ANSWERS & EXPLANATIONS
GENERAL STUDIES (P) TEST – 4144 (2024)

Q 1.B

- Union Government of India approved the National Green Hydrogen Mission with an outlay of ₹ 19,744 crore from FY 2023-24 to FY 2029-30. **The overarching objective of the Mission is to incentivize the commercial production of green hydrogen and make India a net exporter of the fuel. The Mission will facilitate demand creation, production, utilization and export of Green Hydrogen. Hence, statement 1 is correct.**
- The Mission will have wide-ranging benefits- the creation of export opportunities for Green Hydrogen and its derivatives; Decarbonisation of industrial, mobility and energy sectors; reduction in dependence on imported fossil fuels and feedstock; development of indigenous manufacturing capabilities; creation of employment opportunities; and development of cutting-edge technologies. **It aims to achieve the above objectives, the Mission will build capabilities to produce at least 5 Million Metric tonnes (MMT) of Green Hydrogen per annum by 2030, with the potential to reach 10 MMT per annum with the growth of export markets.** The Mission will support the replacement of fossil fuels and fossil fuel-based feedstocks with renewable fuels and feedstocks based on Green Hydrogen. **Hence, statement 2 is correct.**
    - **Achievement of Mission targets is expected to reduce a cumulative ₹ 1 lakh crore worth of fossil fuel imports by 2030.**
- **The Ministry of New and Renewable Energy (MNRE) will be responsible for the overall coordination and implementation of the Mission. The Mission Secretariat, headquartered in MNRE, will formulate schemes and programs for financial incentives to support the production, utilization and export of Green Hydrogen and its derivatives. Hence, statement 3 is not correct.**

Q 2.C

- A carbon credit (also known as carbon offset) is a credit for greenhouse emissions reduced or removed from the atmosphere by an emission reduction project, which can be used by governments, industry, or private individuals to compensate for the emissions they generate elsewhere.
- Those that cannot easily reduce emissions can still operate, at a higher financial cost.
- Carbon credits are based on the "**cap-and-trade" model that was used to reduce sulfur pollution in the 1990s. Hence, statement 2 is correct.**
- One carbon credit is equal to **one metric ton of carbon dioxide, or in some markets, carbon dioxide equivalent gases (CO2-eq), and are bought and sold through international brokers, online retailers, and trading platforms. Hence, statement 1 is correct.**
- Offsetting one metric ton of carbon means that there will be one less Mt of carbon dioxide in the atmosphere than there would otherwise have been. **The Kyoto Protocol provides for three mechanisms that enable countries, or operators in developed countries, to acquire greenhouse gas reduction credits:**
    - **Under Joint Implementation (JI)** a developed country with relatively high costs of domestic greenhouse reduction would set up a project in another developed country.
    - **Under the Clean Development Mechanism (CDM)** a developed country can "sponsor" a greenhouse gas reduction project in a developing country where the cost of greenhouse gas reduction project activities is usually much lower, but the atmospheric effect is globally equivalent. The developed country would be given credits for meeting its emission reduction targets, while the developing country would receive the capital investment and clean technology or beneficial change in land use.
    - **Under International Emissions Trading (IET)** countries can trade in the international carbon credit market to cover their shortfall in Assigned Amount Units (AAUs). Countries with surplus units can sell them to countries that are exceeding their emission targets under Annex B of the Kyoto Protocol.

- **Cap and trade** is an approach that harnesses market forces to reduce emissions cost-effectively. Like other market-based strategies, it differs from "command-and-control" approaches where the government sets performance standards or dictates technology choices for individual facilities.
    - Cap and trade allows the market to determine a price on carbon, and that price drives investment decisions and spurs market innovation.
    - Cap and trade differs from a tax in that it provides a high level of certainty about future emissions, but not about the price of those emissions (carbon taxes do the inverse).

Q 3.D

- **Indoor Air Pollution:** The air within homes and other buildings can sometimes be more polluted than the outdoor air even in the largest and most industrialised cities. Indoor air quality is an important concern for the health and comfort of the occupants.
- **Some of the sources of indoor air pollution are:**
    - **Radon:** Radon is an invisible, radioactive atomic gas that results from the radioactive decay of radium, which may be found in rock formations beneath buildings or in certain building materials themselves. Radon is the second most frequent cause of lung cancer, after cigarette smoking.
    - **Second-hand smoke:** It is tobacco smoke which affects other people other than the 'active' smoker. It includes both a gaseous and a particulate phase, with particular hazards arising from levels of carbon monoxide and very small particulates.
    - **Biological chemicals: They can arise from a host of means, like moisture induced growth of mould colonies and natural substances released into the air such as animal dander and plant pollen.** They are allergens and aggravate asthama.
    - **Ozone:** Ozone is produced by ultraviolet light from the Sun hitting the Earth's atmosphere, lightning, certain high-voltage electric devices and as a by-product of other types of pollution.
    - **Air Freshener: Many air fresheners employ carcinogens, volatile organic compounds and known toxins such as phthalate esters in their formulas.** Most of the products that have been studied contain chemicals that can aggravate asthma and affect reproductive development.
- **Hence, option (d) is the correct answer.**

Q 4.D

- **The Water (Prevention and Control of Pollution) Act was enacted in 1974 to provide for the prevention and control of water pollution and for the maintaining or restoring of wholesomeness of water in the country. The Act was amended in 1988.**
- **The Water (Prevention and Control of Pollution) Cess Act was enacted in 1977, to provide for the levy and collection of a cess on water consumed by persons operating and carrying on certain types of industrial activities. Hence, statement 1 is not correct.**
- This cess is collected with a view to augment the resources of the Central Board and the State Boards for the prevention and control of water pollution constituted under the Water (Prevention and Control of Pollution) Act, 1974.
- The Act was last amended in 2003.
- **On October 9, 2021, India's Ministry of Environment, Forests and Climate Change published "Environment (Protection) 115 Amendment Rules, 2021" to add regulation on the use of water purification systems (WPS). Hence, statement 2 is not correct.**
- Users of domestic water purification systems (DWPS) and other water purification systems (ODPWS) have to comply with the guidelines issued by the Central Pollution Control Board (CPCB) within six months of the promulgation of this regulation.

Q 5.C

- **The Global Environment Facility:**
  The Global Environment Facility has a unique governing structure organized around an Assembly, the Council, the Secretariat, 18 agencies, a Scientific and Technical Advisory Panel, and the Evaluation Office.
- **Financial mechanism provision by GEF**
  The GEF provides funding to assist developing countries in meeting the objectives of international environmental conventions. The GEF serves as a "financial mechanism" to five conventions, which are the **Convention on Biological Diversity (CBD), the United Nations Framework Convention on Climate Change (UNFCCC), the Stockholm Convention on Persistent Organic Pollutants (POPs), the UN Convention to Combat Desertification (UNCCD), and Minamata Convention on Mercury.**

- **Five Focal Areas**
  It supports developing countries' work to address the world's most pressing environmental issues. GEF organizes its work around five focal areas, They are as follows
  - **Biodiversity loss,**
  - **Chemicals and waste**
  - **Climate change**
  - **International waters**
  - **Land degradation**
  - and take an integrated approach to support more sustainable food systems, forest management, and cities. **Hence answer (c) is the correct answer.**

Q 6.A

Status of India's Nuclear Energy

- **Nuclear energy** is the fifth-largest source of electricity for India **which contributes about 3% of the total electricity generation in the country. Hence statement 1 is not correct.**
- **India has over 22 nuclear reactors in 7 power plants across the country which produces 6780 MW of nuclear power. Hence statement 2 is not correct.**
- In addition, one reactor,Kakrapar Atomic Power Project (KAPP-3) has also been connected to the grid in January- 2021.
- **18 reactors are Pressurised Heavy Water Reactors (PHWRs) and 4 are Light Water Reactors (LWRs). Hence statement 3 correct.**
- The existing nuclear power capacity of 6780 MW is going to be increased to 22480 MW by the year 2031 on progressive completion of projects under construction and accorded sanction. More nuclear power plants are also planned in future.

