than conventional silicon PV cells. Hence this **statement is incorrect**.

Knowledge Base:

- 1) Organic solar cells are made of thin layers of organic materials with thickness in the 100 nm range.
- 2) Carbon-based nanostructures, such as fullerenes, nanotubes, and graphene, have promising applications due to their excellent electronic, optical, thermal, and mechanical properties. Among them, graphene is most commonly used for fabrication of carbon-based organic photovoltaic cells.
- 3) Since the organic polymer industry is well established and they are already manufactured on large scale as a part of many industrial processes, the OPV cells are cheaper to manufacture and thus better suited to large scale power generation.

Source:

<https://www.sciencedirect.com/science/article/pii/S187661021300043X#:~:text=The%20upper%20limit%20of%20silicon,a%20laboratory%20and%20commercial%20environment.>

<https://www.thehindu.com/sci-tech/science/iiser-bhopal-develops-organic-solar-cell-using-vitamin-b12-derivative/article24903121.ece>

[https://www.nrel.gov/pv/organic-photovoltaic-solar-cells.html#:~:text=improving%20cell%20efficiency%20\(currently%2018.2%25%20certified](https://www.nrel.gov/pv/organic-photovoltaic-solar-cells.html#:~:text=improving%20cell%20efficiency%20(currently%2018.2%25%20certified)

Q.38)

Ans) c

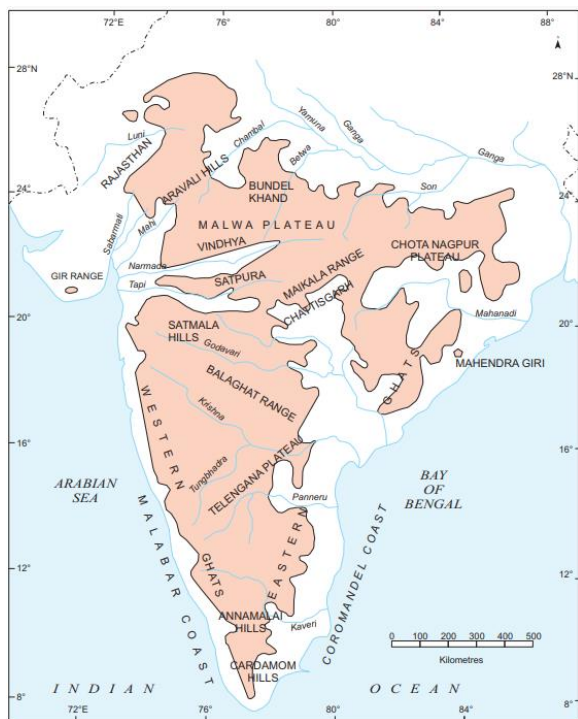
**Exp) Option c is the correct answer.**

River Narmada divides the peninsular block of India into two parts. The region lying to the north of the Narmada is called the Central Highlands and the region lying to the south of Narmada is called the Deccan Plateau (Peninsular plateau).

**Statement 1 is incorrect:** The Satpura range is formed by a series of **scarped plateaus on the south**, generally at an elevation varying between 600-900 m above the mean sea level. This forms the **northernmost boundary of the Deccan plateau**. The Satpura Range rises in **eastern Gujarat** running east through the **border of Maharashtra and Madhya Pradesh** and **ends in Chhattisgarh**. **Satpura range is thus spread across four states in India**. The range parallels the Vindhya Range to the north. It is a classic example of the **relict mountains which are highly denuded and form discontinuous ranges**.

**Statement 2 is correct:** The general elevation of the Central Highlands ranges between 700-1,000 m above the mean sea level and **it slopes are from southwest to northeast**.

**Statement 3 is correct:** An eastern extension of the Central Highland is formed by the Rajmahal hills, to the south of which lies a large reserve of mineral resources in the Chotanagpur plateau

**Knowledge Base:****Other features of Central Highlands:**

- 1) It extends between **river Narmada and Great Northern Plains**.
- 2) The **Aravallis form the west-northwestern edge** of the Central Highlands. These hills extend from Gujarat, through Rajasthan to Delhi in the north-easterly direction.
- 3) The highest peak of the Aravalli hills is Gurushikhar (1722 m) near Mt. Abu.
- 4) **Vindhyachal Range forms the southern edge** of Malwa Plateau. The Mahadeo Hills, Kaimur Hills and Maikal Range lie towards further east.
- 5) The slope of Vindhayachal Range towards Narmada valley is absolutely steep and forms escarpments. It only confirms that **Narmada flows through a rift valley**. This range has very **few passes**. Due to this fact the Vindhyas acted as a barrier between northern and southern parts of India for a long time in the past.
- 6) The valley of Narmada is situated between the Satpuras and the Vindhyas. **River Narmada flows from east to west** in this valley and falls into the Arabian Sea.
- 7) This valley has been formed due to the subsidence of the land mass between the Vindhyas and the Satpuras.
- 8) Malwa plateau forms the dominant part of the Central Highlands. It lies to the southeast of Aravallis and to the north of the Vindhyachal Range. **River Chambal, Betwa and Ken drain the Malwa Plateau** before joining the Yamuna. The rivers draining Central Highlands region are namely the Chambal, the Sind, the Betwa and the Ken. The flow of the rivers is from southwest to northeast, thus indicating the slope. The Central Highlands are wider in the west but narrower in the east.

Source: Geography, NCERT XI, Chapter-2, Structure and Physiography, Pg. 16-17

Geography, NCERT-IX, Chapter-2, Physical Features of India, Pg. 12

<https://artsandculture.google.com/entity/m03dg9c?hl=nl>

<https://www.nios.ac.in/media/documents/316courseE/ch16.pdf> (Pg. 11-13)



Q.39)

Ans) c

Exp) Option c is the correct answer.

Mahayana school is more liberal and believes in the heavenliness of Buddha and Bodhisattvas embodying Buddha Nature. The ultimate goal under Mahayana is “spiritual upliftment”.

**Option c is correct: Virya** is one of the six perfections recommended by Mahayana School and **refers to energy**. As per Lotus Sutra, Mahayana school believes in **six perfections (or paramitas)** to be followed by an individual:

- 1) Dana (generosity)
- 2) Sila (virtue, morality, discipline and proper conduct)
- 3) Ksanti (patience, tolerance, acceptance).
- 4) **Virya (energy, diligence, vigor, effort)**
- 5) Dhyana (one-pointed concentration)
- 6) Prajna (wisdom and insight)

Source: Indian Culture, Nitin Singhania, 3<sup>rd</sup> Edition, Chapter-14, Buddhism and Jainism

Q.40)

Ans) a

Exp) Option a is the correct answer.

**Statement 1 is correct: Non-Communicable Diseases (NCDs)** such as **hypertension, diabetes, obesity**, etc contribute to a **majority of India's Disease Burden (death and disability)**.

Non communicable diseases (NCDs) contribute to around **5.87 million** (60%) of all deaths in India.

IN **1990**, **60%** of total disease burden in India was due to **communicable**, maternal, neonatal, and nutritional diseases (termed **infectious and associated** diseases) which dropped to **33% in 2016**. There was a corresponding **increase** in the contribution of **non-communicable diseases** from **30%** of the total disease burden in **1990 to 55% in 2016**.

**Statement 2 is correct:** For the **last 2 decades**, **heart diseases**, also known as **cardiovascular diseases**, have been the **leading cause of death** in India. **Sedentary** lifestyle combined with an **increasing consumption of processed food** has led to heart issues such as coronary blockages, heart attacks. Etc. According to **Lancet's Global Disease Burden Report**, **Ischemic heart diseases** are the leading cause of deaths in India.

On causative factor is Chronic Obstructive Pulmonary Disorder, followed by Stroke and then Diarrhoea.

**Statement 3 is incorrect:** The **share of the government's health** expenditure in the total GDP of the country has **increased** from **1.15 per cent (2013-14) to 1.35 per cent (2017-18)**, according to the National Health Accounts Estimates for India. This is **not double the original amount**; hence this **statement** is incorrect.

**Knowledge Base:**

- 1) Among the leading non-communicable diseases, the largest disease burden or DALY rate increase from 1990 to 2016 was observed for diabetes, at 80%, and ischaemic heart disease, at 34%.
- 2) In 2016, three of the five leading individual causes of disease burden in India were non-communicable, with ischaemic heart disease and chronic obstructive pulmonary disease as the top two causes and stroke as the fifth leading cause.
- 3) According to the National Health Accounts Estimate report, per capita out-of-pocket expenditure has declined from Rs 2,336 to Rs 2,097 from 2013-14 to 2017-18.

- (a) The share of the government's health expenditure in the total health expenditure has increased to 40.8 per cent (2017-18) from 28.6 per cent (2013-14)

Source: <https://vikaspedia.in/health/health-directory/india-state-level-disease-burden-report-released>

[https://www.downtoearth.org.in/dte-infographics/59394\\_india\\_health\\_burden.html#:~:text=Over%2061%20per%20cent%20of,occur%20due%20to%20cardiovascular%20diseases.](https://www.downtoearth.org.in/dte-infographics/59394_india_health_burden.html#:~:text=Over%2061%20per%20cent%20of,occur%20due%20to%20cardiovascular%20diseases.)

<https://economictimes.indiatimes.com/industry/healthcare/biotech/healthcare/govt-health-expenditure-share-in-gdp-increases-to-1-35-from-1-15/articleshow/87979753.cms?from=mdr>

<https://www.hindustantimes.com/health/the-top-10-causes-of-death-in-india/story-IFLxCFVHmF7svw2RKCl70K.html>

<https://www.healthdata.org/india#:~:text=What%20causes%20the%20most%20deaths>

<https://www.healthdata.org/india#:~:text=What%20causes%20the%20most%20deaths>

Q.41)

Ans) b

Exp) Option b is the correct answer.

**Statement 1 is incorrect:** Hot spot volcanism is unique because it does not occur at the boundaries of Earth's tectonic plates, where all other volcanism occurs. Instead, **it occurs at abnormally hot centers known as mantle plumes**. A **hot spot** is fed by a region deep within the Earth's mantle from which heat rises through the process of convection. This heat facilitates the melting of rock at the base of the lithosphere, where the brittle, upper portion of the mantle meets the Earth's crust. The melted rock, known as magma, often pushes through cracks in the crust to form volcanoes.

**Statement 2 is incorrect:** Shield volcanoes are **mostly made up of basalt**, a type of lava that is very fluid when erupted. For this reason, these **volcanoes are not steep**. They become explosive if somehow water gets into the vent; otherwise, they are **characterized by low explosivity**. The upcoming lava moves in the form of a fountain and throws out the cone at the top of the vent and develops into a cinder cone.

**Statement 3 is correct:** **Deccan Traps** is a very large igneous province located in west central India. Previous studies have suggested it came about due to an eruption associated with a **plume** that now lies **directly below Reunion Island** in the Indian Ocean, about **66 million years ago**.

Because of the huge amount of lava involved, a new study suggest that it may have formed due to eruptions from two distinct plumes. The researchers found that their model showed two plumes feeding **two eruptions simultaneously** for about 10 million years - one under **Reunion** and another called the **Comoros plume**.

**Statement 4 is incorrect:** A **volcano above a hot spot does not erupt forever**. The **volcano moves** as it is **attached with the tectonic plate below** and is eventually cut off from the hot spot. Without any source of heat, **the volcano becomes extinct and cools**. This cooling causes the rock of the volcano and the tectonic plate to become denser. Over time, the dense rock sinks and erodes. A new and active volcano develops over the hot spot, creating a continuous cycle of volcanism.

Knowledge Base:

Hot spot volcanism is unique because it does not occur at the boundaries of Earth's tectonic plates, where all other volcanism occurs. Instead, it occurs at abnormally hot centers known as mantle plumes. Scientific models depict these plumes of molten rock almost like a lava lamp, with a rising bulbous head fed by a long, narrow tail that originates in the mantle.

Island volcanoes that form over hot spots are generally less explosive than volcanic arcs that form over subduction zones.

Major hot spots include the Iceland hot spot, under the island of Iceland in the North Atlantic; the Reunion hot spot, under the island of Reunion in the Indian Ocean; and the Afar hot spot, located under northeastern Ethiopia.

Volcanic activity at hot spots can create submarine mountains known as seamounts.

Hot spots don't always create volcanoes that spew rivers of lava. Sometimes, the magma heats up groundwater under the Earth's surface, which causes water and steam to erupt like a volcano. These eruptions are called geysers.

A hot spring is a discharge of hot (>35–40°C) water from a vent at the Earth's surface.

A geyser is a hot spring characterized by intermittent, turbulent discharges of boiling water and steam.

Source: <https://www.nationalgeographic.org/article/hot-spot-volcanism/>

<https://www.nationalgeographic.org/encyclopedia/geyser/>

<https://www.egyankosh.ac.in/bitstream/123456789/70607/1/Block-1.pdf>

<https://nios.ac.in/media/documents/316courseE/ch4.pdf>

India's Deccan Traps formed by two eruptions: Study

Q.42)

Ans) d

Exp) Option d is the correct answer.

**Statement 1 is incorrect:** Landslides in the Western Ghats (including Kerala) are mainly due to concentrated rainfall, overburdening of hills, mining, and quarrying. The Western Ghats region is tectonically more stable and has less frequency of tremors and landslides due to it. The major part of Western Ghats is comprised of basalt rocks. These rocks have great resistance to erosion and denudation and result in fewer landslides due to differences in rock composition.

**Statement 2 is correct:** Cyclones in the Bay of Bengal can be attributed to the vast low pressure created by the warm water of the ocean. The Bay of Bengal shaped like a trough that makes it more hospitable for storms to gain force. Moreover, the high sea surface temperature makes matters more worse in the Bay triggering the intensity of the storms.

Additionally, the Bay of Bengal gets more rainfall with sluggish winds and warm air currents around it that keep temperatures relatively high all year. The absence of air movements from north-western India towards the Bay of Bengal in the post-monsoon phase is also another reason for the chances of cyclones in the Bay of Bengal.

**Statement 3 is correct:** A numbers of hamlets in the foothills of Arunachal Pradesh and upper Assam have disappeared under water in the last few decades with climate change causing rivers to migrate from their route.

**Statement 4 is correct:** All of the Andaman & Nicobar Islands lie in seismic Zone V. The entire island chain is also susceptible to tsunamis. The Andaman and Nicobar Islands are located near the boundary of the Indian plate and the Burmese Microplate. The Andaman Trench marks this boundary and lies in the Bay of Bengal to the west of the archipelago. Another prominent feature is the north-south West Andaman fault which is strike-slip in nature and lies in the Andaman Sea, to the east of this island chain.

The Indian plate is diving beneath the Burmese Microplate along the Andaman Trench in a process known as "Subduction". Shallow and occasional intermediate-depth earthquakes delineate the subducted slab under the Andaman-Nicobar Islands joining the seismicity trend of the Indo-Burman ranges.

Knowledge Base: Landslides in the Himalayan region are usually due to natural causes such as high seismicity due to plate tectonic movement, easily erodible sedimentary rocks, young and energetic rivers with high erodible, heavy downpour, and snowfall. The Himalayan region is comprised of sedimentary

rocks. These rocks are more susceptible to denudation and erosion as compared to the rocks of Western Ghats.

Source: Flood Problem

Earthquakes in the Andaman & Nicobar Islands

Landslide

Cyclone in Odisha

<https://www.thehindu.com/sci-tech/energy-and-environment/villages-disappearing-as-rivers-change-course-in-arunachal/article4494523.ece>

Q.43)

Ans) d

Exp) Option d is the correct answer.