Q 7.B

- The reduction of anthropogenic carbon dioxide (CO_2) in the atmosphere is crucial for mitigating climate change. CO_2 capture and storage (CCS) is considered as one of the most promising options for carbon reduction. The main means is the injection of CO_2 into structural reservoirs in deep, permeable geologic formations.
- **Trapping mechanisms for geological sequestration or carbon sequestration include hydrodynamic trapping, solubility trapping, and mineral trapping. Hence option (b) is the correct answer.**
  - **Hydrodynamic trapping** refers to that CO_2 which is trapped as supercritical fluid or gas under a low-permeability caprock. Carbon dioxide, being less dense than the formation fluid, will rise buoyantly until it encounters a caprock.
  - **Solubility trapping**: When CO_2 is injected into a reservoir, a portion of the injected CO_2 will dissolve in the formation water in the aquifer and the dissolution of CO_2 per unit volume of water is a function of pressure, temperature, and salinity of the aqueous phase.
  - **Mineral carbonation** refers to the incorporation of CO_2 in a stable mineral phase via reactions with mineral and organic matter in the formation. Over time the injected CO_2 will dissolve into the local formation water and initiate a variety of geochemical reactions.

Q 8.A

- **The International Solar Alliance (ISA) announced that the Global Solar Facility (GSF),** formed by it to stimulate investments into solar power projects, is set to receive a capital contribution of $35 million. The Indian government is considering a $25 million investment as capital contribution in the GSF in addition to $10 million coming from the ISA.
  - **It is a payment guarantee mechanism expected to stimulate investments into solar projects, with two financial components:-**
    - ✓ **Solar Payment Guarantee Fund** to provide a partial guarantee and enable investments in geographies that do not receive investments.
    - ✓ **Solar Insurance Fund** to reduce the burden of insurance premium for solar developers in pre-revenue phase of project.
- **Initiatives taken by ISA but not under Solar Facility:-**
  - **Green Grids Initiative - One Sun, One World, One Grid (OSOWOG).**
  - **Global Energy Alliance for People and Planet (GEAPP) launched at COP26 with USD10 billions.**
  - **ISA's Programme on Scaling Solar Applications for Agriculture Use (SSAAU).**
- **Hence option (a) is the correct answer.**

Q 9.B

- Resilient and Inclusive Supply-chain Enhancement—or **RISE was launched by World Bank and Japan—joined by Italy, the Republic of Korea, Canada, and the United Kingdom. Hence statement 1 is not correct.**
- **Resilient and Inclusive Supply-chain Enhancement—or RISE—initiative will help emerging markets and developing countries (EMDCs) increase manufacturing of clean-energy products and boost their participation in the minerals industry—leading to quality local jobs and economic growth. Hence statement 2 is correct.**
    - Japan, Canada, Italy, the Republic of Korea, and the United Kingdom have pledged an initial total contribution of more than $40 million to RISE, and more donors are expected to contribute.
- The energy transition will create a trillion-dollar market, with tens of millions of jobs along global mineral value chains. It represents an opportunity for EMDCs to build manufacturing capacity, boost job growth, and strengthen long-term economic development.

Q 10.C

Species	Chemical formula	Lifetime (years)	Global Warming Potential (Time Horizon)		
			20 years	100 years	500 years
Carbon dioxide	CO_2	variable §	1	1	1
Methane *	CH_4	12±3	56	21	6.5
Nitrous oxide	N_2O	120	280	310	170
HFC-23	CHF3	264	9100	11700	9800
HFC-32	CH2F2	5.6	2100	650	200
Sulphur hexafluoride	SF_6	3200	16300	23900	34900
Perfluoromethane	CF4	50000	4400	6500	10000
Perfluoroethane	C2F6	10000	6200	9200	14000
Perfluoropropane	C3F8	2600	4800	7000	10100

- **Greenhouse Gasses**
    - Greenhouse gases are a type of gas that traps heat in the atmosphere. This is what causes global warming. Some of the most common greenhouse gasses include carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and fluorinated gases (SF6, HFCS, and PFCs).
- **Global warming potential (GWP)**
    - Global warming potential (GWP) is a metric used to compare the relative impact of different greenhouse gases on global warming. The GWP of a gas is defined as the amount of energy it absorbs over a given period of time, relative to the same amount of CO2.

- **Carbon dioxide (CO2):**
  - Carbon dioxide (CO2) is one of the primary greenhouse gases responsible for global warming. Global warming potential (GWP) is a metric used to compare the relative impact of different greenhouse gases on global warming. The GWP of a gas is defined as the amount of energy it absorbs over a given period of time, relative to the same amount of CO2.
  - **The GWP of CO2 is defined as 1, meaning that it is the reference point for all other greenhouse gases.** The GWP of other gases is calculated by comparing their radiative forcing to that of CO2. For example, methane (CH4) has a GWP of 21, which means that it traps 21 times more heat than the same amount of CO2 over a 100-year period.
  - **GWPs are typically calculated over a 100-year time horizon**, but they can also be calculated for shorter or longer periods. This is because different greenhouse gases have different atmospheric lifetimes. CO2, for example, has a very long atmospheric lifetime of about 100 years, meaning that it can remain in the atmosphere for a long time and continue to trap heat. Methane, on the other hand, has a shorter atmospheric lifetime of about 10 years, meaning that it is removed from the atmosphere more quickly.
- **Methane (CH4)**
  - Methane is a greenhouse gas that is about 56 times more potent than carbon dioxide. It is a major contributor to climate change. Methane is released into the atmosphere from a variety of sources, including:
    - ✓ Natural sources: such as wetlands, wildfires, and termites.
    - ✓ Human sources: such as agriculture, landfills, and oil and gas production.
- **Nitrous Oxide (N2O)**
  - Nitrous oxide is a greenhouse gas that is about 280 times more potent than carbon dioxide. It is a major contributor to climate change. Nitrous oxide is released into the atmosphere from a variety of sources, including:
    - ✓ Agricultural sources: such as fertilizers, manure, and irrigated agriculture.
    - ✓ Industrial sources: such as nitric acid production and combustion processes.
- **Hydrofluorocarbons (HFCs)**
  - Hydrofluorocarbons (HFCs) are a group of greenhouse gases that are used as refrigerants and in foam-blowing applications. HFCs are very potent greenhouse gases. **They are thousands of times more potent than carbon dioxide.** HFCs are not naturally occurring in the atmosphere. They are released into the atmosphere from a variety of sources, including:
    - ✓ Refrigeration and air conditioning
    - ✓ Foam-blowing: HFCs are used in foam-blowing applications, such as in the production of insulation and packaging materials.
- **Sulphur Hexafluoride (SF6)**
  - Sulphur hexafluoride (SF6) is a greenhouse gas that is about 23,000 times more potent than carbon dioxide. It is the most potent greenhouse gas known to man. **SF6 is not naturally occurring in the atmosphere**. It is released into the atmosphere from a variety of sources, including:
  - Electrical equipment: SF6 is used as an insulator in electrical equipment, such as power transformers and switchgear.
  - Semiconductor manufacturing: SF6 is used in the semiconductor manufacturing process.
- **Hence option (c) is the correct answer.**

Q 11.B

- **Biochar is defined as a carbon-rich material produced during the pyrolysis process (not incineration)** that is a thermochemical decomposition of biomass with a temperature of about ≤700°C in the absence or limited supply of oxygen. **Hence statement 1 is not correct.**
  - Both incineration and pyrolysis are forms of combustion in which the thermal decomposition of matter takes place. The key difference between incineration and pyrolysis is that incineration is the combustion of organic matter in the presence of oxygen whereas pyrolysis is the combustion of organic matter in the absence of oxygen.
- Biochar is primarily carbon (~85%), but it can also contain oxygen, hydrogen, and inorganic ash if present in the parent biomass. The heating value of biochar is in the range 25–32 MJ/kg dry basis, which is substantially higher than that of the parent biomass or its liquid product. As biomass is carbon neutral, the combustion of biochar is considered more environmentally friendly than coal.
- Biochar is characterized by a large pore surface area. Hence it has a large number of nonfuel uses such as the adsorption of chemicals and carbon storage in the ground. When added back to the soil, biochar

absorbs and retains water and nutrients. **Biochar enriches the soil and prevents it from leaching pesticides and other nutrients into the runoff. Hence statement 2 is correct.**

- **Biochar is also an excellent carbon sink.** When biomass is charred, it sequesters, or stores, its carbon content. When biochar is added back to the soil, it can continue to absorb carbon and form large underground stores of sequestered carbon that can lead to negative carbon emissions and healthier soil. **Hence statement 3 is correct.**

Q 12.B

- **Atmospheric lifetime of a greenhouse**
  - The atmospheric lifetime of a greenhouse gas is the average time it takes for half of the molecules of that gas to be removed from the atmosphere. In other words, it is the length of time that a greenhouse gas remains in the atmosphere before being removed through natural processes, such as chemical reactions or absorption by the Earth's surface.
  - The atmospheric lifetime of a greenhouse gas is important because it determines how long the gas will continue to contribute to the greenhouse effect and climate change. Greenhouse gases with longer atmospheric lifetimes, such as nitrous oxide (N2O) and hydrofluorocarbons (HFCs), will have a more significant impact on climate change than gases with shorter atmospheric lifetimes, such as methane (CH4).

Details of Green House gases:

- **Methane (CH4)**
  - Atmospheric lifetime: 12 years
  - Global warming potential (GWP): 25
  - Sources: Natural sources such as wetlands, wildfires, and termites, as well as human sources such as agriculture, landfills, and oil and gas production
  - Properties: Methane is a colorless, odorless, and flammable gas. It is a potent greenhouse gas, with a GWP of about 25 times that of carbon dioxide.
- **Nitrous oxide (N2O)**
  - **Atmospheric lifetime: 109 years.**
  - **Hence option (b) is the correct answer.**
- GWP: 280
  - Sources: Natural sources such as soils and oceans, as well as human sources such as agriculture and industrial processes
  - Properties: Nitrous oxide is a colorless, odorless, and non-flammable gas. It is a potent greenhouse gas, with a GWP of about 300 times that of carbon dioxide.
- **Hydrofluorocarbons (HFCs)**
  - Atmospheric lifetime: Hundred years
  - GWP: Thousands
  - Sources: Man-made sources such as refrigeration and air conditioning, foam-blowing, and semiconductor manufacturing
  - Properties: HFCs are a group of colorless, odorless, and non-flammable gases. They are potent greenhouse gases, with GWPs of thousands of times that of carbon dioxide.
- **Chlorofluorocarbons (CFCs)**
  - Atmospheric lifetime: 50-100 years
  - GWP: Thousands
  - Sources: Man-made sources such as refrigerants, propellants, and foam-blowing agents
  - Properties: CFCs are a group of colorless, odorless, and non-flammable gases. They are potent greenhouse gases, with GWPs of thousands of times that of carbon dioxide.

Q 13.A

- **Carbon trading began under the Kyoto Protocol of 1997 (which came into force in 2005).** Under this, 'certified emission reductions' or CERs, were issued to entities that put up projects that reduced emissions — such as wind, solar, or energy efficiency. **Hence option (a) is the correct answer.**
  - It allows nations which are unable to meet their reduction targets to purchase carbon credits. Paris Agreement also allows voluntary trading between countries to meet their NDC goals.
  - If a country reduces more GHG emissions than its target, it can sell the emission reduction to another country as an "internationally traded mitigation outcome.

Q 14.B

- **Global Environment Facility (GEF), International Union for Conservation of Nature (IUCN) and Conservation International** announced the launch of a new **global initiative to support the leadership of Indigenous peoples and local communities in stewarding land, water and natural resources. Hence, statement 1 is correct and 3 is not correct.**
- The Inclusive Conservation Initiative (ICI) will support enhanced Indigenous and community stewardship across 7.5 million hectares of landscapes, seascapes and territories with high biodiversity and irreplaceable ecosystems. Recognizing the continuing historical role of Indigenous peoples and local communities in safeguarding natural ecosystems, **ICI will provide direct financial support to Indigenous and locally-led initiatives in Africa, Central and South America, Asia and the Pacific. Hence, statement 2 is correct.**
- **ICI provides site-based investments in nine subprojects** to prioritize Indigenous and local community organizations to take the lead in carrying out inclusive, culturally appropriate processes for decision-making and strategy development that they have defined, implementing activities within their respective territories, landscapes and/or sea scapes.
- **The establishment of these nine subprojects in 12 countries** demonstrates that there is high demand for these inclusive finance models, as they were selected among over 400 Expressions of Interest (EOIs) that were received from 80 countries.

Q 15.A

- **Udangudi 'Panangkarupatti' (palm jaggery/ gur) from Tamil Nadu has been given a Geographical Indication (GI) tag.**
  - The palm jaggery preparation procedure in this area is traditional to date without the inclusion of any additional modern strategies.
  - Triple superphosphate and phosphoric acid are used in many other areas, but no such chemical additives are used in Udangudi Panangkarupatti**. Hence pair 1 is not correctly matched.**
  - The karupatti prepared from the palm sap from the region around Udangudi in Tiruchendur taluk in Thoothukudi district has some uniqueness. This is due to the presence of red sand dune soil found in the region.
  - This soil holds less groundwater. The moisture content in the atmosphere is less because of the dry climatic conditions, which leads to high sucrose content, in turn adding taste.
- **Khamti rice is a variety of sticky rice produced in the Namsai district of Arunachal Pradesh and is known for its taste. It is cultivated by traditional Khampti tribal farmers. Hence pair 3 is correctly matched.**
- **Tangsa textile is made by the Tangsa tribe of Changlang district in Arunachal Pradesh and is famous for its exotic designs and colors. Hence pair 2 is not correctly matched.**
- The first ever yak milk product, Arunachal Pradesh Yak Churpi also received a GI tag recently.

Q 16.B

- **Carbon leakage** refers to the situation that may occur if, for reasons of costs related to climate policies, **businesses were to transfer production to other countries with laxer emission constraints. This could lead to an increase in their total emissions. Hence option (b) is the correct answer.**
- **How does Carbon Leakage work?**
  - We take an example of two countries A and B.
  - Country A has a very strict emission policy and due to its stringent policy, the costs involved in the production increases.
  - Country B has a less strict and flexible emission policy and due to this flexible policy, the costs involved in the production are less as compared to country A, keeping all other factors constant.
  - So, a company located in country A faces increased costs due to emissions pricing as a result of the strict climate policy. The company would take some action and as a result may decide to go for reducing, closing or even relocating the production to Country B with less stringent climate policies. **This means that the Country A was though able to cut emissions, but now Country B will increase the emissions due to transfer of greenhouse gas intensive industries from Country A to B. The result is more Green House Gases emission and more industrial jobs.**
- **Other associated concepts –**
  - **Carbon Pricing** is an instrument that captures the **external costs of greenhouse gas (GHG) emissions** - the costs of emissions that the public pays for, such as damage to crops, health care costs from heat waves and droughts, and loss of property from flooding and sea level rise - and ties them to their sources through a price, usually in the form of a price on the carbon dioxide (CO_2) emitted.

- **Carbon Tax -** A carbon tax is a fee imposed on businesses and individuals that works as a sort of **"pollution tax."** The tax is a fee imposed on companies that burn carbon-based fuels, including coal, oil, gasoline, and natural gas.
- **Carbon Trading** is the buying and selling of credits that permit a company or other entity to emit a certain amount of carbon dioxide. **Carbon trade agreements allow for the sale of credits to emit carbon dioxide between nations as part of an international agreement aimed at gradually reducing total emissions.**
- **Zero Carbon Law by New Zealand -** The Zero Carbon Act puts in place targets to reduce all greenhouse gases: **Carbon dioxide and nitrous oxide have to reduced to net zero by 2050.**

Q 17.C

- As India shifts gears to meet its net-zero target by 2070, the transition towards clean energy and multiple decarbonization initiatives will optimize the use of the country's energy mix and reduce the proportion of fossil fuels over the long run.
- Since the Indian automotive industry has always been a key indicator of the nation's economic growth, contributing to approximately 6.5 percent of India's overall gross domestic product; 40 percent of its manufacturing GDP and supporting about 30 million direct and indirect jobs, the growth of this industry should be in sync with the government's vision of 'green growth'. Going forward, the industry would need to continue to build on a strong foundation of sustainability, environmental consciousness and safety. Hence, **a range of initiatives have been introduced by the Indian automobile industry under the aegis of the Society of Indian Automobile Manufacturers (SIAM).**
- **One of the initiatives is for biofuels. Through a campaign called 'Javik Pahal', the industry promotes biofuels produced from renewable biological materials.** Alternative fuels can play a pivotal role in powering vehicles, reducing the reliance on petroleum imports, lowering greenhouse gas emissions and also improving farmer incomes. **Hence statements 1 and 2 are correct.**