India's climate is controlled by a number of factors which can be broadly divided into two groups of factors related to location and relief, and factors related to air pressure and winds.

**Option a is incorrect:** Northern part of the India lies in sub-tropical and temperate zone and the part lying south of the Tropic of Cancer falls in the tropical zone. The tropical zone being nearer to the equator, experiences high temperatures throughout the year with **small daily and annual range**. Area north of the Tropic of Cancer being away from the equator experiences extreme climate with high daily and annual range of temperature.

**Option b is incorrect:** There seem to be two rain-bearing systems in India. First originate in the Bay of Bengal causing rainfall over the plains of north India. Second is the Arabian Sea current of the southwest monsoon which brings rain to the west coast of India. **Much of the rainfall along the Western Ghats and western coast is orographic** as the moist air is obstructed and forced to **rise along the Ghats**. The intensity of rainfall over the west coast of India is related to two factors:

- (1) The offshore meteorological conditions.
- (2) The position of the equatorial jet stream along the eastern coast of Africa.

**Option c is incorrect:** During the south-west monsoon period after having rains for a few days, if rain fails to occur for one or more weeks, it is known as **break in the monsoon**. These breaks in the different regions are due to different reasons:

- (1) In **northern India** rains are likely to fail **if the rain-bearing storms are not very frequent along the monsoon trough or the ITCZ** over this region.
- (2) Over the **west coast** the dry spells are associated with days when **winds blow parallel to the coast**.

**Option d is correct:** There are three main **reasons** for the **excessive cold** in **north India** during winter season: (1) States like Punjab, Haryana and Rajasthan being far away from the moderating influence of sea experience continental climate.

- (2) The snowfall in the nearby Himalayan ranges creates cold wave situation; and
- (3) Around February, the **cold winds coming from the Caspian Sea and Turkmenistan** bring cold wave along with frost and fog over the north western parts of India.

Source: NCERT Class 11 India Physical Geography - Chapter 4 Climate.

Q.44)

Ans) d

Exp) Option d is the correct answer.

**Statement 1 is correct:** **Stupas** were **burial mounds** prevalent in India from the **Vedic period**. It is a conventional representation of a funeral cumulus in which relics and ashes of the dead were kept.



The word **Stupa** is mentioned in the **Rigveda and Atharvaveda**. Although a Vedic tradition, stupas were popularised by the Buddhists.

**Statement 2 is correct:** The **Shunga dynasty** introduced the **idea of torans** as beautifully decorated gateways to the stupas. The torans were intricately carved with figures and patterns and were evidence of **Hellenistic influence**. Examples: Bharhut stupa in Madhya Pradesh, the toran at Sanchi stupa in Madhya Pradesh, etc.

**Statement 3 is correct:** King **Ashoka** build 84,000 stupas and divided the Buddha's ashes among them all. One of **Ashoka's goals** was to provide new converts with the tools to **help with their new faith**. In this, Ashoka was following the directions of the **Buddha** who, prior to his death (parinirvana), **directed** Ananda **that stupas should be erected** in places other than those associated with key moments of his life so that "the hearts of many shall be made calm and glad." He also built stupas in regions where the people might have difficulty reaching the stupas that contained the Buddha's ashes.

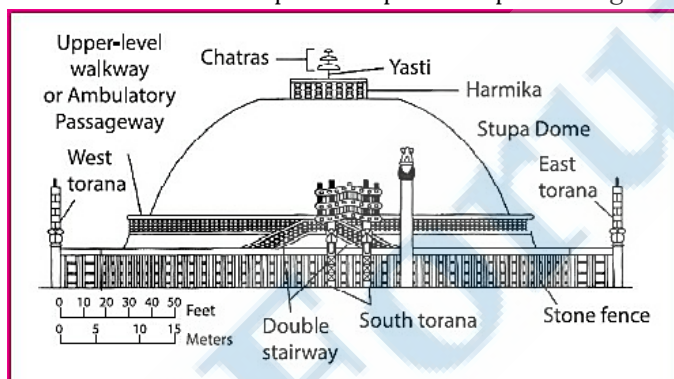
Knowledge Base:

After the death of Buddha, 9 stupas were erected. 8 of them had the relics of Buddha at their medhi while the ninth had the pot in which the relics were originally kept.

During the period of Ashoka, the art of stupas reached its climax. Almost 84000 stupas were erected during his period.

Stupas became larger and more decorative in the post Mauryan period. Stone was increasingly used in place of wood and brick.

The Gupta age saw a decline in the development of stupas. However, Dhamek stupa at Sarnath near Varanasi is a fine example of stupa developed during this period.



Sanchi Stupa in Madhya Pradesh is the most famous of the Ashokan stupas. Piprahwa stupa in Uttar Pradesh is the oldest one.

Source: Indian Art and Culture by Nitin Singhania – 2<sup>nd</sup> Edition – Chapter 1 Indian Architecture, Sculpture and Poetry.

Stupa mentioned in Rigveda

NCERT Class 12 History - Themes in Indian History Part I – P 96.

Q.45)

Ans) b

Exp) Option b is the correct answer.

Lakes can be classified based on their formation – Tectonic, Volcanic, Glacial, Oxbow, Lagoon, Crater and Artificial Lake. Tectonic lakes are lakes formed by the deformation and resulting lateral and vertical movements of the Earth's crust. These movements include faulting, tilting, folding, and warping.

Caldera lakes are formed from the collapse of a volcano's magma chamber. Calderas form a lake as the bowl-shaped depression fills with water.

**Statement 1 is incorrect: Wular Lake** is located in Union Territory of Jammu and Kashmir. It is the largest freshwater lake of India. The lake basin was formed as a result of **tectonic activity**. It is fed by the Jhelum River. It is a Ramsar site. The Tulbul Project is a “navigation lock-cum-control structure” at the mouth of Wular Lake.

**Statement 2 is incorrect: Vembanad Lake is a Kayal Lake of Kerala.** It is the largest lake in Kerala and is the longest lake in India. It is formed out of backwaters.

**Statement 3 is incorrect: Lake Baikal** is the largest freshwater lake in the world (by volume) and the world's deepest lake. It is in the southern Siberia area of Russia. It is a UNESCO World Heritage Site.

Lake Baikal is in a rift valley. It was **formed by the Earth's crust fracturing** and moving. Parts of the Baikal basin developed at different times throughout the Tertiary Period (66 million to 2.6 million years ago).

**Statement 4 is correct: Lake Toba** is the largest lake in Southeast Asia located in Sumatra island of Indonesia. **It is a Caldera Lake.** It was formed by **mega-volcanic eruptions** 74,000 years ago. The Toba Caldera is filled by rain-water. It was incorporated in the UNESCO's Global Geopark.

Q.46)

Ans) a

Exp) Option a is the correct answer.

**Himalayan Serow:** Previously assessed as ‘near threatened’, the **Himalayan serow is now been categorised as ‘vulnerable’** in the IUCN Red List of Threatened Species. A Himalayan serow has been sighted for the first time in Assam. It's a medium-sized mammal with a large head, thick neck, short limbs, long, mule-like ears, and a coat of dark hair. There are several species of serows, and all of them are found in Asia. The Himalayan serow, or *Capricornis sumatraensis* thar, is restricted to the Himalayan region. According to the International Union for Conservation of Nature (IUCN), Himalayan serows have experienced significant declines in population size, range size and habitat in the last decade, and this is expected to continue due to intensive human impact.

**Fishing Cat:** The fishing cat (*Prionailurus viverrinus*) is a medium-sized wild cat of South and Southeast Asia. Because of their dependency on water, fishing cats are threatened by the loss of wetlands, swamps and mangrove habitats. Urbanization, farming and other human-animal conflict also mean that populations are set to drop by up to 30%, and the **fishing cat is listed as Vulnerable on the IUCN Red List**. The first-ever survey of the elusive fishing cat in and around Asia's biggest brackish water lagoon, the Chilika lake in Odisha started recently.

**Smooth-coated otters:** It is listed as **vulnerable** on the International Union for Conservation of Nature (IUCN) Red List since the year 1996. Otters feed on juvenile birds, reptiles like snakes, etc., and help in preserving the balance in ecosystem. Mainly seen in groups, smooth-coated otters are known to follow a distinct pattern of hunting trying to induce panic in their prey. The unique characteristics of otters include a short and sleek fur, rounded head, hairless nose and webbed feet which makes it an excellent hunting mammal in water. Otters vary in size, with the larger of them measuring up to 59 to 64 cm in length, weighing in between 7 and 11 kg. They occur usually in larger water bodies and where freshwater is available. They are known to breed throughout the year and some species breed between October and February. Conservation efforts are met with challenges of poaching, loss and destruction of wet lands.

**Lesser Florican** has been recently categorized as Critically Endangered from earlier Endangered.

**Nicobar Imperial-pigeon** has been recently categorized as Near Threatened from earlier Least Concerned.

**Mountain Hawkeagle** has been recently categorized as Near Threatened from earlier Least Concerned.

**Finn's weaver** has been recently categorized as Endangered from earlier Vulnerable.

**Source)** <https://www.thehindu.com/sci-tech/energy-and-environment/campaign-by-the-fishing-cat-conservation-alliance-to-protect-the-feline/article33741075.ece#:~:text=Because%20of%20their%20dependency%20on,on%20the%20IUCN%20Red%20List.>

<https://indianexpress.com/article/explained/its-a-goat-its-a-pig-its-a-serow-explaining-an-unusual-sighting-in-the-spiti-cold-desert-7105007/>

<https://www.thehindu.com/news/national/andhra-pradesh/smooth-coated-otters-mark-their-presence-in-uppalapadu/article33952337.ece>

Q.47)

Ans) b

Exp) Option b is the correct answer.

In Maharashtra the bhakti movement drew its inspiration from the Bhagavata purana and the Siva Nathpanthis. The Vithoba of Pandarpur became the mainstay of the movement in Maharashtra. Saint Eknath was a popular bhakti saint belonging to varkari tradition.

**Option a is incorrect: Eknath was the only saint from Maharashtra** to be a **family householder**. He was renowned for resolving the conflicts between householder duties and the demands of religious devotion through an unswerving faith in Krishna.

**Option b is correct:** Eknath's pen name was Eka-janardana. He wrote a variation of the Hindu epic Ramayana known as **Bhavarth Ramayan** in Marathi language. He also wrote a variation of the Bhagavata Purana known as Eknathi Bhagavata. He composed Rukmini Swayamwar Hastamalak, a literary piece based on a Sanskrit hymn of the same name.

His other literary works include Shukashtak, Sukha, Ananda-Lahari, Chiranjeeva-Pad, Geeta-Saar and Prahlad-Vijaya. He introduced a new form of devotional melodies called Bharood.

**Option c is incorrect: Eknath (1533-1599)** was contemporary to the **Mughal ruler Akbar (1542-1605)**.

**Option d is incorrect: Eknath** emphasized the importance of **kirtana** (singing God's names), **nama smarana** (remembering God's name), and meditation (**dhyana**). He explained the nine traditional limbs of the bhakti marga (navangani).

Although himself from the Deshastha caste of the Brahman class, Eknath came into conflict with the orthodox Brahmans in over his beliefs about caste and religion. Eknath insisted that there is no distinction in God's eyes between Brahman and outcaste or between Hindu and Muslim.

Source: <https://www.britannica.com/biography/Eknath>

[https://nios.ac.in/media/documents/SrSec315NEW/History\\_Module2.pdf](https://nios.ac.in/media/documents/SrSec315NEW/History_Module2.pdf)

Q.48)

Ans) d

Exp) Option d is the correct answer.

**Pair 1 is incorrect: Bugyals are summer grasslands** in the higher reaches of the Great Himalayas in the **Uttarakhand** region. These are high-altitude alpine grassland or meadow. The nomadic groups like Bhotiyas, migrate to Bugyals during summer months and return to valleys during winters.

**Pair 2 is incorrect: Ramgarh crater** is a meteor impact crater of 3 kilometres located in Ramgarh village of Baran district in **Rajasthan**. It is estimated by geologists to have occurred some 150 million years ago. It

is designated as a National Geological Monument. The Bhand Deva Temple is a 10th-century Shiva temple in the style of the Khajuraho Group of Monuments is located here.

Other meteor created lakes in India - Dhala in Madhya Pradesh with 14 km diameter and Lonar in Buldhana district of Maharashtra with 1.8 km diameter.

**Pair 3 is correct: St. Mary's Island** (also called Coconut Island or Thonsepar) is a group of four small islands in the Arabian Sea. It is located 6.5 km off Malpe Beach in **Karnataka**. The northern island has basaltic rock formations in a hexagonal form and was declared as a national geological monument by the Geological Survey of India in 1979.

**Pair 4 is correct: Chir batti** is a natural phenomenon seen in Banni grasslands in **Gujarat**. The word 'chir batti' is derived from chir for ghost and batti for flame in the Kutchi-Sindhi dialect. It is associated with the fireballs suddenly lighting up in the air and floating there. The phenomenon lasts about five to 10 seconds and occurs at night.

In the centre of this grassland is the Kiro Hill, a dormant volcanic hill. While scientifically, no detailed studies have been done, it is believed that the methane gas that rises from the land through the cracked up earth, and the difference in temperature sets it on fire. Another belief is that these are volcanic gases that rise up through the cracks in the land.

Knowledge Base:

Geo-heritage refers to the geological features which are inherently or culturally significant offering insight to earth's evolution or history to earth science or that can be utilized for education.

The Geological Survey of India (GSI) declares geo-heritage sites/ national geological monuments for protection and maintenance.

India has named Lonar lake as wetlands of international importance under the Ramsar Convention. It is a notified National Geo Heritage Monument. The lake is believed to have been formed when a meteorite crashed into Earth around 50,000 years ago. The lake is mentioned in ancient scripts like the Skanda Purana, the Padma Purana and the Ain-i-Akbari.

State	Geological heritage site / National geological monument
<b>ANDHRA PRADESH</b>	Volcanogenic bedded Barytes (Mangampeta), Eparchaeon Unconformity, Natural Geological Arch (Tirumala Hills), Erra Matti Dibbalu (the dissected and stabilized coastal red sediment mounds located between Vishakhapatnam and Bhimunipatnam).
<b>KERALA</b>	Laterite near Angadipuram, Varkala Cliff Section
<b>TAMILNADU</b>	Fossil wood near Tiruvakkarai, National fossil wood park, Charnockite (St. Thomas Mount), Badlands of Karai Formation with Cretaceous fossils along Karai - Kulakkalnattam Section
<b>GUJARAT</b>	Sedimentary Structures - Eddy Markings, Kadan Dam
<b>RAJASTHAN</b>	Sendra Granite, Barr Conglomerate, Stromatolite Fossil Park, Gossan in Rajpura-Dariba Mineralised belt, Stromatolite Park Kishangarh Nepheline Syenite, Akal Fossil Wood Park, Welded Tuff, Jodhpur Group - Malani Igneous Suite Contact, Great Boundary Fault at Satur
<b>MAHARASHTRA</b>	Lonar Lake
<b>CHATTISGARH</b>	Lower Permian Marine bed at Manendragarh
<b>KARNATAKA</b>	Columnar Lava (St Mary Island), Pillow lavas near Mardihalli, Peninsular Gneiss, Pyroclastics & Pillow lavas (Kolar Gold fields)
<b>HIMACHAL</b>	Siwalik Fossil Park



<b>PRADESH</b>	
<b>ODISHA</b>	Pillow Lava in Iron ore belt at Nomira
<b>JHARKHAND</b>	Plant Fossil bearing Intertrappean beds of Rajmahal Formation, upper Gondwana sequence
<b>NAGALAND</b>	Nagahill Ophiolite Site
<b>SIKKIM</b>	Stromatolite bearing Dolomite / Limestone of Buxa Formation

Source: NCERT Class 11 Indian physical environment – Chapter 2 Structure and Physiography P 13.