Q 18.B

- **Recent context:** China to build the world's largest 'ghost particle' or Neutrino detector.
- **Neutrinos are a type of electron but, like neutrons, they do not have any charge**. They are among the most abundant particles in our universe — with trillions of neutrinos passing through you at any given second — and also among the tiniest. **Hence statement 3 is correct**.
- **Neutrinos were long believed to be massless until scientists found evidence that they do have a very small mass. Hence statement 2 is correct.**
- Neutrinos' weak charge and almost nonexistent mass have made them notoriously difficult for scientists to observe. **They can only be "seen" when they interact with other particles.**
  - The rarity of interactions with other particles makes them almost impossible to track. That's why they're called ghost particles — the vast majority skirt around undetected.
- They rarely interact with other particles. But rarely doesn't mean "never". **Sometimes they interact with water molecules,** which is why China is building its ghost molecule telescope underwater. **Hence statement 1 is not correct.**
- Scientists have observed ghost particles in fleeting instances when the particles create byproducts after traveling through water or ice. These "muons" create flashes of light that can be detected by sophisticated underwater telescopes and offer one of the fews ways to study the energy and source of neutrinos.
- Right now, the largest neutrino-detecting telescope is the University of Madison-Wisconson's "IceCube" telescope. Situated deep in the Antarctic, the telescope's sensors span around 1 cubic kilometer.

Q 19.B

- **The Convention on Wetlands of International Importance (Ramsar Convention):**
  - The Convention on Wetlands of International Importance (Ramsar Convention) was adopted in 1971 and entered into force in 1975.
  - It is a **legally binding intergovernmental framework** instrument embodying the commitments of its member countries to maintain the ecological character of their Wetlands of International Importance and to plan for the "wise use", or sustainable use, of all wetlands in their territories. **Hence statement 1 is correct**
  - The Convention's mission is "the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world".

- **What are wetlands under the Ramsar Convention:**
  - Wetlands are areas where water is the primary factor controlling the environment and the associated plant and animal life. They occur where the water table is at or near the surface of the land, or where the land is covered by water. The Ramsar Convention takes a broad approach in determining the wetlands which come under its aegis.
  - Under the text of the Convention (Article 1.1), wetlands are defined as: "**areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is *static or flowing*, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters".**
  - This definition **includes lotic water bodies, such as rivers and streams,** if they meet specific criteria. For example, they must be important waterbird habitats, representative examples of particular types of wetland systems, or ecologically important for other reasons, such as providing flood control or sediment retention. **Hence statement 2 is not correct.**
- **Lotic water bodies:**
  - Lotic water bodies are **water bodies that have a current or flow of water, such as rivers, streams, and creeks.**
  - They are characterized by their high dissolved oxygen content and their ability to transport sediment and nutrients.
  - Lotic water bodies support a variety of aquatic and riparian (streamside) organisms, including fish, insects, and plants.
- **Lentic water bodies:**
  - Lentic water bodies are **water bodies that do not have a current or flow of water, such as ponds, lakes, and marshes.**
  - They are characterized by their low dissolved oxygen content and their tendency to stratify (form layers) due to differences in temperature and density.
  - Lentic water bodies support a variety of aquatic and emergent (water-loving) plants, as well as amphibians, reptiles, and waterfowl.
- **Five major wetland types are generally recognized under the Ramsar Convention:**
  - **marine** (coastal wetlands including coastal lagoons, rocky shores, and coral reefs);
  - **estuarine** (including deltas, tidal marshes, and mangrove swamps);
  - **lacustrine** (wetlands associated with lakes);
  - **riverine** (wetlands along rivers and streams);
  - **palustrine** (meaning "marshy" - marshes, swamps and bogs).
- **Ramsar Wetlands in India:**
  - In the 75th year of Independence, the number of Ramsar sites in India stands at 75, covering an area of 13,26,678 ha, thanks to the recent addition of 11 more wetlands to the list in 2022.
  - **Among the eleven new sites**,
    - ✓ **four are in Tamil Nadu** (Chitrangudi Bird Sanctuary, SuchindramTheroor Wetland Complex, Vaduvur Bird Sanctuary, Kanjirankulam Bird Sanctuary)
    - ✓ **three in Odisha** (Tampara Lake, Hirakud Reservoir, Ansupa Lake)
    - ✓ **two in Jammu & Kashmir** (Hygam Wetland Conservation Reserve, Shallbugh Wetland Conservation Reserve)
    - ✓ **and one each in Madhya Pradesh** (Yashwant Sagar) and **Maharashtra** (Thane Creek).
- **Currently India, with 75, has the largest network of Ramsar Wetlands in Asia surpassing China. Hence statement 3 is correct.**

Q 20.A

- E-waste, electronic waste, e-scrap and end-of-life electronics are terms often used to describe used electronics that are nearing the end of their useful life, and are discarded, donated or given to a recycler.
- The UN defines e-waste as any discarded products with a battery or plug, and features toxic and hazardous substances such as mercury, that can pose severe risk to human and environmental health.
- The overarching **objective of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal is to protect human health and the environment against the adverse effects of hazardous wastes. E-waste is categorized as hazardous waste due to the presence of toxic materials such as mercury, lead and brominated flame retardants** are considered as hazardous waste according to the Basel Convention. In addition, transboundary movements of hazardous and other wastes, including e-waste ending up in dumps, are deemed to be illegal traffic under the Basel Convention, Article 9. **Hence, statement 1 is correct.**

- **India is the third largest electronic waste generator in the world after China and the USA** and these three countries together contributed 38% of total 53.6 million tonnes (Mt) of e-waste generated world wide in 2019. **Hence, statement 2 is not correct.**

Q 21.A

- **Recently, in 2023 the Dhordo village in the Kutch district of Gujarat was awarded as the Best Tourism Village by the United Nations World Tourism Organization (UNWTO).**
  - From Salty marshland to an Iconic destination of the Western Indian Subcontinent – Dhordo, in the Rann of Kutch, has become the face of Gujarat's development.
  - **Tourism was launched through Rann Utsav, a four-month festival whereby a special tent city was created in the desertic land with all the necessary amenities made available to tourists.**
  - It is during these four months that the village comes to life displaying all the natural and cultural resources/products to its consumers.
- **Mawlynnong** is a village in the East Khasi Hills district of the Meghalaya state in North East India. It is notable for its cleanliness and also was chosen by Discover India magazine as Asia's cleanest village.
- **The remote village of Malana** is nestled in the pristine Parvati Valley of Himachal Pradesh, and stands as a mysterious and enchanting destination. Known for its unique customs, centuries-old traditions, and breathtaking natural beauty, Malana is a place that has captured the imaginations of travelers for years.
- **Odanthurai** of Tamil Nadu has taken energy generation to another level. The village not only produces its own electricity but also sells it to the state's government. The village has come up with self-help ventures Wind-power generation.
  - They have replaced the grid electricity with a 9kW biomass gasifier power generation system for the means of pumping water to the houses.
- **Hence option (a) is the correct answer.**

Q 22.B

- **The Least Developed Countries Fund (LDCF) was established at the 7th Conference of the Parties in 2001 (COP7) to meet the adaptation needs of least developed countries (LDCs). Hence, statement 1 is not correct.**
- LDCF is active in sectors including water, agriculture and food security, health, disaster risk management and prevention, infrastructure and fragile ecosystems and has the largest portfolio of adaptation projects of its kind. The Global Environmental Facility (GEF) administers the LDCF as a specialized trust fund and serves as a basis for programming resources.
- **The LDCF aims to address the needs of the 51 LDCs which are particularly vulnerable to the adverse impacts of climate change. As a priority, the LDCF supports the preparation and implementation of the National Adaptation Programmes of Action (NAPAs), which are country-driven strategies that identify the immediate needs of LDCs in order to adapt to climate change. Hence, statements 2 and 3 are correct.**

Q 23.C

- The India GHG Program led by WRI India, Confederation of India Industry (CII) and The Energy and Resources Institute (TERI) is an **industry-led voluntary framework to measure and manage greenhouse gas emissions. Hence option (c) is the correct answer.**
- The programme builds comprehensive measurement and management strategies to reduce emissions and drive more profitable, competitive and sustainable businesses and organisations in India.
- The programme is supported by the Shakti Sustainable Energy Foundation, the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) and Pirojsha Godrej Foundation.

Q 24.C

- Recently, Scientists have made history by **successfully turning on the world's smallest particle accelerator for the first time.** With a size similar to a small coin, this astonishing discovery holds **enormous potential for a variety of applications**, including the **use of miniature particle accelerators for medicinal purposes. Hence statements 1 and 2 are correct.**
- The **NEA is a cutting-edge technology made up of a microscopic microprocessor and an even smaller vacuum tube made up of thousands of individual pillars.**
- By **directing microscopic laser beams onto these tiny pillars, researchers have developed a way for accelerating electrons.** Surprisingly, the main acceleration tube within the NEA is only 0.02 inches (0.5 millimeters) long, which is 54 million times shorter than the massive 16.8-mile-long (27-kilometer) ring

housing CERN's Large Hadron Collider (LHC) in Switzerland, the world's largest and most powerful particle accelerator.

- **Nano-Scale Precision: T**he interior of the NEA's tiny tunnel is around 225 nanometers broad. According to the National Nanotechnology Institute, the thickness of a human hair ranges between 80,000 and 100,000 nanometers.
- **Acceleration of Electrons:** Researchers from the Friedrich-Alexander University of Erlangen-Nuremberg (FAU) in Germany used the NEA to accelerate electrons in a recent study published in the journal Nature. They effectively increased electron energy from 28.4 kiloelectron volts (keV) to 40.7 keV, a 43% increase. This is the first successful activation of a nanophotonic electron accelerator, which was first proposed in 2015.
- It is a Particle Acceleration on a Microchip.
- **In contrast to Large Particle Accelerators:** The **LHC uses almost 9,000 magnets to create a magnetic field for particle acceleration, whereas the NEA uses light beams focused at the vacuum tube's pillars to magnify energy, resulting in a far lower energy field.** Electrons accelerated by the NEA have substantially less energy than electrons accelerated by major colliders such as the LHC. However, experts believe that by experimenting with different materials or stacking many tubes together, they can improve particle acceleration even further. Despite this, the NEA will not achieve energy levels equivalent to those of massive particle colliders. **Hence statement 3 is correct.**
- **Possibilities for Medical Applications: One of the key goals of developing these small accelerators is to exploit the energy released by accelerated electrons to deliver tailored medicinal treatments, perhaps replacing more invasive forms of radiotherapy used to battle cancer cells.** The ultimate goal is to mount a particle accelerator on an endoscope, allowing radiotherapy to be delivered directly to afflicted parts of the body. This transformational application, however, remains a long-term goal.

Q 25.A

- **E-Waste Rules (Management), 2022**
- These rules shall apply to every manufacturer, producer refurbisher, dismantler and recycler involved in the manufacture, sale, transfer, purchase, refurbishing, dismantling, recycling and processing of e-waste or electrical and electronic equipment listed in Schedule I, including their components, consumables, parts and spares which make the product operational.
- **But they shall not apply to - (a) waste batteries as covered under the Battery Waste Management Rules, 2022; (b) packaging plastics as covered under the Plastic Waste Management Rules, 2016; (c) micro-enterprise as defined in the Micro, Small and Medium Enterprises Development Act, 2006 (27 of 2006); and (d) radio-active wastes as covered under the provisions of the Atomic Energy Act, 1962 (33 of 1962) and rules made there under. Hence, statement 1 is correct.**
- **'e-retailer' means an individual company or business entity that uses an electronic network such as the internet, social media, telephone or any other media, to sell its goods. Hence, statement 2 is not correct.**
- 'historical e-waste' means e-waste generated from electrical and electronic equipment as specified in Schedule I which was available on the date from which these rules came into force;
- **'orphaned products' means non-branded or assembled electrical and electronic equipment as specified in Schedule I or those produced by a company which has closed its operations; Hence, statement 3 is not correct.**
- 'extended producer responsibility' means the responsibility of any producer of electrical or electronic equipment as given in Schedule-I for meeting recycling targets as per Schedule-III and Schedule-IV, only through registered recyclers of e-waste to ensure environmentally sound management of such waste;

Q 26.A

- **Statement 1 is correct.** 'Zero budget' farming promises to end a reliance on loans and drastically cut production costs, ending the debt cycle for desperate farmers. The word 'budget' refers to credit and expenses, thus the phrase 'Zero Budget' means without using any credit, and without spending any money on purchased inputs.
- **Statement 2 is correct.** The main aim of ZBNF is eliminate use of chemical pesticides and uses biological pesticides and promote of good agronomic practices. Farmers use earthworms, cow dung, urine, plants, human excreta and such biological fertilizers for crop protection.
- **Statement 3 is not correct.** It has attained wide success in southern India, especially the southern Indian state of Karnataka where it first evolved. The movement in Karnataka state was born out of collaboration between Mr Subhash Palekar, who put together the ZBNF practices, and the state farmers association Karnataka Rajya Raitha Sangha (KRRS).

Q 27.C

- **Recent context** : **Raising concerns over the use of World Bank's Worldwide Governance Indicators** in ratings assessment by credit ratings agencies, especially for emerging economies, Chief Economic Adviser V Anantha Nageswaran said there is a need for the World Governance Index to be more transparent and less subjective.
- **The World Bank's Worldwide Governance Indicators provide a ranking of 215 countries** territories based on six dimensions of governance: 'Voice and Accountability'; 'Political Stability and Absence of Violence'; 'Government Effectiveness'; 'Regulatory Quality'; 'Rule of Law' and 'Control of Corruption.
- The WGI were developed in 1999 by two World Bank researchers, Daniel Kaufmann and Aart Kraay. The data are updated annually each September.
- **The WGI aggregate data from more than 30 think tanks, international organizations, nongovernmental organizations, and private firms** across the world selected on the basis of three key criteria: 1) they are produced by credible organizations; 2) they provide comparable cross-country data; and 3) they are regularly updated.
- **Hence option (c) is the correct answer.**

Q 28.A

- **The United Nations Environment Assembly (UNEA):**
  - **The United Nations Environment Assembly (UNEA) is the world's highest-level decision-making body on the environment. It is a universal body with the membership of all 193 UN Member States. Hence statement 2 is correct.**
  - **UNEA meets every two year**s to set the global environmental agenda, provide overarching policy guidance, and define policy responses to address emerging environmental challenges. **Hence statement 3 is not correct.**
- **Establishment of UNEA**
  - **UNEA was established in 2012** as a result of the United Nations Conference on Sustainable Development (UNCSD), also known as **Rio+20. Hence statement 1 is not correct.**
  - The UN General Assembly then adopted resolution on strengthening and upgrading UNEP and establishing universal membership of its Governing Council (GC).
  - In March 2013, the UN General Assembly further adopted resolution, which changed the designation of the UNEP Governing Council (GC) to the UNEA of the UNEP.
- **Key Functions of UNEA**
  UNEA plays a pivotal role in shaping international environmental policy and driving action towards a sustainable future. Its key functions include:
  - **Setting environmental priorities:** UNEA identifies and prioritizes key environmental issues that require international attention and action.
  - **Developing policy frameworks:** UNEA develops and adopts policy frameworks to address global environmental challenges, providing a roadmap for action.
  - **Monitoring and review:** UNEA monitors the implementation of environmental policies and agreements, conducting regular reviews to assess progress and identify areas for improvement.
  - **Strengthening environmental governance:** UNEA strengthens environmental governance by providing a platform for international cooperation and collaboration on environmental matters.
  - **Promoting sustainable development:** UNEA promotes sustainable development by integrating environmental considerations into social and economic policies.
- **Structure of UNEA**
  UNEA is governed by the Conference of the Parties (COP), which is composed of representatives from all 193 UN Member States. **The COP meets every two years to deliberate and adopt decisions on environmental matters.**

Q 29.D

- The Ministry of New and Renewable Energy (MNRE) is the nodal Ministry of the Government of India for all matters relating to new and renewable energy. The broad aim of the Ministry is to develop and deploy new and renewable energy to supplement the energy requirements of the country.
- **Renewable Energy in India includes:**
  - **Wind energy**
  - **Nuclear energy**
  - **Solar energy**
  - **Biomass energy**

- **Geothermal energy**
- **Hydropower**

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

Installed capacity of renewable sources of energy in India

Solar	Wind	Small hydro	Large hydro	Biopower	Nuclear
48.55 GW	40.03 GW	4.83 GW	46.51 GW	10.62 GW	6.78 GW