Rajasthan: Ramgarh crater will be developed as tourist spot

<https://www.thehindu.com/features/metroplus/landscapes-on-fire/article8399462.ece>

<https://blog.forumias.com/geological-heritage-sites-of-himalayan-region-of-india/>

<https://blog.forumias.com/lonar-lake-sur-sarovar-declared-as-ramsar-sites/>

Q.49)

Ans) b

Exp) Option b is the correct answer.

**Statement 1 is incorrect:** Being a sovereign state, India can acquire foreign territories according to the modes recognized by international law, i.e., cession (following treaty, purchase, gift, lease or plebiscite), occupation (hitherto unoccupied by a recognized ruler), conquest or subjugation.

The Constitution itself declares that laws made for admission or establishment of new states (under Article 2) in India are not to be considered as amendments of the Constitution under Article 368. This means that such laws can be passed by a simple majority and by the ordinary legislative process.

**Statement 2 is incorrect:** On acquisition of foreign territory, the pre-acquisition laws and the rights acquired therein may continue only if the Government chooses to recognize them unequivocally. So, they do not become null and void automatically.

**Statement 3 is correct:** Foreign territories which become part of India on acquisition may

- (1) either be admitted into the Union, or
- (2) constituted into new States under article 2, or
- (3) merged into an existing State under article 3(a) or 3(b), or
- (4) formed into a Union territory.

Source: The Acquired Territories (Merger) Act, 1960

The Constitution of India by PM Bakshi – 17<sup>th</sup> Edition – Chapter 1 – P7.

Q.50)

Ans) c

Exp) Option c is the correct answer.

Some major consequences of climate change on the species component of biodiversity include: changes in distribution, increased extinction rates, changes in reproduction timings, and changes in length of growing seasons for plants.

**Option a is incorrect:** Population of krill and other small organisms is declining as ice is receding due to climate change. Due to the high importance of krill in food chains, the entire marine food web would be adversely affected.

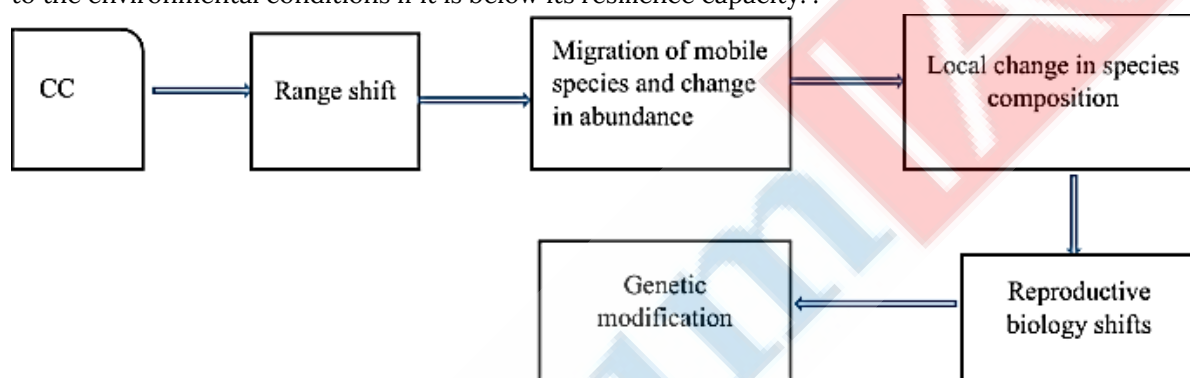
**Option b is incorrect:** Climate change has resulted in increased melting of ice in the high latitude regions. As a result of thawing of snow, the amount of arable land in high-latitude region is likely to increase by reduction of the area of frozen lands.

**Option c is correct:** Many traits incorporated into the modern crop varieties were introduced from wild relatives, improving their productivity and tolerance to pests, disease and difficult growing conditions. Wild relatives of food crops are considered an insurance policy for the future as they can be used to breed new varieties that can cope with the changing conditions. But many **wild races of staple food crops are endangered** and facing **decline in their distribution**. For example, one quarter of all wild potato species are predicted to die out within 50 years.

**Option d is incorrect:** An organism's response to climate change can be driven by genetic (evolutionary) or non-genetic (plastic) processes. Adaptive responses occur within an individual's lifetime and are almost immediate, whereas **evolutionary change requires multiple generations**.

**Widespread Genetic changes do not occur due to recent environmental changes. They require multiple generations over much longer period of time.**

Morphological or physiological adaptation takes place in short span of time and allows a species to adapt to the environmental conditions if it is below its resilience capacity. .



#### Knowledge Base:

Climate change may affect plant growth and production by promoting the spread of pests and diseases. Other expected impacts include:

- 1) increased exposure to heat stress,
- 2) changes in rainfall patterns,
- 3) greater leaching of nutrients from the soil during intense rains,
- 4) greater erosion due to stronger winds, and
- 5) more wildfires in drier regions.

Observed changes in species due to climate changes include:

- 1) Behavioral responses include seeking shade or refuge, altering feeding times, changing site use, and shifting circadian or circannual rhythms.
- 2) Morphological changes commonly entail changes in body size. For example, increasing summer temperatures have been associated with reduced body size and increased wing length in North American migratory.
- 3) Phenology or the seasonal timing of recurring biological events is a critical part of ecological relationships, and a primary indicator of species responses to climate change.
- 4) Geographic range shifts in the distribution of species has been observed.
- 5) The frequency of pests and diseases outbreaks has also changed in forest ecosystems because of changes in climatic variables. Therefore, extreme climatic events and variability (e.g. floods, hail, freezing temperatures, tropical cyclones, and droughts) and the consequences of these (e.g. landslides and wildfire) have affected ecosystems as well.

Some example are:

- 1) Painted turtles grew larger in warmer years and reached sexual maturity faster during warm sets of years.
- 2) The bodyweight of the North American wood rat has declined with an increase in temperature over the last 8 years.
- 3) Some frogs begin calling earlier (to attract mates) or call more during warm years.

Source: <https://www.cbd.int/doc/bioday/2007/ibd-2007-booklet-01-en.pdf>

<https://www.sciencedirect.com/science/article/pii/S0048969720312948>

<https://agricultureandfoodsecurity.biomedcentral.com/articles/10.1186/s40066-021-00318-5>

**Q.51)**

**Ans) c**

**Exp) Option c is the correct answer.**

Among all the developing nations, India is the only one using indigenously developed, demonstrated, and deployed nuclear reactors and is also estimated to have an arsenal of 90–110 nuclear weapons on war front.

**Statement 1 is incorrect.** The Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies aims at promoting transparency and greater responsibility in transfers of conventional arms and dual-use goods and technology. It **does not prohibit** member states but necessitates for members to **exchange information** on deliveries of conventional arms to **non-Wassenaar members** every six months. Both **Russia and India** are **members** of Wassenaar Arrangement.

**Statement 2 is correct.** The Australia Group (AG) is an informal forum of countries which, through the harmonisation of export controls, seeks to ensure that exports do not contribute to the development of chemical or biological weapons.

**Statement 3 is incorrect.** Coordinating Committee on Multilateral Export Controls (CoCom) was the committee, with representatives from the 15 western nations in the NATO alliance plus Japan, that specified the technology for which (CoCom) export approval was required. Following the end of the Cold War, CoCom was replaced in 1996 by the **Wassenaar Arrangement** on Export Controls for Conventional Arms and Dual-Use Goods and Technologies.

**Statement 4 is incorrect.** The Missile Technology Control Regime (MTCR) is a multilateral export control regime established in 1987. It seeks to limit proliferation of missile and missile technology. India joined the group in 2016. China applied for its membership in 2004, but it could not materialise owing to concerns raised regarding its export control standards.

Source: <https://www.armscontrol.org/factsheets/wassenaar>

[https://www.files.ethz.ch/isn/187853/diisreport2015-02\\_pdf.pdf](https://www.files.ethz.ch/isn/187853/diisreport2015-02_pdf.pdf)

<https://economictimes.indiatimes.com/news/india/india-to-import-100-tonne-of-uranium-to-power-nuclear-power-plants-in-fy23/articleshow/90561182.cms>

<https://timesofindia.indiatimes.com/india/nuclear-suppliers-group-and-indias-membership-bid-key-points/articleshow/87471341.cms>

<https://www.dfat.gov.au/publications/minisite/theaustraliagroupnet/site/en/index.html>

**Q.52)**

**Ans) c**

**Exp) Option c is the correct answer.**

Russia shares Land borders with following countries- Azerbaijan, Belarus, China, Estonia, **Finland**, **Georgia**, Kazakhstan, **Latvia**, **Lithuania**, Mongolia, Norway, Poland, and Ukraine. It also shares maritime borders with Japan, Sweden, Turkey, and the United States.



Source: BLACK Swan ATLAS (POLITICAL MAP of ASIA, EUROPE)

<https://www.nationsonline.org/oneworld/russia.htm#:~:text=Russia%20is%20bordered%20by%2014,Turkey%2C%20and%20the%20United%20States>

Q.53)

Ans) d

Exp) Option d is the correct answer.

**Statement 1 is correct:** Under the arctic ocean there is a thick layer of sediment containing large **amounts of methane** in the form of solid methane hydrates; these have a cage-like crystal structure in which methane molecules are surrounded by ice. The release of the overlying pressure due to melting Arctic Sea **allows the hydrates to disintegrate and turn into gaseous methane**, which bubbles up through the water column in intense plumes and is released to the atmosphere.

**Statement 2 is incorrect:** Melting of Arctic Sea ice **adds freshwater to the north Atlantic Sea making the seawater less dense**. This has caused the North Atlantic to become fresher over the past several decades **and has also caused the currents to slow**.

**Statement 3 is correct:** As global temperature rises due to the melting of Arctic Sea ice; it disturbs the delicate balance of warm and cold air that keeps the jet streams in place and thus the jet stream is **shifted north before it finds cold air which leads the jet stream's position to migrate toward higher latitudes**.

**Statement 4 is correct:** The melting of Arctic Sea results in turning the top of the world from white to blue. Since the dark surfaces absorb far more heat than the white ones (**albedo effect**), it leads to increased loss of ice on land and sea. These further increases **regional and global temperature**.





### DISAPPEARING ARCTIC SEA ICE: THE GLOBAL CLIMATE IMPACTS

The rapid disappearance of Arctic sea ice is having profound regional climatic impacts and is beginning to affect the global climate. This graphic illustrates those repercussions as the Arctic Ocean heads for a largely ice-free state in summer, which some scientists say could occur in as little as five years.



#### ① ALBEDO EFFECT

The melting of Arctic Ocean ice is turning the top of the world from white to blue. Since dark surfaces absorb far more heat than white ones, the loss of ice and snow on sea and land is increasing regional and global temperatures.



#### ② METHANE RELEASE

The retreat of Arctic sea ice, and the resulting warming, is beginning to thaw offshore permafrost that contains large amounts of frozen methane, a potent greenhouse gas. Continued Arctic Ocean ice loss and rising temperatures could cause massive methane releases.



#### ③ MELTING THE GREENLAND ICE SHEET

Rising Arctic air temperatures, in part caused by the disappearance of sea ice, are leading to widespread surface melting of Greenland's massive ice sheet. This melt is adding some 72 cubic miles of water to the ocean annually, leading to sea level increases.



#### ④ INCREASE IN WATER VAPOR

Warmer air holds more moisture, so rising Arctic air temperatures mean that the once-frigid polar atmosphere is holding more water vapor. Water vapor is itself a greenhouse gas, trapping outgoing long-wave radiation, so this further heats up the Arctic.



#### ⑤ WARMING RIVERS

As snow cover disappears, causing Arctic terrestrial regions to absorb more heat, the runoff and snowmelt from waterways flow through warmer land, increasing the temperature of large, north-flowing rivers in Siberia and Canada. These warmer rivers inject even more heat into the Arctic Ocean.

MAP SOURCES: NATURAL EARTH; NATIONAL SNOW AND ICE DATA CENTER. ICE EXTENT AS OF SEPTEMBER 2015.

YALE  
environment360

Source: [https://e360.yale.edu/features/as\\_arctic\\_ocean\\_ice\\_disappears\\_global\\_climate\\_impacts\\_intensify\\_wadhams](https://e360.yale.edu/features/as_arctic_ocean_ice_disappears_global_climate_impacts_intensify_wadhams)

<https://scied.ucar.edu/learning-zone/climate-change-impacts/melting-arctic-sea-ice-and-ocean-currents#:~:text=The%20melting%20ice%20causes%20freshwater,caused%20the%20currents%20to%20slow.>

<https://www.businessinsider.in/science/news/the-jet-stream-has-started-an-unprecedented-shift-north-which-could-wreak-havoc-on-weather-in-the-us-and-europe/articleshow/86707357.cms>

<https://nsidc.org/cryosphere/icelights/2011/03/arctic-sea-ice-and-tipping-point#:~:text=Even%20without%20a%20tipping%20point,about%2013%20percent%20per%20decade>

Q.54)

Ans) b

**Exp) Option b is the correct answer.**

Ramayana is one of the greatest Indian epics ever written and it forms an important part of Indian religious and literary history. It is believed to have been written by a poet named Valmiki.

**Statement 1 is incorrect:** The Ramayana is an ancient Sanskrit epic which follows Prince Rama's quest to rescue his beloved wife Sita from the clutches of Ravana with the help of an army of monkeys. It is dated to around **500 BCE to 100 BCE (not finalized during Gupta period)**.

**Statement 2 is incorrect:** The Ramayana was **written by sage Valmiki**. It is **didactic epic** that teaches people, especially the ideal king and ideal wife, how to honour dharma through proper behaviour. On the other hand, **Mahabharata was written by vedvayasa**.

**Statement 3 is correct:** Ramavataram, popularly referred to as **Kamba Ramayanam**, is a Tamil epic that was written by the **Tamil poet Kambar during the 12th century**. It is based on **Valmiki's Ramayana**; the story describes the life of King Rama of Ayodhya.

**Statement 4 is incorrect:** The original version of Ramayana was written in the Sanskrit language is called the Valmiki Ramayana, which **dates back to the 4th century B.C.** As per the Hindu tradition, the Ramayana was considered to have taken place during the period known as **Treta yug**. Whereas, Ramcharitmanas was written in Awadhi Language by tulsidas.

Source: <https://www.indianetzone.com/2/ramayana.htm>

<https://unesdoc.unesco.org/ark:/48223/pf00000032971>

<https://hinduism.stackexchange.com/questions/42710/on-what-basis-does-the-author-of-ancient-india-say-that-the-original-v%C4%81lm%C4%ABki-r%C4%81m>

Q.55)

Ans) b

**Exp) Option b is the correct answer.**

The term "State" is defined under Article 12 of Part III (Fundamental Rights) of the Constitution of India. It states that: "the State" includes the Government and Parliament of India and the Government and the Legislature of each States and all local or other authorities within the territory of India or under the control of the Government of India.

**Option 1 is incorrect:** Co-operative societies are not considered as 'state' under article 12 of constitution. This is because cooperative societies are not created by the co-operative Societies Act and they are **not statutory bodies**. They are only functioning in accordance with the provisions of the Act. Moreover, the **Government has no share** in the Co-operative Societies. There is **no deep and pervasive State Control**. The management of the societies does not vest in the Government, or in the representatives of the Government Bank.