Q 30.A

- As a specialized UN agency to address all matters related to international civil aviation, including environmental protection, ICAO has been diligently addressing GHG emissions from international aviation. The ICAO agreement on carbon-neutral growth and CORSIA complements the ambition of the Paris Agreement and constitutes the most significant international climate-related agreement since its adoption.
- **CORSIA is the first global market-based measure for any sector and represents a cooperative approach that moves away from a "patchwork" of national or regional regulatory initiatives. It offers a harmonized way to reduce emissions from international aviation,** minimizing market distortion, while respecting the special circumstances and respective capabilities of ICAO Member States. **Hence, statement 1 is correct.**
- CORSIA complements the other elements of the basket of measures by offsetting the amount of CO2 emissions that cannot be reduced through the use of technological improvements, operational improvements, and sustainable aviation fuels with emissions units from the carbon market.
- Why does the Paris Agreement not include international aviation emissions?
  - Specifically, governments working under the auspices of the UNFCCC have agreed that while **all domestic GHG emissions are dealt with under the UNFCCC, GHG emissions associated with international aviation and maritime transport are to be dealt with under ICAO and International Maritime Organization (IMO),** respectively. This approach is consistent with similar UNFCCC decisions that also apply to the Kyoto Protocol.
  - In this regard, GHG emissions from domestic aviation, as per other domestic sources, are calculated as part of the UNFCCC national GHG inventories and are included in national totals (part of the Nationally Determined Contributions (NDCs) of the Paris Agreement), while GHG emissions from international aviation are reported separately and are not included in NDCs.
- CORSIA will be implemented in three phases, as follows:
  - Pilot phase: from 2021 to 2023;
  - First phase: from 2024 to 2026; and
  - Second phase: from 2027 to 2035.
- **For the pilot and first phase, participation is voluntary, while for the second phase, participation is based on the States' RTK level in 2018 and voluntary participation. Hence, statement 2 is not correct.**

Q 31.B

- **The Montreal Protocol on Substances that Deplete the Ozone Layer is a global agreement to protect the Earth's ozone layer** by phasing out the chemicals that deplete it. This phase-out plan includes both the production and consumption of ozone-depleting substances.
- The landmark agreement was signed in 1987 and entered into force in 1989.
- The most recent amendment, the Kigali Amendment, called for the phase-down of hydrofluorocarbons (HFCs) in 2016. These HFCs were used as replacements for a batch of ozone-depleting substances eliminated by the original Montreal Protocol.
- Although they do not deplete the ozone layer, they are known to be powerful greenhouse gases and, thus, contributors to climate change.The Montreal Protocol provided a set of practical, actionable tasks that were universally agreed on.
- **Under the Kigali Amendment; Parties to the Montreal Protocol will phase down production and consumption of Hydrofluorocarbons, commonly known as HFCs.**
  - **Hydrofluorocarbons were introduced as a non-ozone-depleting alternative to Hydrofluorocarbons (HFCs). Hence, statement 1 is not correct.**

- While HFCs do not deplete the stratospheric ozone layer, they have a high global warming potential ranging from 12 to 14,000, which has an adverse impact on climate.
- Recognizing the growth in the use of HFCs, especially in the Refrigeration and Air-conditioning sector the Parties to the Montreal Protocol, reached an agreement at their 28th Meeting of the Parties (MOP) held in October 2016 in Kigali, Rwanda to add HFCs to the list of controlled substances and approved a **timeline for their gradual reduction by 80-85 per cent by the late 2040s. Hence, statement 2 is correct.**
- **India will complete its phase-down of HFCs in 4 steps from 2032 onwards** with a cumulative reduction of 10% in 2032, 20% in 2037, 30% in 2042 and 85% in 2047.
- All amendments and adjustments of the Montreal Protocol, prior to the Kigali Amendment have Universal support.
- **India has successfully met the phase-out targets of all the Ozone Depleting Substances as per the Montreal Protocol Schedule. Hence, statement 3 is correct.**

Q 32.C

- Ethanol, anhydrous ethyl alcohol is produced from sugarcane, maize, wheat, etc which are having high starch content. In India, ethanol is mainly produced from sugarcane molasses by the fermentation process. Ethanol can be mixed with the gasoline to form different blends.
- The Ethanol Blending Programme (EBP) seeks to achieve the blending of Ethanol with motor spirit with a view to reducing pollution, conserving foreign exchange and increasing value addition in the sugar industry enabling them to clear cane price arrears of farmers.The level of ethanol blending in petrol in India has reached 9.99 per cent.
- India had targeted 10 per cent ethanol blending in petrol by the end of 2022 and 20 per cent blending by 2030 as per National Biofuel Policy-2018. Later the Central Government advanced it by five years for achieving 20% ethanol blending in petrol.
- **The amended National Biofuel Policy-2018 has now set the new target for 2025-26 instead of 2030.** To achieve this target within the timeframe the central government announced premium rates for ethanol produced from sugar syrup, cane juice as well as B-heavy molasses**. Hence statement 1 is correct.**
- The Centre has also targeted a 5 per cent blending of biodiesel with diesel by 2030. Mixing 20 per cent ethanol in a petrol can potentially reduce the auto fuel import bill by a yearly Rs 30,000 crore.
- In India, the **Department of Food and Public Distribution (DFPD) is the nodal department for the promotion of fuel-grade ethanol-producing distilleries in the country.** It launched the Interest Subvention Scheme for enhancement and augmentation of the ethanol production capacity. **Hence statement 2 is correct.**

Q 33.B

- Ethanol is one of the principal biofuels, which is naturally produced by the fermentation of sugars by yeasts or via petrochemical processes such as ethylene hydration. It has medical applications as an antiseptic and disinfectant. It is used as a chemical solvent and in the synthesis of organic compounds, apart from being an alternative fuel source.
- **Ethanol blending offers significant advantages such as an increase in the Research Octane Number (RON) of the blend, fuel-embedded oxygen and higher flame speed. These properties of ethanol help in complete combustion and reduce vehicular emissions such as hydrocarbon, carbon monoxide and particulate matter.**
- **The calorific value of ethanol is around 2/3rd of gasoline. This indicates that the increase in ethanol content will decrease the heating value of the ethanol-gasoline blend. Hence, more fuel is required to achieve the same engine power output.**
- However, ethanol has a higher octane number and thus the engine can be operated with a high compression ratio without knocking. This increases the efficiency of the engine considerably.
- **This combined with optimal spark timing negates the fuel economy debit due to the low calorific value of ethanol. Hence, ethanol is considered as an efficient fuel provided suitable modifications are made in the vehicle. Hence, option (b) is the correct answer.**

Q 34.C

- The wastewater containing hazardous waste chemicals should be detoxified and neutralised through treatment.
- There are many technologies available for treating hazardous wastes before they are ultimately disposed of.

- Their aim is to modify the physical and/or chemical properties of the wastes so that they are rendered harmless.
- Selection of a treatment process depends on many factors such as the nature of the waste, the desired characteristics of the output stream, and economic and energy considerations.
- The treatment technologies can be divided into the following groups, namely:
    - **Physical treatment**
        - ✓ is conducted using various methods such as phase separation. Phase separation includes three steps, namely: lagooning, prolonged storage in tanks and sludge drying in beds. **Lagooning** and tank storage are collectively used to separate particulate impurities.
    - **Chemical treatment**
        - ✓ is used to facilitate the complete breakdown of hazardous wastes and more usually to modify the chemical properties of the wastes, e.g., to reduce water solubility or to neutralise acidity or alkalinity. The techniques involve oxidation, chemical reduction, **neutralization,** heavy metal precipitation, oil-water separation and solvents/ fuels recovery.
    - **Biological treatment**
        - ✓ The gross impurities obtained from the treatment of sewage are collectively known as sludge, which is given biological treatment, before disposal.
        - ✓ This is known as sludge processing which has become important since improvements in industrial waste water treatment.
        - ✓ The typical technologies for sludge processing include conditioning, digestion, composting, thickening or dewatering and solidification.
            - **Conditioning**: In this step, the sludge is exposed to the atmosphere for a stipulated period until a desired consistency is reached.
            - **Digestion**: In this process, the sludge is treated with bacteria which break down the long-chain compounds into simpler ones.
            - **Composting**: In this step, the organic matter in the waste sludge is converted into a usable stable material.
    - **Solidification**
        - ✓ processes convert liquid waste into insoluble, rock-hard material and are used as pre-treatment prior to landfill disposal. This is usually done by mixing the waste with various reactants to produce a solid mass. The basic aim of the solidification process is to immobilize the hazardous constituents of the waste so that these do not leach out at the landfill disposal site.
    - **Incineration**
        - ✓ Apart from the above-mentioned methods, incineration is also a method of detoxification, in which oxidation of waste detoxifies the waste from its toxic proportion.
    - **Hence option (c) is the correct answer.**

Q 35.A

- **National Action Plan on Climate Change (NAPCC)**
  The National Action Plan on Climate Change (NAPCC) is a comprehensive framework for India's climate change strategy. It was launched in 2008 and outlines eight key missions to address climate change in various sectors of the economy.
    - **The Eight Missions and Objectives of NAPCC**
        - ✓ **National Mission on Sustainable Habitat:** Promote sustainable urban planning and transportation to reduce the impact of cities on the environment. It is executed under the Ministry of Housing and Urban Affairs (MoHUA)
        - ✓ **National Mission for Enhanced Energy Efficiency:** Improve energy efficiency across all sectors of the economy to reduce greenhouse gas emissions. It is executed under the Ministry of Power (MoP)
        - ✓ **National Mission For Sustainable Agriculture (Nmsa):** Promote sustainable agricultural practices to reduce greenhouse gas emissions and enhance food security. It is executed under the Ministry of Agriculture and Farmers Welfare (MoAFW)
        - ✓ **National Water Mission:** Conserve and efficiently use water resources to adapt to the impacts of climate change. It is executed under the **Ministry of Jal Shakti.**
        - ✓ **National Mission For Sustaining The Himalayan Ecosystem:** Protect and preserve the Himalayan ecosystem, which is highly vulnerable to climate change. It is executed under the Department of Science & Technology, **Ministry of Science & Technology.**
        - ✓ **National Solar Mission:** It aims to increase the share of solar energy in India's energy mix. It is executed under the **Ministry of New and Renewable Energy (MNRE)**

- ✓ **National Mission on Strategic Knowledge for Climate Change (NMSKCC):** It aims to generate and disseminate knowledge about climate change to inform policy decisions and adaptation strategies. It is executed under the Department of Science & Technology**, Ministry of Science & Technology.**

- **National Mission on Natural Farming (NMNF)**
  - The National Mission on Natural Farming (NMNF) is a **separate and independent scheme launched by the Government of India in 2023-24**. It aims to promote natural farming practices in India and to reduce the use of chemical fertilizers and pesticides. **It is not included in NAPCC.**
  - To motivate farmers to adopt chemical-free farming and enhance the reach of natural farming, the Government has formulated the National Mission on Natural Farming (NMNF) as a separate and independent scheme from 2023-24 by upscaling the Bhartiya Prakritik Krishi Paddati (BPKP).
  - The success of NMNF will require behavioral change in farmers to shift from chemical-based inputs to cow-based locally produced inputs and thus requires continuous creation of awareness, training, handholding, and capacity building of farmers in the initial years.
- **Hence Option (a) is the correct answer.**

Q 36.D

- **Recent context**: India is embarking on a major program to launch its maiden national-level framework towards providing climate services and information.
  - Spearheaded by the India Meteorological Department (IMD), the National Framework for Climate Services (NFCS) envisions bringing a seamless working platform for users of climate information and services and helping decide and mitigate climate risks for key sectors — agriculture, energy, disaster management, health, and water.
- In line with the global framework, the national framework will be based on country-specific weather and stakeholder needs. Unlike the GFCS, the nodal agency for the formulation and implementation of the national framework in India will be the IMD.
- **The Global Framework for Climate Services (GFCS) was established by the international community at the World Climate Conference-3 in 2009 to enable better management of the risks of climate variability and change, and adaptation to climate change,** through the development and incorporation of science-based climate information and prediction into planning, policy and practice on the global, regional and national scale. **Hence statements 1 and 2 are not correct.**
  - At the invitation of the Government of Switzerland, World Climate Conference-3 (WCC-3) was held in Geneva, Switzerland, from 31 August to 4 September 2009.
  - It was organized by the World Meteorological Organization (WMO), in collaboration with the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Environment Programme (UNEP), the Food and Agriculture Organization of the United Nations (FAO), the International Council for Science (ICSU) and other intergovernmental and non-governmental partners.
- **The main sources of GFCS funding thus far are Member's contributions to the GFCS Trust Fund or through bilateral and multi-lateral investments for projects in selected countries or regions.**
  - In addition, various actors can support projects – listed in a compendium of GFCS projects – or designate their activities as contributing to the GFCS if they fulfill the criteria endorsed by the Intergovernmental Board on Climate Services (IBCS)

Q 37.D

- **Recent context**: A new study has revealed that two species of mosquitofish also known as Gambusia Fish have invaded various ecosystems across India.
- Gambusia fish are native to the southeastern United States and parts of Mexico, but they have been introduced to various regions worldwide for mosquito control.
- Gambusia fish are often used for biological mosquito control. They are known for their voracious appetite for mosquito larvae. Introducing these fish into water bodies can help reduce mosquito populations.
- **Gambusia fish are livebearers, meaning they give birth to live young ones instead of laying eggs**. They are known for their rapid reproduction rates.
- While Gambusia fish are effective at controlling mosquito larvae, **their introduction to non-native habitats has been controversial. In some cases, they have outcompeted or preyed upon native fish species, affecting the local ecosystem**. **Hence statement 1 is not correct.**
  - **Wildlife biologists and conservations consider mosquitofish to be among the hundred most detrimental invasive alien species. Thus they are not critically endangered. Hence statement 2 is not correct.**

- In 2018, the National Biodiversity Authority of the Government of India also designated G. affinis and G. holbrooki as invasive alien species.

- **Gambusia Fish do not have any symbiotic relationship with Olive Ridley Turtles. Hence statement 3 is not correct.**

Q 38.B

- **The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):**
  - The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international agreement between governments that aims to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species in the wild. It is a **legally binding agreement that is implemented by the Parties to the Convention**, which are currently 183 countries. **Hence statement 1 is not correct.**
  - Although CITES is legally binding on the Parties – in other words, they have to implement the Convention – **it does not take the place of national laws.**
  - CITES was drafted as a result of a resolution adopted in 1963 at a meeting of members of IUCN (The World Conservation Union).
- **CITES Implementation:**
  CITES is implemented through a system of permits and quotas. All international trade in specimens of species listed on the CITES Appendices must be accompanied by a permit from the appropriate export or import authority. Quotas are also used to control the trade in certain species, such as elephants and tigers.
  - **CITES Appendices:** CITES has three Appendices:
    - ✓ **Appendix I:** Includes all species threatened with extinction that are or may be affected by international trade.
    - ✓ **Appendix II:** Includes all species which are not necessarily threatened with extinction but which may become so if trade is not strictly controlled.
    - ✓ **Appendix III:** Includes all species which any Party to the Convention identifies as being subject to regulation within its jurisdiction for the purpose of preventing or restricting exploitation and which it has requested the Conference of the Parties to the Convention to add to the Appendices.
- **The CITES Secretariat**
  The CITES Secretariat is administered by UNEP and is located in Geneva, Switzerland. It has a pivotal role, fundamental to the Convention, and its functions are laid down in Article XII of the text of the Convention. **Hence statement 2 is correct.** They include:
  - Playing a coordinating, advisory, and servicing role in the working of the Convention.
  - Assisting with communication and monitoring the implementation of the Convention to ensure that its provisions are respected.
  - Providing assistance in the fields of legislation, enforcement, science, and training.