**Option 2, 3 and 4 are correct:** The Supreme Court held that '**other authorities**' under article 12 are authorities which includes **all authorities created by the Constitution or statute** on whom the powers are conferred by Law. These authorities will be **termed as state**. It is not necessary that these authorities should be engaged in performing the governmental or sovereign function.

Other authorities include the **State Electricity Board, LIC, ONGC, and Children Aid society**.

**Option 5 is correct:** In Ramana Dayaram Shetty v. Airport Authority of India, the Supreme Court concluded in this decision that **if a body is a government agency** or instrumentality, it can be an authority under Article 12 **regardless of whether it is a statutory corporation**, a government company, or

a registered society. As a result, the **Airport Authority of India is a State under Article 12** because it was established by an Act of Parliament.

Source: The Constitution of India by PM Bakshi 17<sup>th</sup> edition page-14, 15

Other Authorities under Article 12 of Constitution - Academike (lawctopus.com)

Q.56)

Ans) c

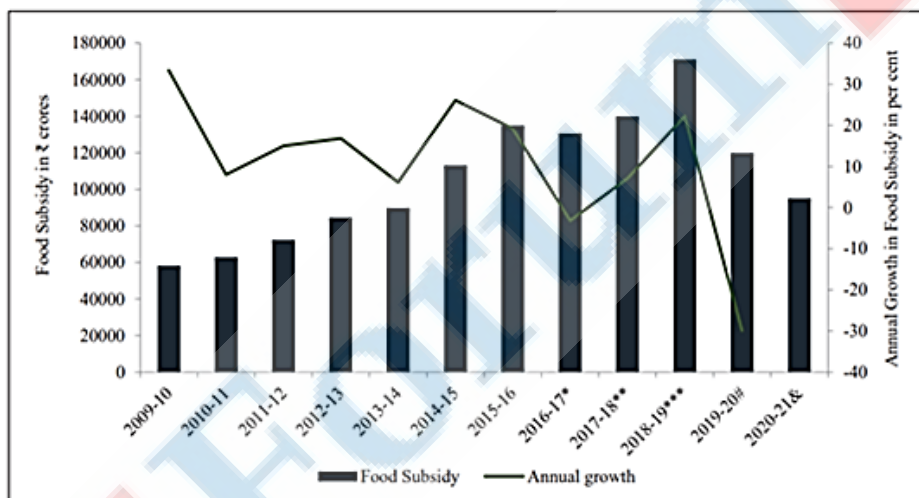
Exp) Option c is the correct answer.

The Government of India provides various types of subsidies including on fertiliser, food, exports, power, tax concessions etc.

**Statement 1 is correct:** The DAC&FW is implementing a **capital subsidy sub-scheme “Agricultural Marketing Infrastructure (AMI)” of Integrated Scheme for Agricultural Marketing (ISAM)** across the country. It promotes creation of scientific storage capacity for storing farm produce, processed farm produce and agricultural inputs etc., to reduce post-harvest & handling losses, promote pledge financing and market access including marketing infrastructure (other than storage).

**Statement 2 is incorrect:** The total annual food subsidy has not risen consistently during the last decade. This can be inferred from the graph given below:

**Figure 18: Trend in Food Subsidy Released by the Government of India since 2009-10**



**Statement 3 is correct: Tax incentives and tax concessions provided by the government are indirect subsidy to preferred tax payers. They represent a significant policy choice of the government. Such tax incentives are provided to corporate tax payers and individuals.**

Source: Pradhan Mantri Krishi Sinchai Yojana – Vikaspedia

<https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1607343>

Explained: How fertiliser subsidy works | Explained News, The Indian Express

Microsoft Word - CRB5100512KC (rbi.org.in)

Q.57)

Ans) b

Exp) Option b is the correct answer.

In February of 2018, India overtook Japan and now stands as the second largest producer of crude steel in the world. At present, China is the largest producer of crude steel in the world, accounting for about 50



per cent of the production. But even while being the second largest producer of crude steel, India is not able to access its full potential in production of structural steel and relies on import of structural steel to a certain extent.

**Option 1 is correct:** Steel is a capital-intensive sector. Nearly INR 7,000 crore is required to set up 1 tonne of steel-making capacity through the greenfield route. Naturally, **the cost of financing any expansion or new steel capacity is usually through borrowed capital.** And in India the cost of finance is extremely high compared to the cost of finance in developed countries.

**Option 2 is correct:** Although India has abundant reserves of iron ore and coal, it has negligible reserves of coking coal. The National Steel Policy envisages that India will reach 300 million tonnes of steel-making capacity, and 68% of that will be through the blast furnace route, which requires coking coal. This translates to about 200 million tonnes of steel being produced using coking coal, which means an annual consumption of about 180 million tonnes of coking coal. India largely fulfils its coking coal requirements through imports. But due to vagaries of weather, there has been huge fluctuations in coking coal supply as well as coking coal prices.

**Option 3 is incorrect:** India has **abundant reserves of iron ore and coal, it has negligible reserves of coking coal.** The National Steel Policy envisages that India will reach 300 million tonnes of steel-making capacity, and 68% of that will be through the blast furnace route, which requires coking coal. India largely fulfils its coking coal requirements through imports from Australia.

**Option 4 is correct:** Material substitution has been one of the toughest challenges facing the steel industry. **Plastic, aluminium, wood and bamboo have been replacing steel** in various application areas. For the last one-and-a-half decade, the automobile sector, which holds a 23-25% market share in global steel consumption, has been toying with the idea of **increasing aluminium use to lighten weights, boost fuel efficiency and cut down emissions.** Studies reveal that aluminium is increasingly finding its way into hoods, doors, fenders, deck lids, lifts, tail gates and body structures in cars and trucks

Source: The Indian steel industry: Growth, challenges and digital disruption (pwc.in)

Material substitution biggest challenge for steel industry (financialexpress.com)

Q.58)

Ans) c

**Exp) Option c is the correct answer.**

The National Policy on Narcotic Drugs and Psychotropic Substances is based on the Directive Principles, contained in Article 47 of the Indian Constitution, which direct the State to endeavour to bring about prohibition of the consumption, except for medicinal purposes, of intoxicating drugs injurious to health.

**Statement 1 is correct:** NCB was constituted by the Government of India in 1986 under the **Narcotic Drugs and Psychotropic Substances Act, 1985**. So it is a statutory body.

**Statement 2 is incorrect:** National Crime Records Bureau (NCRB) was entrusted with the responsibility for monitoring, coordinating and **implementing the Crime and Criminal Tracking Network & Systems (CCTNS) project** in the year 2009. The project has connected 15000+ police stations and 6000 higher offices of police in the country.

**Statement 3 is correct:** It coordinates actions taken by the Ministry of Health and Family Welfare, the Ministry of Welfare and other concerned Ministries, Departments or Organisations in respect of matters relating to drug abuse.

**Statement 4 is correct:** One of the functions of NCB is analysis of seizure data, study of trends and modus operandi and preparation of National Drug Enforcement Statistics;



Knowledge Base: The responsibility of drug abuse control, which is a central function, is carried out through a number of Ministries, Departments and Organisations. These include the Ministry of Finance, Department of Revenue which has the nodal co-ordination role as administrator of the Narcotic Drugs and Psychotropic Substances Act, 1985 and the Prevention of Illicit Traffic in Narcotic Drugs and Psychotropic Substances Act, 1988.

It has also been acting as a coordinating entity between various narcotics and drug law enforcement agencies within the country and also as India's nodal point with international agencies like **United Nations Office on Drugs and Crime (UNODC)**, **International Narcotics Control Board (INCB)** etc.

Source: Narcotics Control Bureau (narcoticsindia.nic.in)

Director's Desk | National Crime Records Bureau (ncrb.gov.in)

Q.59)

Ans) b

Exp) Option b is the correct.

Amicus Curiae is a person who either volunteers to provide the information or is appointed by the judiciary. He doesn't have any interest in the case's judgment, nor he favors any particular party. He only assists the tribunal

**Statement 1 is incorrect:** Hon'ble Supreme Court has defined the term Amicus curiae under Supreme Court jurisdiction quoted "If a petition is received from the jail or in **any other criminal matter** if the accused is unrepresented then an Advocate is appointed as amicus curiae by the Court to defend and argue the case of the accused". In civil matters also the "Court can appoint an Advocate as amicus curiae if it deemed fit it necessary in case of an unrepresented party.

**Statement 2 is incorrect:** Amicus Curiae, which literally translates as friend of the court, is a neutral lawyer appointed by the court (not executive) to assist it in cases which require specific expertise.

**Statement 3 is correct:** Amicus curiae is a person who volunteers to assist the court of law in deciding certain matters. However, **the court is free to choose whether or not to accept the information given by him.** The information provided by this person is usually a kind of a short, unbiased testimony

Source: Law should be enacted for appointment and procedure of AMICUS CURIAE in India as an Effective Dispute Settlement Mechanism (indianbarassociation.org)

What Is The Purpose Of Amicus Curiae - 2022 Beginners Guide - Law & Crime News (ilawjournals.com)

<https://www.hindustantimes.com/india-news/sc-asks-ag-to-be-amicus-curiae-in-bhushan-case/story-L5JYX9wtPLxluTpsJ8RP9K.html>

Q.60)

Ans) d

Exp) Option d is the correct answer.

According to the section 154 of the Code of Criminal Procedure, FIR is the very first information report recorded by the police officer. The chief role of the FIR is to set the law in motion.

First Information Report (FIR) is a written document prepared by the police when they receive information about the commission of a cognizable offence.

**Option a is incorrect:** The Code of Criminal Procedure deals with the registration of FIR. Section 154 **obligates the police to register the FIR** after receiving the information, oral or written, **qua commission of a cognizable offence.** The police officials have the right to arrest the accused **without the permission of the Magistrate in cognizable cases.** Moreover, the Supreme Court in the case of "**Lalita Kumari vs.**

**Govt of UP & Ors**” stated that the police is bound to register an FIR when the information supplied to the police discloses the commission of cognizable offence(s).

**Option b is incorrect:** In the case of non-cognizable offences, the police has the same powers **except the police can't investigate the matter** and arrest the accused persons **without the leave of a magistrate**. However, if the information received does not disclose the commission of cognizable offence, then a preliminary inquiry may be conducted to ascertain the nature of the offence.

**Option c is incorrect:** In case of cognizable offence conducting **preliminary inquiry is not necessary**. Thus, it was held by the Supreme Court that the registration of FIR is compulsory if the offence is cognizable in nature.

**Option d is correct:** When a police station receives a complaint regarding an **alleged offence** that has been committed in the jurisdiction of another police station, it registers an FIR. It then transfers it to the concerned police station for further investigation. This is called a Zero FIR.

No regular FIR number is given. After receiving the Zero FIR, the concerned police station registers a fresh FIR and starts the investigation.

Knowledge Base:

The Supreme Court in the case of **Sakiri Vasu vs. State of Uttar Pradesh & Ors**, stated that if a person has a grievance that his FIR has not been registered by the police or proper investigation is not being done, then the remedy available to the aggrieved person is **not to go to the High Court under Article 226 of the Constitution of India**, but to approach the Magistrate concerned under Section 156(3) first.

Source: <https://indiankanoon.org/docfragment/10239019/?formInput=registration%20of%20fir>

<https://blog.ipleaders.in/need-know-registration-fir/#:~:text=As%20stated%20earlier%2C%20Section%20154,the%20Magistrate%20in%20cognizable%20cases.>

<https://www.legalserviceindia.com/legal/article-6974-is-a-police-officer-bound-to-register-fir-.html>

Q.61)

Ans) a

Exp) Option a is the correct answer.

Price stability implies an absence of erratic and unplanned movements in the general price levels.

**Statement 1 is correct.** The **Increase in Government Spending** increases excess demand which may **result in Inflation**, if it becomes difficult to expand supply. Increased Government spending will put extra money in the hands of the people. This will increase demand. If the supply of goods and services remains same, then there will be inflation in the economy.

**Statement 2 is correct.** **Depreciation of domestic currency poses risk of imported inflation.** Currency depreciation tends to cause inflation because imports become more expensive. Depreciation increases the rupee cost of imported goods and thus leading to inflation.

**Statement 3 is incorrect.** **An increase in interest rates will make borrowing costlier. Thus, people will lend less and it will reduce the demand in the economy.** This will put a downward pressure on general level of prices. On the other hand, a reduction in interest rates will tend to increase demand and thus can cause inflation.

**Statement 4 is incorrect.** FDI, FPI and Depository Receipts are non-debt flows which don't create any repayment burden. **Large inflows of foreign capital** by way of factor incomes from abroad, direct investment and portfolio investment add to the available liquidity in the economy. This generates new demand for goods and services. This **causes of Inflation**. On the other, less inflow will result in less liquidity and thus downward pressure on general level of prices.

Source: <https://egyankosh.ac.in/bitstream/123456789/19337/1/Unit-4.pdf>

<https://economictimes.indiatimes.com/what-influences-interest-rate-movements/articleshow/4599202.cms?from=mdr>

<https://egyankosh.ac.in/bitstream/123456789/19312/1/Unit-19.pdf>

<https://smallbusiness.chron.com/business-investment-risks-725.html>

Q.62)

Ans) b

Exp) Option b is the correct answer.

Tribunals are institutions established for discharging judicial or quasi-judicial duties. The objective may be to reduce case load of the judiciary or to bring in subject expertise for technical matters. The Supreme Court has ruled that tribunals, being quasi-judicial bodies, should have the same level of independence from the executive as the judiciary.

**Statement 1 is incorrect:** Under Article 323 A, only one tribunal for the Centre and one for each state or two or more states may be established. There is **no question of the hierarchy of tribunals**, whereas under **Article 323 B a hierarchy of tribunals may be created**.

**Statement 2 is correct:** Administrative Tribunals created under Article 323A are not bound by the Code of Civil Procedure, 1908. Administrative Tribunals created under Article 323A **have been freed from technical rules of Indian Evidence Act, 1872 and procedural shackles of the Code of Civil Procedure, 1908**. At the same time, they have been vested with the powers of Civil Court in respect of some matters including the review of their own decisions and are bound by the principles of natural justice.

**Statement 3 is incorrect:** Under Article 323 A, tribunals can be established **only by Parliament** while tribunals under Article 323 B can be established both by Parliament and state legislatures with respect to matters falling within their legislative competence.

Source: <https://lawcommissionofindia.nic.in/reports/Report272.pdf> page-9

Laxmikanth Chapter-63 page-63.1

Q.63)

Ans) b

Exp) Option b is the correct answer.

Lok Sabha is composed of representatives of the people chosen by direct election on the basis of the adult suffrage while the Lok Sabha Secretariat is an independent office of Lok Sabha which functions under advice of the Speaker of Lok Sabha.

**Statement 1 is incorrect.** In Lok Sabha Secretariat, all appointments to posts shall be **made by the Speaker**, provided that the Speaker may by general or special-order delegate to the **Secretary or any other officer** of the Secretariat his power to make appointments to any post or class of posts specified in such order, **except the posts in Group A**.

**Statement 2 is correct.** The **Speaker of Lok Sabha** may by order sanction the required number of temporary posts of the categories Group A, Group B, Group C or Group D from time to time. The **only exception** is that no order sanctioning the creation of a temporary post in Group-A carrying pay scales exceeding Rs. 2,750/- p.m. shall be issued by the Speaker only after consultation with the **Ministry of Finance**.

**Statement 3 is correct.** The Lok Sabha Secretariat provides secretarial assistance to the Parliamentary Committees. The Parliamentary Committee Branches of the Secretariate deal with the work connected

with various Committees. Officials in the Committee Branches provide secretarial assistance to the Parliamentary Standing/other Committees.

Source:

<http://loksabhaph.nic.in/writereaddata/Secretariat/RulesApplicableToEmployees/RandCSrules1955.pdf>

Q.64)

Ans) d

Exp) Option d is the correct answer.

Raman spectroscopy; is a spectroscopic technique typically used to determine vibrational modes of molecules, although rotational and other low-frequency modes of systems may also be observed.

**Statement 1 is correct.** Raman spectroscopy is the measurement of the intensity and wavelength of inelastically scattered light from molecules. The Raman scattered light occurs at wavelengths that are shifted from the incident light by the energies of molecular vibrations.

A Raman spectrometer coupled with a fiber optics probe **has great potential in applications such as monitoring and quality control in industrial food processing**, food safety in agricultural plant production, and convenient inspection of pharmaceutical products, even through different types of packing.

**Statements 2 is correct.** Raman Spectroscopy is a powerful technique for **mapping mineralogy and petrography**. The small spatial resolution of the laser beam allows detection and identification of very small mineral phases that are impossible to identify by optical microscopy.

**Statement 3 is correct.** Raman spectroscopy is very useful in drug analysis due to advantages such as ease of use, minimal sample handling, and the significant differences in scattering strength between packaging materials, tablet excipients, and active drug components. It can also be used to identify isomers and to determine energy difference between isomers. These advantages, in combination with fiber optics and microscopes, have enabled the use of Raman spectroscopy as a quality control tool in the pharmaceutical industry.

**Statement 4 is correct.** The **quantitative analysis of samples** is based on the intensity of the Raman scattered light being proportional to concentration. As water does not scatter much, Raman spectroscopy can be used to **measure species dissolved** or suspended in aqueous solutions.

Source: <https://nij.ojp.gov/library/publications/raman-spectroscopy-forensic-analysis-identification-cocaine-and-other-illegal>

<https://www.pharmatutor.org/pharma-analysis/analytical-aspects-of-infra-red-spectroscopy-ir/application-ir-spectrophotometry#:~:text=Infrared%20spectroscopy%20is%20widely%20used,in%20civil%20and%20criminal%20analysis.>

<https://egyankosh.ac.in/bitstream/123456789/43275/1/Unit-4.pdf>

<https://digitalcommons.usu.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=2384&context=smallsat>

<https://www.sciencedirect.com/science/article/pii/S1021949814000040>

Q.65)

Ans) c

Exp) Option c is the correct answer.



Science and technology play a vital role in the development strategy of various sections of the society. Various schemes are formulated by the Government with the broad objective of providing opportunities to motivated scientists, engineers and field-level activists to take up time-bound research-oriented projects with inputs of science and technology for the benefit of disadvantaged sections of society.

**Pair 1 is correct.** Under **Knowledge Involvement in Research Advancement through Nurturing (KIRAN) scheme**, **women scientists** are being encouraged to pursue research in frontier areas of science and engineering, on problems of societal relevance and to take up **S&T-based internship** followed by **self-employments** as a large number of well-qualified women get left out of the S&T activities due to various circumstances which are usually typical to the **gender**.

**Pair 2 is correct.** **Innovation in Science Pursuit for Inspired Research (INSPIRE)** is an innovative programme sponsored and managed by the **Department of Science & Technology** to communicate to the youth of the country the excitements of creative pursuit of science, **attract talent to the study of science at an early age** and thus build the required critical human resource pool for strengthening and expanding the Science & Technology system and R&D base..

**Pair 3 is incorrect.** **Technological Advancement for Rural Areas (TARA)** is scheme to provide long term Core Support to **Science and Technology (S&T) based NGOs** to promote and nurture them as **S&T Incubators/Active Field Laboratories** in rural and other disadvantaged areas. They should work and provide technological solutions and effective delivery of technologies for livelihood generation & societal benefits.

**Pair 4 is correct.** Jigyasa, a **student - scientist connect programme** is an initiative of **Council of Scientific and Industrial Research (CSIR)** in collaboration with **Kendriya Vidyalaya Sangathan (KVS)**. It is for further widening and deepening its **Scientific Social Responsibility (SSR)** by connecting school students and scientists to extend student's classroom learning with well-planned research laboratory-based learning.

Source: [https://vikaspedia.in/education/policies-and-schemes/scholarships/post-matric-scholarship/inspire-](https://vikaspedia.in/education/policies-and-schemes/scholarships/post-matric-scholarship/inspire-scholarships#:~:text=INSPIRE%20is%20an%20innovative%20programme,S%26T%20system%20and%20R%26D%20base.)

[scholarships#:~:text=INSPIRE%20is%20an%20innovative%20programme,S%26T%20system%20and%20R%26D%20base.](https://vikaspedia.in/education/policies-and-schemes/scholarships/post-matric-scholarship/inspire-scholarships#:~:text=INSPIRE%20is%20an%20innovative%20programme,S%26T%20system%20and%20R%26D%20base.)

<https://www.indiascienceandtechnology.gov.in/programme-schemes/women-schemes/knowledge-involvement-research-advancement-through-nurturing-kiran>

<https://dst.gov.in/long-term-core-support-technological-advancement-rural-areas-tara>

<https://www.lopol.org/article/sbi-sme-stree-shakti-loan-scheme>

Q.66)

Ans) b

Exp) Option b is the correct answer.

Satellites are objects which revolve around the Earth in a specific orbit that are useful for many purposes.

**Pair 1 is incorrect.** A satellite used for sending messages for telephonic conversations and conferencing, television broadcast, FAX, computer related network services or other communication/transmission to long distances is called a **communication satellite**. These satellites are commonly placed in the **geostationary orbit**. Very few communication satellites are placed in Polar Orbits.

**Pair 2 is correct.** **Navigation satellites** like GPS are placed in **medium Earth orbit (MEO)** at an altitude of approximately 20,200 km (12,550 miles). Each satellite circles the Earth twice a day.

**Pair 3 is correct.** **Earth observation satellites** are usually put into space to monitor the resources that are important for humans. These can be placed in both **Sun-synchronous orbit** and **Geostationary orbits**

**Pair 4 is correct. Reconnaissance satellites** are used to spy on other countries. They provide intelligence information on the military activities of foreign countries. These satellites can be placed in **Low earth orbit; sun-synchronous orbit and polar orbits** to possess varying strong capability for gathering intelligence by satellites.

Source: <https://theprint.in/world/dprk-to-launch-more-reconnaissance-satellites-to-space/866755>

<http://satellites.spacesim.org/english/function/reconnai/index.html>

<https://www.isro.gov.in/spacecraft/earth-observation-satellites>

[https://www.gps.gov/systems/gps/space/#:~:text=GPS%20satellites%20fly%20in%20medium,20%2C200%20km%20\(12%2C550%20miles\).](https://www.gps.gov/systems/gps/space/#:~:text=GPS%20satellites%20fly%20in%20medium,20%2C200%20km%20(12%2C550%20miles).)

<https://egyankosh.ac.in/bitstream/123456789/39532/1/Unit-4.pdf>

Q.67)

Ans) c

Exp) Option c is correct.

Microorganisms are of two types- single-celled like bacteria, some algae and protozoa, and multicellular, such as many algae and fungi that are useful in various ways in human life.

**Statement 1 is correct.** Scientists have recently used a **bacterium called Shewenella** to produce large quantities of thinner, **more stable graphene** – a nanomaterial composed of a single layer of carbon atoms with extraordinary properties. Graphene is strong, flexible and conductive with the potential to revolutionize electronics, but using it has remained difficult.

**Statement 2 is correct.** Soil microorganisms, generally fungi and bacteria are more or less deeply naturally associated with plant roots. These microorganisms can facilitate directly or indirectly, the availability of certain nutrients such as nitrogen, phosphorus and water, and produce substances called plant hormones **promoting plant growth**. While some bacteria are able to **fix nitrogen** from the atmosphere to enrich soil with nitrogen and **increase its fertility**. These microbes are commonly called **biological nitrogen fixers**.

**Statement 3 is correct.** Scientists at the University of Edinburgh have developed a **low-cost biosensor** which **uses bacteria** to **detect unsafe levels of arsenic** in drinking water. The bacteria are genetically engineered to fluoresce in the presence of arsenic, with the biosensor attached to a smartphone, which displays an easily readable pattern to show the levels of the element.

**Statement 4 is incorrect.** **Yeast is used as a fermentation agent in the production of bread.**

**Statement 5 is correct.** In 2015, MIT scientists used **genetically modified bacteria** to detect tumors in mice. In which, the researchers fed a harmless strain of GM bacteria to the mice, which produced a **luminescent signal** when it encountered a tumor. This luminescence could be detected in urine, and allows detection of tumors as small as one square millimeter. This research has paved the way for medical advancement for detecting tumors in humans.

Source: <https://www.theguardian.com/technology/2019/jul/21/five-new-uses-for-bacteria-graphene-plastic-waste-oil-spills-tumours>

<https://ncert.nic.in/textbook/pdf/hesc102.pdf>

<https://ideagro.es/en/la-importancia-de-las-bacterias-en-la-agricultura/#:~:text=Soil%20microorganisms%2C%20generally%20fungi%20and,plant%20hormones%20promoting%20plant%20growth.>

<https://pubmed.ncbi.nlm.nih.gov/8913812/>

<http://www.botany.hawaii.edu/faculty/wong/BOT135/Lect16.htm>

Q.68)

Ans) c

Exp) Option c is the correct answer.

Space technology is a revolutionary, high-payoff technique that plays a vital role to explore the unknown activities beyond low Earth orbit.

**Statement a is incorrect.** Orbital decay is a gradual decrease of the distance between two orbiting bodies at their closest approach (the periapsis) over many orbital periods. These orbiting bodies can be a planet and its satellite, a star and any object orbiting it, or components of any binary system. Orbits decay because of some friction-like mechanism which transfers energy from the orbital motion.

**Statement b is incorrect.** Impact cratering is the excavation of a planet's surface when it is struck by a meteoroid. When an impactor strikes the solid surface of a planet, a shock wave spreads out from the site of the impact. The shock wave fractures the rock and excavates a large cavity (much larger than the impactor) called craters.

**Statement c is correct.** Space weathering is a process of formation of hydroxyl and water molecules on the Moon due to interaction of solar winds with the lunar surface. Space weathering along with the impact from small meteorites often lead to chemical changes on the surface of the moon ultimately leading to formation of either the volatile and reactive hydroxyl molecules or the more stable form of water molecules.

**Statement d is incorrect.** The Kessler Syndrome is a phenomenon in which the density of objects in the Low Earth Orbit grows so high that collisions between two objects could cause a massive cascade. The collisions could increase the scope of further collisions generating more space junk. This causes more and more debris problems and negatively impacts satellites, astronauts and mission planners.

Source: <https://indianexpress.com/article/technology/science/isro-sac-instrument-finds-presence-of-hydroxyl-and-water-molecules-on-moon-7448012/>

[https://www.nasa.gov/topics/technology/features/atomic\\_oxygen.html](https://www.nasa.gov/topics/technology/features/atomic_oxygen.html)

[https://www.lpi.usra.edu/education/explore/shaping\\_the\\_planets/impact-cratering/](https://www.lpi.usra.edu/education/explore/shaping_the_planets/impact-cratering/)

[https://dbpedia.org/page/Orbital\\_decay](https://dbpedia.org/page/Orbital_decay)

Q.69)

Ans) a

Exp) Option a is the correct answer.

An island is a piece of land surrounded on all sides by water. It may occur individually or in a group, in open oceans or seas.

**Pair 1 is correct.** Barren Island is located in the Andaman and Nicobar Islands which was formed due to subduction of the Indian Plate under the Burmese Plate along the Andaman Trench.

**Pair 2 is correct.** New Moore Island in Sunderbans of Bay of Bengal sprang up as late as 1971 as a result of the great tropical cyclone Bhola. The island remained a bone of contention between Bangladesh and India. It is an offshore sandbar island in the Bay of Bengal.

**Pair 3 is incorrect.** Androth islands is a coral island which is part of Lakshadweep Islands built up by coral animals of various species that are found both near the shores of the mainland and in the midst of oceans. Recently a College of Arts & Sciences was inaugurated by Vice President M Venkaiah Naidu here. The slow movements of the Earth's crust broke apart Pangaea into several pieces that began to drift apart. When the breakup occurred, some large chunks of land split. These fragments of land became islands. Greenland and Madagascar are these types of continental islands.

Source: <https://www.theguardian.com/world/cif-green/2010/mar/24/india-bangladesh-sea-levels>

<https://egyankosh.ac.in/bitstream/123456789/70609/1/Unit-2.pdf>

<https://www.indiatoday.in/magazine/special-report/story/19810615-india-bangladesh-at-loggerheads-over-new-moore-island-805968-2014-02-22>

<https://egyankosh.ac.in/bitstream/123456789/16976/1/Unit-29.pdf>

<https://www.ndtv.com/education/vice-president-venkaiah-naidu-inaugurates-two-arts-and-science-colleges-in-lakshadweep>

Q.70)

Ans) d

Exp) Option d is correct.

The fundamentals of food processing and preservation, involves the following two basic principles: Prepare the products fit for consumption and destroy or inactivate pathogens found in food.

**Statement 1 is correct. Photohydroionization** is a new potential intervention considered as a processing aid to control pathogens in meat and poultry. It uses a combination of ultraviolet (UV) light and oxidizing gasses and leaves no residual by-product on the product. The PHI technology does not require the use of water and uses less energy. It is recognized as a chemical-free, natural, green and environmentally friendly advanced oxidation

**Statement 2 is correct.** Sterilization is the complete destruction or elimination of all viable organisms in/on a food product. Sterilization destroys yeasts, molds, vegetative bacteria, and spore formers and allows the food processor to store and distribute the products at ambient temperatures, with extended shelf life. Thermal food sterilization and pasteurization are the most widespread preservation technologies to extend food shelf life. The sterilization process involves providing heat treatment.

**Statement 3 is correct.** Blanching is defined as a **mild heat treatment applied prior to freezing, drying or canning**. It helps in reducing the number of microorganisms present on the surface of the food product. It also preserves the natural colour in the dried products,

**Statement 4 is correct.** Vacuum degassing is also used in the food industry to remove encapsulated air from products such as beverages, minced meat, sausage meat, cheese, pasta, vegetable puree, mustard or jam. It helps in increasing the shelf life of the product. The process normally takes place immediately before packaging the product. It may be carried out in a filler, mixer or extruder production line.

**Statement 5 is incorrect. Polycrack technology is waste-to-energy conversion technology that converts multiple feed stocks into hydrocarbon liquid fuels, gas, carbon and water.**

Source: <https://egyankosh.ac.in/bitstream/123456789/33563/1/Unit-11.pdf>

<https://www.foodbusinessnews.net/articles/15741-seven-clean-label-technologies-to-extend-shelf-life>

<https://pib.gov.in/PressReleasePage.aspx?PRID=1600784>

Q.71)

Ans) d

Exp) Option d is the correct answer.

Voice voting is the preferred method of decision making by Indian Parliament. MPs in favour of a decision call out "Ayes" and those opposed say "Noes". The Speaker then takes a call on which voices were louder and conveys the decision of the House. **The rules of procedure of Lok Sabha do not mandate recording of votes of MPs for every decision taken.** Voice voting does not reveal the individual positions taken by MPs.

**Statement 1 is correct: The concept of a voice votes has been borrowed from the Parliament of the United Kingdom** and was already in use in the legislatures in British India.



**Statement 2 is correct:** Speaker in Lok Sabha and Chairman in Rajya Sabha have the right to conduct a voice vote in their respective houses.

**Statement 3 is correct:** Voice vote can be used for all the bills that which Speaker deems fit for the oral deliberation and voting. Thus, it can also be used for constitutional amendments.

However, in case of constitutional amendment requiring special majority of the Parliament, recording of votes is mandated. Here voice vote does not happen.

As the statement is saying, voice vote may be used for constitutional amendment so it is correct as it can be done for constitutional amendment bills requiring simple majority.

Source: <https://prsindia.org/articles-by-prs-team/parliament-voting-ayes-vs-noes-and-road-from-manual-to-electronic-recording>

<https://scroll.in/article/970083/what-is-a-voice-vote-and-why-has-it-created-a-controversy-in-the-manipur-assembly>

Q.72)

Ans) b

Exp) Option b is the correct answer.

**Statement 1 is correct:** Everything we see – the planets, moons, massive galaxies make up less than 5% of the universe. **About 27% is dark matter and 68% is dark energy.** Dark energy has intrigued physicists and astronomers for decades. Dark energy has been noted as “the most profound mystery in all of science”. With advanced technologies and newer experiments, scientists have found certain clues about it. An international team of researchers made the first putative direct detection of dark energy. They have noticed certain unexpected results in an underground experiment and found that dark energy may be responsible for it.

**Statement 2 is incorrect:** While dark matter attracts and holds galaxies together; dark energy repels and causes the expansion of our universe. Both components are invisible. More is known about dark matter, since its existence was suggested as early as the 1920s, while dark energy wasn't discovered until 1998. Large-scale experiments like XENON1T have been designed to directly detect dark matter, by searching for signs of dark matter ‘hitting’ ordinary matter. Dark energy is even more difficult to find.

**Statement 3 is incorrect:** The XENON1T experiment is the world's most sensitive dark matter (and not dark energy) experiment and was operated deep underground at the INFN Laboratori Nazionali del Gran Sasso in Italy. In this experiment scientists noticed certain unexpected results. As per them, dark energy may be responsible for it. Hence, this experiment can also be used to detect dark energy.

Source: <https://indianexpress.com/article/explained/what-is-dark-energy-have-scientists-detected-it-finally-7534930/>

<https://blog.forumias.com/explained-what-is-dark-energy-and-have-scientists-finally-detected-it/>

Q.73)

Ans) b

Exp) Option b is the correct answer.

**Statement 1 is incorrect:** The Millimeter wave band is a new spectrum band introduced for 5G auctions, inhabiting frequencies 24.25 to 28.5 GHz. At the highest frequency of all 5G bands introduced for the upcoming auctions, the mm-wave spectrum is typically used for meeting the very high-capacity and ultra-low latency requirements. Since it is unable to transmit data over large distances, it is best suited for high capacity, urban applications.

**Statement 2 is correct:** The Millimeter waveband has a short wavelength and it is appropriate to deliver superior speeds and low latencies. 5G services can be deployed using lower frequency bands. These bands cover greater distances and are proven to work efficiently even in environments with interference, common in urban settings. But, data speeds on these bands could not hit the peak potential of 5G. For true 5G experience, mm Wave band is essential. Though the high-frequency bands cover smaller areas and are prone to interferences, such bands are capable of carrying much more data with low latency compared to lower frequency bands.

**Statement 3 is correct:** The millimetre-wave band or extremely high-frequency frequency spectrum is mainly designed for usage in airport security scanners, closed-circuit television, scientific research, machine-to-machine communication, and military fire control. As a wavelength becomes smaller, the cell size becomes less, which is the footprint of the relay station. This will be used more by the industry.

Source: [https://www.business-standard.com/podcast/technology/what-is-5g-mmwave-spectrum-121123000031\\_1.html](https://www.business-standard.com/podcast/technology/what-is-5g-mmwave-spectrum-121123000031_1.html)

<https://indianexpress.com/article/business/dot-plans-millimeter-spectrum-sale-to-see-trai-view-in-january-6186594/>

<https://www.thehindubusinessline.com/info-tech/mm-wave-will-be-a-promising-band-in-5g-auctions-say-industry-experts/article65324119.ece>

Q.74)

Ans) d

Exp) Option d is the correct answer.

All options given above are part of renewable energy sources basket in India. Renewable energy (RE) in India includes along with their installed capacity : (solar: 48.55 GW, wind: 40.03 GW, Small hydro Power: 4.83, Bio-power: 10.62, Large Hydro: 46.51 GW) as on 30.11.2021 while its nuclear energy based installed electricity capacity stands at 6.78 GW. This brings the total non-fossil based installed energy capacity to 157.32 GW which is 40.1% of the total installed electricity capacity of 392.01 GW.

Source: <https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1785808>

Q.75)

Ans) a

Exp) Option a is the correct answer.

**Option a is correct: Supplementary Grant-** The supplementary demand for grants is needed for government expenditure over and above the amount for which Parliamentary approval was already obtained during the Budget session. It is granted when the amount authorized by the Parliament through the appropriation act for a particular service for the current financial year is found to be insufficient for that year.

**Option b is incorrect: Additional Grant** - It is granted when a need has arisen during the current financial year for additional expenditure upon some new service not contemplated in the budget for that year.

**Option c is incorrect: Excess Grant-** It is granted when money has been spent on any service during a financial year in excess of the amount granted for that service in the budget for that year. It is voted by the Lok Sabha after the financial year. Before the demands for excess grants are submitted to the Lok Sabha for voting, they must be approved by the Public Accounts Committee of Parliament.

**Option d is incorrect: Vote of Credit-** It is granted for meeting an unexpected demand upon the resources of India, when on account of the magnitude or the indefinite character of the service, the

demand cannot be stated with the details ordinarily given in a budget. Hence, it is like a blank cheque given to the Executive by the Lok Sabha.

Source: <https://www.thehindu.com/business/govt-looks-to-spend-235-lakh-cr-more/article32603971.ece>

Indian polity by M laxmikanth. Chapter name- Parliament. Page no-544.

Q.76)

Ans) c

Exp) option c is the correct answer.

**Statement 1 is correct. Coriolis effect:** The main cause of the Coriolis effect is the Earth's rotation. As the Earth spins in a counter-clockwise direction on its axis, anything flying or flowing over a long distance above its surface is deflected. This occurs because as something moves freely above the Earth's surface, the Earth moves east under the object at a faster speed. **As latitude increases and the speed of the Earth's rotation decreases, the Coriolis effect increases.**

**Statement 2 is incorrect. Salinity of the oceans:** On average, there is a distinct decrease of salinity near the equator and at both poles, although for different reasons.

**Near the equator, the tropics receive the most rain on a consistent basis. As a result, the fresh water falling into the ocean helps decrease the salinity of the surface water in that region.** As one move toward the poles, the region of rain decreases and with less rain and more sunshine, evaporation increases.

Fresh water, in the form of water vapor, moves from the ocean to the atmosphere through evaporation causing the higher salinity. **Toward the poles, fresh water from melting ice decreases the surface salinity once again.**

**Statement 3 is incorrect. Surface temperature of oceans:** At low latitudes, near the equator, **direct overhead sunlight received all year warms surface waters.** At high latitudes, ocean waters receive less sunlight – the poles receive only 40 percent of the heat that the equator does. Hence, **sea surfaces are much warmer along the equator than at the poles**

**Statement 4 is incorrect. Air temperature:** Due to the curvature of the earth, the amount of solar energy received varies according to latitude. As a result, air **temperature generally decreases from the equator towards the poles.** As one goes from the surface of the earth to higher altitudes, the atmosphere becomes less dense and temperature decreases. The hills are therefore cooler during summers.

**Statement 5 is correct. Earth's gravity:** The earth is not a perfect sphere rather it is geoid shape. **As the radius of the earth increases from the poles to the equator, the value of g becomes greater at the poles than at the equator.** For most calculations, we can take g to be more or less constant on or near the earth. But for objects far from the earth, the acceleration due to gravitational force of earth is given by Eq.  $g = G \times (M/d^2)$  where M is the mass of the earth, and d is the distance between the object and the earth.

Source: <https://www.weather.gov/jetstream/seawater>

<https://ncert.nic.in/textbook/pdf/iess104.pdf> Pg no.27

<https://www.thoughtco.com/what-is-the-coriolis-effect-1435315>

<https://lisbdnet.com/why-are-ocean-surface-temperatures-higher-near-the-equator/#:~:text=The%20ocean%20receives%20most%20of,primarily%20by%20air%20temperature%20gradients.>

<https://ncert.nic.in/textbook/pdf/iesc110.pdf> pg no.134

Q.77)

Ans) c

Exp) Option c is the correct answer.

**Pair 1 is incorrect: Agha Khan Cup is associated with the game of Hockey.****Pair 2 is incorrect: The Durand Football Tournament, commonly known as Durand Cup, is an annual domestic football competition in India which was first held in 1888 in Annadale, Shimla.** It is hosted by the Durand Football Tournament Society (DFTS). The tournament is the oldest existing football tournament in Asia and 3rd oldest existing club football tournament in the world. Currently, the tournament serves as the pre-season knock-out tournament for India's football clubs from all divisions before the start of the Indian domestic football season each year.**Pair 3 is correct: The Deodhar Trophy is a List A cricket tournament competition in Indian domestic cricket.** It is named after D. B. Deodhar (known as the Grand Old Man of Indian cricket) and is a 50-over knockout competition played on an annual basis among the 3 national level teams - India A, India B and India C.**Pair 4 is correct: The Ezra Cup is a popular polo tournament conducted annually in India by the Calcutta Polo Club.** It is claimed that it is the first official polo trophy in history. The first Ezra Cup was held in 1880.

Q.78)

Ans) a

Exp) Option a is the correct answer.

- 1) According to a 2016 NASA study, the parts of city **New Orleans in Louisiana** are sinking at a rate of 2 inches per year and could be underwater by 2100. Some parts of New Orleans are also 15 feet below sea level, and its location on a river delta increases its exposure to **sea-level rise and flooding**.
- 2) **Jakarta in Indonesia** is sinking up to 6.7 inches per year due to excessive groundwater pumping (which creates a change in pressure and volume that causes the land to sink) expecting much of the city could be underwater by 2050, because of which Indonesia is **relocating its capital from Jakarta to Nusantara**, an island of Java located in the province of East Kalimantan by 2024.
- 3) **Bangkok in Thailand** is sinking at a rate of more than 1 centimeter a year and could be below sea level by 2030. This is due to the city's geographic location at the southern end of the **Chao Phraya River Basin**, as well as its low-lying terrain of around 1.5 meters average elevation above mean sea level. The city normally experiences six months of rainy season every year from May to October which may worsen due to climate change impacts.
- 4) **Venice in Italy** is sinking at a rate of 0.08 inches every year. The reasons are multiple-the increasing flooding due to climate change, the sediment that the city rests on is compacting under the weight of new construction and the millions of tourists who visit; the fragile lagoon has also been impacted by the increasing number of cruise ships entering Venice, which create artificial waves that pummel the city's foundation and infrastructure and decades of digging and reshaping the delta to account for bigger cruise ships has allowed more water to enter the city.

Source: <https://theasianpost.com/article/bangkok-sinking-fast><https://indianexpress.com/article/lifestyle/destination-of-the-week/who-can-stop-venice-from-sinking-flooding-st-marks-basilica-acqua-alta-7498048/><https://www.weforum.org/agenda/2019/09/11-sinking-cities-that-could-soon-be-underwater><https://www.dnaindia.com/world/report-nusantara-is-the-new-capital-of-indonesia-here-is-why-it-was-relocated-from-jakarta-island-of-java-pollution-2929303>



Q.79)

Ans) b

**Exp) Option b is the correct answer.**

A geopark is a unified area that advances the protection and use of geological heritage in a sustainable way and promotes the economic well-being of the people who live there.

**Statement 1 is incorrect and statement 2 is correct.** The country's first geopark at Lamheta village on the banks of the Narmada river in Jabalpur district of Madhya Pradesh is an initiative for the conservation of the **rock formations of geological significance**.

The **National Fossil park in Mandla** of Jabalpur is famous for the conservation of plant fossils.

**Statement 3 is correct.** According to UNESCO, geoparks are single, unified geographical areas where sites and landscapes of international geological significance are managed with a holistic concept of protection, education, and sustainable development. The local community is included to foster conservation with sustainable development. Geoparks can help in promoting the economic well-being of the people living nearby. It would also help in the conservation of rock formations of geological significance.

**Statement 4 is incorrect.** The geological park of India is yet **not part** of UNESCO Global Geoparks Network (GGN). A Geopark seeking to become a member of the GGN should **possess an area** with clearly **defined boundaries** and a large enough area for it to serve local economic and cultural development (particularly through tourism). The Geopark should display through a **range of sites of international, regional and/or national importance**, a region's geological history, and the events and processes that formed it. The sites may be important from the point of view of science, rarity, education and/or aesthetics.

Source: [http://www.globalgeopark.org/uploadfiles/2012\\_9\\_6/ggn2010.pdf](http://www.globalgeopark.org/uploadfiles/2012_9_6/ggn2010.pdf)

<https://www.deccanherald.com/national/north-and-central/2-places-in-mp-find-place-in-unescos-tentative-list-of-natural-world-heritage-sites-988105.html>

<https://egyankosh.ac.in/bitstream/123456789/69607/1/Unit-7.pdf>

<https://theprint.in/india/indias-first-geo-park-to-come-up-in-mps-jabalpur-district/816782/>

Q.80)

Ans) a

**Exp) Option a is the correct answer.**

Kelp is the term used to refer to marine algae belonging to the phylum heterokontophyte. It is not taxonomically diverse but is structurally and functionally diverse. The three main guilds of kelp are differentiated by their structural appearance where canopy kelp comprises floating canopies that extend to the ocean surface, stipitate kelps extend a few meters above the seafloor, and can grow in dense aggregations, and prostrate kelps that lie near the seafloor.

**Statement 1 is correct. Kelp forests are usually found in arctic and temperate waters across the world.**

The major species of Laminaria occur in the Atlantic Ocean and the coastlines of China and Japan. The Ecklonia species is found on the coast of, New Zealand, Australia, and Africa while Macrocystis grow in the Pacific Ocean, Southern Ocean archipelagos, and parts of Australia. Due to their complex and sensitive structure, kelps are not common in tropical waters but Laminaria has been located in the deep waters of tropic regions such as the Galapagos Island. The absence of kelps in the tropic regions is the lack of nutrients in the warm oligotrophic waters.

**Statement 2 is incorrect.** Kelp forests provide a habitat for a variety of fish species, marine mammals, birds, and other invertebrates. Each guild of kelps has endemic organisms that will usually vary based on

the level of independence within the ecosystems. **The most dominant invertebrates in these ecosystems** include **bristle worms**, prawns scud, **jellyfish**, brittle stars, and **sea urchins**. Most of these species feed on algae that are in plenty in kelp forests.

**Statement 3 is incorrect.** Kelp forests thrive in cold and nutrient-rich waters along rocky coastlines where the **depth is 6 to 90 ft. deep**. The growth of kelps is favoured by clear waters where sunlight can reach the ocean floor where the life of the kelps begins. Kelps mostly recruit most successfully in regions where the ocean waters overturn, bringing cool and nutrient-rich waters from the bottom to the surface and regions where there are continuously high-nutrient waters. In warm waters where the temperatures exceed 72 degrees F, Kelp does not grow since the amount of dissolved inorganic nitrogen which supports kelp growth decrease significantly.

**Statement 4 is correct.** Besides being great biodiversity ecosystems hosting marine flora and fauna, **kelp forests play a fundamental role in supporting water recreational activities** such as **kayaking** and **scuba diving** as they provide a buffer from the rough ocean waters. Kelps played a great role to colonialists in the ancient days as they were able to travels thousands of miles without the need to adapt to new ecosystems. In modern economies, humans continue to harvest kelps to feed aquaculture species and also extract alginic acid used in antacids and toothpaste.

Source: <https://www.worldatlas.com/articles/kelp-forest.html>

Q.81)

Ans) c

Exp) Option c is the correct answer.

Forms of People's Uprisings against the Britishers during the 19<sup>th</sup> century included Civil Uprisings, Peasant Movements, Tribal Revolts and Military Revolts.

**Option a is incorrect: This statement does not reflect the true nature of civil uprisings.** The semi-feudal leaders of civil uprisings were backward looking and traditional in outlook. Their basic objective was to restore earlier forms of rule and social relations.

**Option b is incorrect: This statement does not reflect the true nature of civil uprisings.** The Peasant Movements firmly opposed the role of foreign planters whereas the civil uprisings were the result of local causes and grievances and were also localised in their consequences.

**Option c is correct:** Nature of Peasant Movements was centred on economic issues. The peasant movements were directed against the immediate enemies of the peasant—foreign planters and indigenous zamindars and moneylenders. Colonialism was not the target of these movements. Whereas, **Civil uprisings in most cases represented common conditions**, though separated in time and place. The semi-feudal leaders of civil uprisings were backward looking and traditional in outlook. Their basic objective was to **restore earlier forms of rule and social relations**.

**Option d is incorrect: This statement does not reflect the true nature of Peasant Movements.** The Peasant Movements were **not widespread throughout India**. Its territorial reach was limited. There was no continuity of struggle or long-term organisation and no major involvement of national leaders of the freedom struggle.

Knowledge Base:

### Nature of Civil Uprisings

- 1) These uprisings in most cases represented common conditions, though separated in time and place.
- 2) The semi-feudal leaders of civil uprisings were backward looking and traditional in outlook. Their basic objective was to restore earlier forms of rule and social relations.

- 3) These uprisings were the result of local causes and grievances and were also localised in their consequences.

#### Nature of Peasant Movements

- 1) Peasants emerged as the main force in agrarian movements, fighting directly for their own demands.
- 2) **The demands were centred almost wholly on economic issues.**
- 3) The movements were directed against the immediate enemies of the peasant—foreign planters and indigenous zamindars and moneylenders.
- 4) The struggles were directed towards specific and limited objectives and redressal of particular grievances.
- 5) Colonialism was not the target of these movements.
- 6) It was not the objective of these movements to end the system of subordination or exploitation of the peasants.
- 7) Territorial reach was limited.
- 8) There was no continuity of struggle or long-term organisation.
- 9) The peasants developed a strong awareness of their legal rights and asserted them in and outside the courts.

Source: A Brief History of Modern India by Rajiv Ahir

Q.82)

Ans) a

Exp) Option a is the correct answer.

Initial attempts to Improve Workers' Conditions were made in 1870-1880 to better the working conditions of the workers by legislation. However, till the Swadeshi surge of 1903-08, there was no concerted effort to better the working conditions of the labour. The trade unions emerged in India after World War I. The main factors that led to the emergence of trade unions include:

**Option 1 is correct and 4 is incorrect.** The first world war and its aftermath brought a rise in exports, soaring prices, **rise in price of essential commodities** due to **massive profiteering** opportunities for the industrialists. At the same time there was **very low wages (not rise)** for the workers. This led to discontent among workers.

**Option 2 is correct.** Formation of ILO **facilitated the formation of trade unions** in India. The International Labour Organisation (ILO) came into existence as a result of the Peace Treaty of Versailles for the well-being-physical and intellectual of the industrial wage-earners. The ILO has profoundly **influenced India's trade union movement**, labour legislation and labour policy. When the first ILO conference was held in 1919 in Washington, there was no central federation of Indian trade unions.

**Option 3 is correct.** The Russian Revolution, which ushered in workers' rule, **placed an ideal before the workers**, namely, that the **exploitation of labour** could be stopped by political means. This revolution motivated trade unions in India. In its early stage, the Indian trade union movement was influenced by communism. **(Hence, Option 3 is correct)**

Source: <https://www.egyankosh.ac.in/bitstream/123456789/70966/1/Unit-6.pdf>

Q.83)

Ans) a

Exp) Option a is the correct answer.

The folk-dance forms are generally spontaneous, crude and performed by the masses without any formal training. This simplicity gives the art form an inherent beauty. However, these dance forms have

remained confined to a certain sect of people or at a particular locality, to whom the knowledge has been passed down the ages.

**Statement 1 is correct:** Giddha is a folk **dance of Punjab** which is performed **only by females**. **Bhangra/Giddha** are the highly energetic folk dance of Punjab. Accompanied with infectious and catchy drum beats, this dance form is a popular form of celebration during festivities. **Giddha is the female counterpart of the male Bhangra.**

**Statement 2 is incorrect:** The **Rangma** is the **war dance** of the Nagas in Nagaland. The dance is performed **by both the male and female** folk of the tribe. Dressed in colourful costumes, jewellery and colourful headgears, the dancers enact mock war formations and traditions.

**Statement 3 is incorrect:** Alkap is a rural dance-drama performance prevalent in the Rajmahal hills of **Jharkhand and Murshidabad** and Malda regions of West Bengal. It is performed by troops of **10-12 dancers**, accompanied by one or two lead singers known as gayens. The troops perform **popular folk lore** and **mythological stories**, in which the dance is interspersed with comical sketches known as kap. The dance is generally associated with the Gajan festival of Shiva.

Source: Art and Culture Nitin Singhaniya 3rd Edition.pdf

Q.84)

Ans) d

Exp) Option d is the correct answer.

**Option a is incorrect:** **Sariputrprakarana** was written by Ashvaghosa (not by Kalidasa). Another important book written by Ashvaghosa was **Buddhacarita**. Ashvaghosa was a contemporary of Kanishka.

**Option b is incorrect:** The nine-act 'Sariputrprakaran' describes the conversion of Buddha's two disciples, **Sariputta** and **Maudgalyayana** into Buddhism.

**Option c is incorrect:** **Sariputrprakarana** was **written in Sanskrit** and not in Pali. Though incomplete, it is yet a standard and **mature Sanskrit drama** in terms of characters, language and structure.

**Option d is correct:** Sariputrprakarana was one of the three Buddhist dramas that have been discovered from the **fragments of manuscripts** on palm-leaf, **at Turfan, Xinjiang, China**.

Source: [https://mea.gov.in/images/pdf/India-ChinaEncyclopedia\\_Vol-2.pdf](https://mea.gov.in/images/pdf/India-ChinaEncyclopedia_Vol-2.pdf)

Q.85)

Ans) d

Exp) Option d is the correct answer.

**Pair 1 is correct:** **Ellora Cave Paintings** are mural paintings at Ellora caves in Maharashtra State. They are found in five caves, mostly limited to Cave No. 16, i.e., Kailasha Temple. The temple is decorated with some of the boldest and finest sculptural compositions to be found in India. **The sculpture depicting Ravana attempting to lift Mount Kailasa**, the abode of Siva, is especially noteworthy.

**Pair 2 is correct:** **Bagh caves** in Madhya Pradesh with their exquisite work rank quite **close to the actual Ajanta caves** in terms of their design, execution and decoration. It has beautiful murals on the walls depicting Buddhist **Jataka tales**, just like those in Ajanta. Although scanty and decayed now, these paintings depict religious themes in the light of contemporary lifestyle of people, thus are more **secular** in nature.

**Pair 3 is correct:** **Jogimara Cave Paintings** are located in **Surguja district of Chattisgarh**. It is an artificially carved out cave dating back around 1000-300 BC and has few paintings and inscriptions of a love story in **Brahmi script**. The cave is said to be an attachment to amphitheatre and the paintings were



made to decorate the room. Paintings are of dancing couples, of animals like elephant and fish. **The paintings have a distinct red outline.**

**Pair 4 is correct: Badami Cave Temples of Karnataka** are famous for its sculptures, and beautiful paintings. The important carvings in this cave are an **18-armed dancing Shiva**, a two-handed Ganesha, Mahishasura Mardini, Ardha Nareeshwara & Shankarnarayana. Murals at Badami caves having **lost their original grandeur** and charm, still offer a glimpse into the artistic capabilities of people of that era. They are one of the earliest surviving Hindu paintings.

Source: Art and Culture Nitin Singhaniya 3rd Edition.pdf

Q.86)

Ans) b

Exp) Option b is the correct answer.

Native States Indian Irrigation Commission also known as the Scott-Moncrieff Commission. The commission was named for its chairman, Sir Colin Campbell Scott-Moncrieff, who in 1903 recommended measures for the irrigation of an additional 10,200 square miles (26,400 square km) beyond the roughly 30,000 square miles (78,000 square km) already irrigated.

**Statement 1 is incorrect:** Scott Moncrieff Commission was a delegation appointed in 1901 by George Nathaniel Curzon (not by Ripon), the British viceroy of India. This was a result of Lord Curzon's observation of famine conditions soon after his arrival in 1899.

**Statement 2 is correct:** The commissions mandate was to draw up a **comprehensive irrigation plan for India.**

**Statement 3 is incorrect:** Lord **Curzon's government** in 1905 accepted the recommendations made by Scott-Moncrieff Commission. These recommendations became landmark in the government of India's irrigation policy later.

Source: A Brief History of Modern India by Rajiv Ahir

<https://www.britannica.com/topic/Scott-Moncrieff-Commission>

<https://indianculture.gov.in/native-states-indian-irrigation-commission-1901-02-minutes-evidence>

Q.87)

Ans) c

Exp) Option c is the correct answer.

**Pair 1 is incorrectly matched:** Also known as a 100 drums festival, **the Wangala Festival of Meghalaya** is a most popular festival among the Garos of Meghalaya. It is a harvest festival held in honour of Saljong, the Sun-God of fertility. It also signifies the onset of winter.



**Pair 2 is correctly matched: Nuakhai Juhar** is one of the most ancient **harvest festivals** celebrated in Odisha, Chhattisgarh and areas of neighbouring states to welcome the new crop of the season.

**Pair 3 is correctly matched: Torgya festival** is a festival to welcome healthy and a prosperous **new year**. It is celebrated by the **Monpa community of Arunachal Pradesh**. The basic belief of the people is that the

celebration of this festival is to **eliminate any kind of external energy** from the earth which can harm sentient beings and to protect them from natural calamities.

**Pair 4 is correctly matched: 'Herath' or 'Shivratri'**, historically a major festival of local Hindus (Kashmiri Pandits) in **Kashmir** who migrated in large numbers in the 1990s when militancy broke out here.

Source: <https://meghalaya.gov.in/wangala>

<https://timesofindia.indiatimes.com/blogs/the-rock-bottom/nuakhai-the-greatest-harvesting-festival-of-odisha/>

<https://blog.mygov.in/torgya-festival/>

<https://www.thehindu.com/news/national/other-states/muslims-pandits-bond-over-herath-festivities-online/article65095094.ece>

Q.88)

Ans) b

Exp) Option b is the correct answer.

**Pair 1 is incorrectly matched:** Kuchipudi classical dance is indigenous to the state of Andhra Pradesh and differs from the other classical styles by the **inclusion of singing**. Kuchipudi originated in the 17<sup>th</sup> century with the creation by Sidhyendra Yogi of the **dance-drama** Bhama Kalapam, a story of Satyabhāma, the charming but jealous wife of the god Krishna.



**Pair 2 is correctly matched: Mohiniyattam** literally interpreted as the dance of 'Mohini', the celestial enchantress of the Hindu mythology, is the **classical dance form of Kerala**. According to a Puranic story, Lord Vishnu took on the guise of a 'Mohini' to **seduce the Asuras**, both in connection with churning of the ocean and episode of the slaying of Bhasmasura. **The delicate body movements and subtle facial expressions are more feminine in nature and therefore are ideally suited for performance by women.**



**Pair 3 is incorrectly matched: Katakamukha Hasta'**, in which the three fingers are joined to symbolise 'Om', is one of the principal **mudras in Bharatnatyam**.

Whereas, Kathakali is the dance-drama form performed in Kerala. **The actor's performance in a Kathakali play is completely speechless:** the 'libretto' is sung by two singers on the stage who keep time

on gong and cymbals, while a pair of drummers also on the stage play the Chenda. In no other dance style is the **entire body** used so completely as in Kathakali. The **facial muscles** play an important part. The **movement of the eyebrows**, the eye-balls and the lower eye-lids as described in the Natya Shastra.'



Source: <http://ccrtindia.gov.in/kathakali.php>  
<https://www.britannica.com/art/mohini-attam>  
<https://www.britannica.com/art/kuchipudi>  
<http://ccrtindia.gov.in/kuchipudi.php>  
<http://ccrtindia.gov.in/mohiniyattam.php>

Q.89)

Ans) c

Exp) Option c is the correct answer.

**Statement 1 is correct:** Nathpanthis, criticized the ritual and other aspects of conventional religion and the social order, using simple, logical arguments. They **advocated renunciation** of the world. To them the **path to salvation lay in meditation** on the **formless Ultimate Reality** and the **realisation of oneness** with it. To achieve this, they advocated intense **training of the mind and body** through practices like yogasanas, breathing exercises and meditation. These groups became particularly popular **among "low" castes**.

**Statement 2 is incorrect:** The Lingayats **challenged the idea of caste** and the "pollution" attributed to certain groups by Brahmanas. They also **questioned the theory of rebirth**. The Lingayats also **encouraged certain practices disapproved in the Dharmashastras**, such as post-puberty marriage and the remarriage of widows.

**Statement 3 is correct:** The Kalamukha were a medieval Shaivite sect of the Deccan Plateau who were among the first professional monks of India. Kalamukha were most prominent during the **8th to the 13th century**. They became notorious for their practices of esoteric rituals that allegedly included **both animal and human sacrifice**.

Source: NCERT History New, Class 7, Page 110

NCERT History New, Class 12, Page 147

<https://www.britannica.com/topic/Kapalikas#ref25175>

Q.90)

Ans) b

**Exp) Option b is the correct answer.**

Knowledge of India's past can be enriched through a consideration of descriptions of social life provided by travelers who visited the subcontinent.

**Statement 1 is correct:** Abdur Razzaq was greatly impressed by the fortifications of the city of Vijayanagara and mentioned seven lines of forts. **These encircled not only the city but also its agricultural hinterland and forests.** Abdur Razzaq came visiting south India in the 1440s from Herat.

**Statement 2 is correct:** The Sultan Muhammad bin Tughlaq **was impressed by Ibn Battuta's scholarship, and appointed him the qazi or judge of Delhi.** He was later ordered in 1342 to proceed to China as the Sultan's envoy to the Mongol ruler Zaytun (now known as Quanzhou). Ibn Battuta came to India from Morocco in northwestern Africa in the fourteenth century.

**Statement 3 is incorrect:** Ibn Battuta's (not Alberuni) book of travels, called Rihla, **written in Arabic**, provides extremely rich and interesting details about the **social and cultural life** in the subcontinent in the **fourteenth century**. His account is often compared with that of Marco Polo, who visited China (and also India) from his home base in Venice in the late thirteenth century.

Source: NCERT History, Part 2, Class 12, Chapters 5 and 7

<https://www.livemint.com/Leisure/tdmt5VFB1281YF5fjSw19O/The-journey-of-Abdur-Razzaq.html>

**Q.91)**

**Ans) b**

**Exp) Option b is correct.**

**Semi-classical style** of Indian music **uses the basic structure of classical music but takes the leverage** to blend the different ragas. It even deviates from the rigid path to beautify the melody and make it more appealing to the mass.

**Option a is incorrect:** Semi-Classical styles have the concept of Gharanas. For example, **Thumris of Benaras Gharana.**

**Option b is correct:** There are several type of Semi-classical music. Few major examples are **Thumri, Dadra, Bhajan, Ghazal, Chaiti, Kajri, Tappa, Natya Sangeet, and Qawwali.**

**Option c is incorrect:** Semi-Classical Music is also sung in other regional languages such as **Rajasthani, Marathi, Bengali** etc.

**Option d is incorrect:** **Similar to Dadra in Hindustani music, Carnatic music has Javali.** Thus, it is incorrect to say that Carnatic Music does not have semi-classical musical forms.

Source: <https://www.thehindu.com/features/friday-review/music/semiclassical-beauties/article6169994.ece>

<https://www.ipassio.com/blog/semi-classical-music>

<https://magikindia.com/semi-classic-music/>

**Q.92)**

**Ans) b**

**Exp) Option b is the correct answer.**

Raja Ram Mohan Roy is known as the 'Maker of Modern India'. He was the founder of the 'Brahmo samaj', one of the first Indian socio-religious reform movements. Raja Ram Mohan Roy is called as the 'First Great Leader' of modern India. Swami Dayanand Saraswati was the founder of Arya Samaj and propagated egalitarian approach of the Vedas at a time when widespread casteism was prevalent in the society

**Statement 1 is incorrect:** Though Brahmo Samaj believes in the concept of soul and that the soul is immortal and is poised to become a part of Brahman, **it does not advocate the concept of salvation or**



**'Mukthi.'** Also, it doesn't believe in the concepts of hell and heaven. **Dayananda also strongly criticised the aim of human life as a struggle to attain moksha (salvation)** through escape from this evil world to seek union with God. Instead, he advocated that God, soul and matter (prakriti) were distinct and eternal entities and every individual had to work out his own salvation in the light of the eternal principles governing human conduct.

**Statement 2 is correct:** Raja Rammohan roy **declared that Vedanta is based on reason** and that, if reason demanded it, even a **departure from the scriptures is justified**. He said the principles of rationalism applied to other sects also, particularly to the elements of blind faith in them. Whereas Dayanand Saraswati took inspiration from the Vedas and considered them to be 'India's Rock of Ages', **the infallible** and the true original seed of Hinduism. He gave the slogan "Back to the Vedas".

**Statement 3 is incorrect.** Both Raja Ram Mohan Roy and Dayanand Saraswati did not believe in Idol worship. Rammohan vigorously **opposed the worship of idols** and the prevalence of meaningless religious rituals. He held that all the sacred books of the Hindus preached the worship of one God. Swami Dayanand Saraswati told the people **"Idol worship is not mentioned in the Vedas**. The rational mind cannot accept idol worship. God is everywhere God has no shape or form.

**Statement 4 is correct:** Raja Ram Mohan Roy **rejected the barriers of caste divisions** and stood forth as the high priest of Universalism and Love. Swami Dayanand Saraswati **repudiates a hereditary caste system**, and only recognizes professions or guilds, suitable to the complementary aptitudes of men in society. To many people, the Arya Samaj aims to be a "universal church" based on the authority of the Vedas. He gave new interpretations to reform the stagnant Hindu thought through his book "Satyaprakash" (The Light of Truth)

Source: [https://www.indianetzone.com/5/swami\\_dayanand\\_sarawati.htm](https://www.indianetzone.com/5/swami_dayanand_sarawati.htm)

[https://www.indianetzone.com/18/ram\\_mohan\\_roy.htm](https://www.indianetzone.com/18/ram_mohan_roy.htm)

Spectrum 17<sup>th</sup> edition chapter-9 page-228, 229, 244, 245

**Q.93)**

**Ans) d**

**Exp) Option d is the correct answer.**

The word mimamsa means a reflection, investigation, or analysis. In the context of this darshana, it refers to the **enquiry into the nature of Dharma, or a code of conduct** in its ritualistic, ceremonial, and sacrificial sense. This schools of philosophy believed that the Vedas were eternal and the Vedic rituals, combined with an ethical life, was the way to Salvation. According to Jaimini, Dharma is an imperative carrying Vedic authority. Human beings cannot escape the compulsion of Dharma. This school advocates taking the assistance of the priests, while performing the Vedic rituals. Therefore, this philosophy inherently legitimized the social distance between the various classes.

**Sankhya:** Sankhya attempts to understand the cosmos through reason and logic. One of its main threads is Unity and the interdependence of our universe, which was not created by any external force, such as a God. Instead, this system speaks of two eternal entities in the universe, having no beginning or end; they are *Prakriti* or Infinite Unconsciousness (nature, matter in potential), and *Purusha*, or Infinite Consciousness (spirit).

**Nyaya:** In a broad sense Nyaya means a process of reasoning or syllogistic reasoning based on logic. In popular usage Nyaya also means justice. The Nyaya texts are a study of formal logic, but ultimately their focus, like every other Indian philosophical system, is Life.

**Vaisheshika:** Vaisheshika elaborates that within every object there is a certain inherent, irreducible quality which is *Vishesh* (particular) and which distinguishes it from all other objects. It is the essence of that substance

Source: <https://library.acropolis.org/the-darshanas-six-schools-of-indian-philosophy/>

Q.94)

Ans) c

Exp) Option c is the correct answer.

**Treaty of Sagauli (March 4, 1816)** was agreement between the Gurkha chiefs of Nepal and the British Indian government. It ended the Anglo-Nepalese (Gurkha) war (1814–16). By the treaty, Nepal renounced all claim to the disputed Tarai, or lowland country, and ceded its conquests west of the Kali River and extending to the Sutlej River.

**The treaty of Yandabo** is the peace treaty that put an end to the First Anglo-Burmese war with the British emerging victories. The treaty was signed on **24<sup>th</sup> February 1826** almost 2 years after the war broke down on 5<sup>th</sup> March 1824.

**Tripartite Treaty was signed in June 1838** between Ranjit Singh, Shah Shuja and Lord Auckland. As per this treaty, Shah Shuja would be reinstated on the Throne but he recognised the Sikh ruler, Maharaja Ranjit Singh's claims over the Afghan territories on the right bank of the River Indus.

**Treaty of Gandamak was signed in may 1879** after the Second-Anglo Afghan War in which the Amir conduct his foreign policy with the advice of Government of India; a permanent British resident be stationed at Kabul; and the Government of India give Amir all support against foreign aggression, and an annual subsidy.

Source: Spectrum 17<sup>th</sup> edition chapter-5 expansion and consolidation of British empire page- 136, 137, 140, 142

Q.95)

Ans) d

Exp) Option d is the correct answer.

**Pair 1 is correctly matched: Kaziranga National Park** is located in the **State of Assam**. It is the single largest undisturbed and representative area in the Brahmaputra Valley floodplain. The entire area of park is confined by the Brahmaputra River that forms the eastern & northern boundaries, and the Diphlu that forges the southern boundary.

**Pair 2 is correctly matched: Silent Valley National Park** is a national park in Kerala, India. It is located in the Nilgiri hills. A perennial river named Kunthipuzha is passing through the western side of the park, from north to south direction finally merging in to Bharathapuzha. Main tributaries of this river are Kunthancholapuzha, Karingathodu, Madrimaranthode, Valiaparathodu and Kummathanthode. All major tributaries of Kunthipuzha originate on the upper slopes of the eastern side of the Valley. The streams from the western slopes are dry in summer.

**Pair 3 is correctly matched: Bandhavgarh** is spread in vindhya hills in Madhya Pradesh. The whole park is filled with more than 20 luminous streams out of which some of the most important streams are Johilla, janadh, **charanganga**, Damnar, Banbei, Ambanala and Andhiyari Jhiria. These streams then merge into the son river, an important southern tributary to the river Ganges.

Source: <https://www.thehindu.com/news/national/other-states/flood-situation-improves-in-assam/article31983382.ece>

<https://www.kaziranga-national-park.com/kaziranga-location.shtml>

<http://www.silentvalley.gov.in/AboutThePark/Geology>

[https://www.bandhavgarh-national-park.com/location-of-](https://www.bandhavgarh-national-park.com/location-of-bandhavgarh.html#:~:text=The%20whole%20park%20is%20filled,tributary%20to%20the%20river%20Ganges.)

[bandhavgarh.html#:~:text=The%20whole%20park%20is%20filled,tributary%20to%20the%20river%20Ganges.](https://www.bandhavgarh-national-park.com/location-of-bandhavgarh.html#:~:text=The%20whole%20park%20is%20filled,tributary%20to%20the%20river%20Ganges.)

Q.96)

Ans) a

Exp) Option a is the correct answer.

**Seabuckthorn** is a shrub which produces an **orange-yellow coloured edible berry**. In India, it is found above the tree line in the **Himalayan region**, generally in dry areas such as the cold deserts of Ladakh and Spiti. A major part is covered by this plant in Himachal Pradesh, Ladakh, Uttarakhand, Sikkim and Arunachal Pradesh. The Himachal Pradesh government has recently decided to start planting seabuckthorn in the cold desert areas of the state.

Q.97)

Ans) b

Exp) Option b is the correct answer.

The Ministry of Agriculture is working on a digital 'stack' of agricultural datasets, which will provide farmers with recommendations on which seeds to buy, and best practices to maximise their yield, along with updates on weather, agricultural credit, insurance and more.

**Option a is correct:** AgriStack project will **collect granular data** to provide growers with a range of customized services. For example, what to plant, where to sell, market information on price movements, and linkages to formal credit arrangements. Each farmer will be provided **a unique farmer's ID**, which will be **linked to her Aadhaar number**. It will contain **details related to land ownership, the crops she grows, soil health and the benefits available under government schemes** such as direct cash transfers, crop insurance and subsidized credit.

**Option b is incorrect:** There is **no provision for consolidation and digitisation of land records** under Agriculture. However, the project **relies on land ownership records** to provide valuable information to farmers. Old land records, and landlessness limit AgriStack accuracy and its usefulness. **Land records** that are at the core of AgriStack are **either dated, incomplete, erroneous or non-existent** in India. Linking land ownership data with Aadhaar may hit a roadblock because the process of digitizing land records is still under progress in India. Further land disputes account for more than 60% of all civil litigation.

**Option c is correct:** In order to create Agristack, the government is in the process of finalising "**India Digital Ecosystem of Agriculture (IDEA)**" which will lay down a framework for Agristack. The IDEA would help in laying down the architecture for the Agri-stack in the country and that would serve as a foundation to build **innovative agri-focused solutions leveraging emerging technologies** to contribute effectively in creating a better ecosystem for agriculture in India.

**Option d is correct:** AgriStack would have some building blocks such as data on weather, the newest science and research on agriculture, **agricultural commodity prices in India and abroad**, information and access to central government schemes, agricultural regulations and permissions.

Source: <https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1741995>

[https://www.business-standard.com/article/economy-policy/what-is-a-digital-agristack-and-why-indian-farmers-are-opposed-to-it-122011300175\\_1.html](https://www.business-standard.com/article/economy-policy/what-is-a-digital-agristack-and-why-indian-farmers-are-opposed-to-it-122011300175_1.html)

<https://epaper.livemint.com/Home/ShareArticle?OrgId=236a8cf4465&imageview=0>

Q.98)

Ans) d

Exp) Option d is the correct answer.

**Pair 1 is correctly matched:** Radio telescopes are **used to detect electromagnetic radiation that is not visible to naked human eye**. A radio telescope is a specialized antenna and radio receiver used to detect radio waves from astronomical radio sources in the sky. Radio telescopes are the main observing instrument used in radio astronomy. Examples: James Clerk Maxwell Telescope, Five-hundred-metre Aperture Spherical Telescope

**Pair 2 is correctly matched:** Optical Astronomy is also known as **Visible-light astronomy** and an **optical telescope is a telescope that gathers and focuses light mainly from the visible part** of the electromagnetic spectrum, to create a magnified image for direct visual inspection, to make a photograph, or to collect data through electronic image sensors. Example: Hubble Space Telescope.

**Pair 3 is correctly matched:** Infrared telescope is an **instrument designed to detect and resolve infrared radiation from sources outside Earth's atmosphere such as nebulae, young stars, and gas and dust** in other galaxies. It is helpful in **detecting the temperatures of planetary bodies** and stars. Example: Spitzer Space Telescope used by NASA.

Source: <https://www.ucl.ac.uk/~zcpe78/Telescopes%20report.pdf>

<https://public.nrao.edu/telescopes/radio-telescopes/>

<https://sciencing.com/infrared-telescope-work-4926827.html>

Q.99)

Ans) a

Exp) Option a is the correct answer.

A Development Bank may be defined as a financial institution concerned with providing all types of medium term and long term lending facilities of financial assistance medium to both private as well as public sector institutions.

**Statement 1 is correct.** The New Development bank is majorly concerned with mobilizing resources for **infrastructure and sustainable development projects** in BRICS and other emerging economies, as well as in developing countries. While the Asian Development Bank (ADB) envisions a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to **eradicate extreme poverty** in the region.

**Statement 2 is correct.** In Asian Development Bank (ADB) the largest stakeholders are **Japan and the US** with nearly **13 per cent** voting shares whereas In New Development bank (NDB), all five member nations of BRICS share equal **20 per cent stakes each**.

**Statement 3 is incorrect.** As of 31 December 2020, ADB's members consist of 49 developing and developed members within Asia and the Pacific region, and **19 members from outside the region**. Recently 4 new members were added to the NDB shareholders. Besides BRICS nation the new members are Bangladesh, UAE, Egypt, Uruguay.

Knowledge Base: Other objectives of NDB operations are: (i) fostering development of member countries, (ii) supporting economic growth, (iii) promoting competitiveness and facilitating job creation, and (iv) building a knowledge sharing platform among developing countries.

Source: [https://www.business-standard.com/article/news-ians/adb-readies-for-face-off-with-aiib-ndb-in-india-119032400266\\_1.html](https://www.business-standard.com/article/news-ians/adb-readies-for-face-off-with-aiib-ndb-in-india-119032400266_1.html)

<https://www.ndb.int/wp-content/themes/ndb/pdf/Agreement-on-the-New-Development-Bank.pdf>

<https://www.adb.org/sites/default/files/institutional-document/32120/charter.pdf>



<https://www.ndb.int/about-us/essence/history/>

<https://www.adb.org/news/asian-development-bank-new-development-bank-meet-discuss-new-project-cofinancing#:~:text=It%20is%20owned%20by%2067,on%20infrastructure%20and%20sustainable%20development.>

**Q.100)**

**Ans) b**

**Exp) Option b is the correct answer.**

Currency depreciation is a fall in the value of a currency in terms of its exchange rate versus other currencies. Currency depreciation can occur due to factors such as economic fundamentals, interest rate differentials, political instability, or risk aversion among investors.

**Statement 1 is correct:** Depreciating rupee can create concerns for **Current Account Deficit (CAD)**. It increases the **CAD** as a weak rupee against the dollar makes imports costlier. Some imports cannot be cut down such as oil, which can negatively affect India's current account deficit. Exports may rise with depreciating currency.

**Statement 2 is correct:** It also poses an inflationary risk given that imports are costlier when the currency depreciates. Costlier oil means costlier vegetables and groceries since transportation costs go up.

**Statement 3 is incorrect:** The external borrowing costs for Indian firms move up due to rupee weakening. This dampens industry borrowing and slows economic growth.

Source: <https://www.elibrary.imf.org/view/journals/024/1950/001/article-A003-en.xml>

<https://www.investopedia.com/terms/c/currency-depreciation.asp>

<https://timesofindia.indiatimes.com/business/india-business/trade-current-account-deficit-seen-widening-rupee-under-pressure/articleshow/89967199.cms>