Q 39.A

- **The International Whaling Commission (IWC):**
  The International Whaling Commission (IWC) was established in 1946 to regulate whaling and conserve whale stocks. The Commission has 88 member countries and meets every other year to review the status of whale stocks and adjust conservation measures.
  The IWC regulates three types of whaling: commercial, scientific research, and aboriginal subsistence whaling.
- **Commercial Whaling**
  - **In 1986, a global moratorium was placed on commercial whaling due to overexploitation of whale stocks. However, some countries, such as Norway and Iceland, continue to engage in commercial whaling. Hence statement 1 is correct.**
  - In recent years, Norway and Iceland have caught whales commercially. The Government of Norway lodged a formal objection to the moratorium decision when it was introduced. Iceland left the IWC in 1992 and re-joined in 2002 with a reservation to the moratorium. When the moratorium was introduced, the Russian Federation also registered an objection but did not exercise it. The moratorium is binding on all other members of the IWC.
- **Scientific research**
  - Scientific research whaling is permitted under special permits issued by the IWC. Japan's lethal scientific research in the North Pacific and Southern Oceans ended in 2019.
- **Subsistence whaling**
  - **Aboriginal subsistence whaling is also regulated by the IWC. Aboriginal subsistence whaling is the practice of hunting and killing whales for food, cultural, and spiritual purposes by indigenous peoples who have a long history of whaling traditions. Hence statement 2 is not correct.**

- Indigenous communities in Denmark, the Russian Federation, St. Vincent and the Grenadines, and the United States are **permitted to engage in this type of whaling.**
- The IWC places a strong emphasis on scientific advice and has established a Scientific Committee to provide guidance. The Scientific Committee meets annually and has produced catch-limit algorithms to ensure sustainable whaling practices.

- **Members**
  - Membership of the IWC is open to any country in the world. Each member formally adheres to the 1946 International Convention for the Regulation of Whaling and is represented by a Commissioner who is nominated by their government. **Currently, there are 88 member nations in the IWC.**
  - **India has been a member of the International Whaling Commission since 1981 and has maintained a consistent stand on whale conservation.**
  - **Japan left the IWC in 2019 and began to catch whales commercially the same year. Having left the IWC is no longer bound by the moratorium. Japanese catches are also reported to the IWC.**
- **Other G2O nations that are not members of the IWC include Canada, Indonesia, Saudi Arabia, and Turkiye along with Japan.**

Q 40.C

- **Indo-Pacific Partnership for Maritime Domain Awareness (IPMDA)** is a technology and training initiative to **enhance maritime domain awareness in the Indo-Pacific region and to bring increased transparency to its critical waterways**. IPMDA harnesses innovative technology, such as commercial satellite radio frequency data collection, to provide partners across Southeast Asia, the Indian Ocean region, and the Pacific with near real-time information on activities occurring in their maritime zones.
- To contribute to maritime domain awareness in the Indo-Pacific region, which is fundamental for stability and prosperity. **At the 2022 Quad Leaders' Summit in Tokyo, Quad Leaders announced the Indo-Pacific Partnership for Maritime Domain Awareness (IPMDA)** to enhance existing maritime domain awareness capabilities.
- **Only QUAD countries** are members of the IPMDA initiative, which are **India, Japan, the USA, and Australia.**
- **Hence option (c) is the correct answer.**

Q 41.B

- **Statement 1 is not correct:** Global Footprint Network is an independent think tank originally founded in 2003. It was established as a charitable not-for-profit organization. Global Footprint Network develops and promotes tools for advancing sustainability, including the ecological footprint and biocapacity, which measure the amount of resources we use and how much we have. These tools aim at bringing ecological limits to the center of decision-making.
- Every year, Global Footprint Network produces a new edition of its National Footprint Accounts, which calculate Ecological Footprint and biocapacity of more than 200 countries and territories from 1961 to the present. It has also launched Ecological Footprint Explorer, an open data platform for the National Footprint Accounts.
- **Statement 2 is correct:** Earth Overshoot Day marks the date when humanity's demand for ecological resources and services in a given year exceeds what Earth can regenerate in that year. Earth Overshoot Day is hosted and calculated by Global Footprint Network.
- **World Summit on Sustainable Development, 2002 (WSSD)**
  - Also known as the Earth Summit, it was held in Johannesburg, South Africa. It was convened to discuss sustainable development by the United Nations. WSSD gathered a number of leaders from business and non-governmental organizations, 10 years after the first Earth Summit in Rio de Janeiro. (It was therefore also informally nicknamed "Rio+10").

Q 42.D

- The National River Conservation Plan (NRCP) was initiated in 1995. Subsequently, all the projects for river cleaning in the country were brought under NRCP. It is under the purview of Ministry of Environment, Forest & Climate Change. **Hence, option (a) is not correct.**
- The objective of the NRCP is to reduce the pollution load in rivers through implementation of various pollution abatement works which include -:
  - Interception and diversion works/ laying of sewerage systems to capture raw sewage flowing into the rivers through open drains and diverting them for treatment.
  - Setting up of Sewage Treatment Plants (STPs) for treating the diverted sewage
  - Construction of **Low Cost Sanitation Toilets** to prevent open defecation on river banks.
  - Construction of Electric Crematoria and Improved Wood Crematoria to conserve the use of wood.

- **River Front Development works,** such as improvement of bathing ghats.
- Public participation & awareness and capacity building, etc.

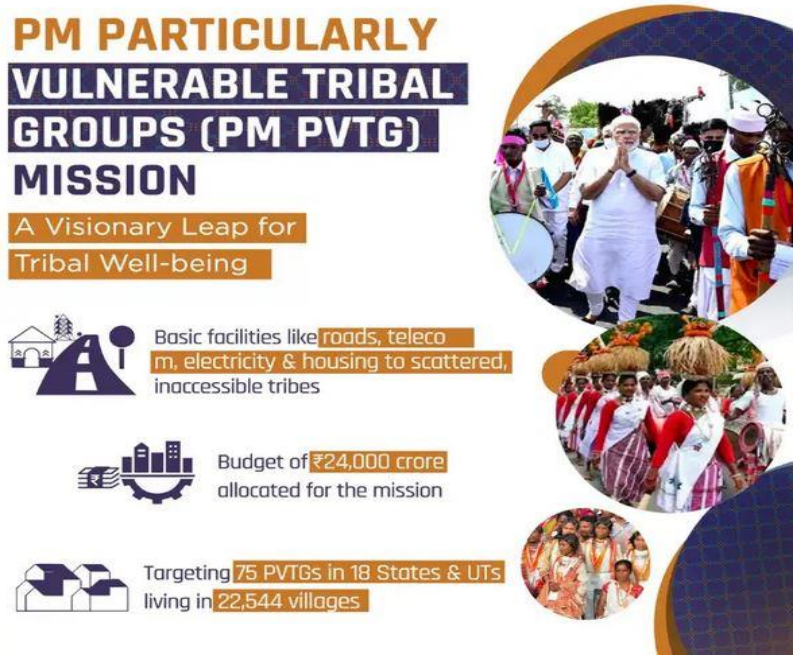
- **Hence, option (d) is correct.**
- NRCP doesn't have any sub-schemes. National Lake Conservation Programme is a separate Centrally Sponsored Schemes (CSS) under Ministry of Environment, Forest & Climate Change with an objective to restore and conserve the urban and semi-urban lakes of the country. Since 2013, National Lake Conservation Programme along with the National Wetlands Conservation Programme (NWCP) have been merged into a new integrated scheme named 'National Plan for Conservation of Aquatic Eco-systems NPCA'. **Hence, option (b) is not correct.**
- Currently, NRCP (excluding Ganga and its tributaries) has covered polluted stretches of 33 rivers in 76 towns spread over 15 States at a sanctioned cost of Rs.4801.57 crore. NRCP covers the following states - Andhra Pradesh; Goa; Gujarat; Jammu & Kashmir; Jharkhand; Karnataka; Kerala; Madhya Pradesh; Maharashtra; Nagaland; Odisha; Punjab; Sikkim; Tamil Nadu; Telangana. **Hence, option (c) is not correct.**

Q 43.A

- **Recently, at COP28, 196 parties adopted the decision to operationalise the Loss and Damage fund. Hence statement 2 is not correct.**
- **Loss and damage** refers to the negative consequences that arise from the unavoidable risks of climate change, like rising sea levels, prolonged heatwaves, desertification, the acidification of the sea and extreme events, such as bushfires, species extinction and crop failures.
- **The fund was set up during COP27 at Sharm el-Shaikh in Egypt, 2022. T**he establishment of a Loss and Damage Fund was, for many, the highlight of the United Nations Climate Conference (COP 27) and the culmination of decades of pressure from climate-vulnerable developing countries.
- The fund aims to provide financial assistance to nations most vulnerable and impacted by the effects of climate change. **Hence sattement 1 is correct.**

Q 44.A

- Recently, the Prime Minister launched the **₹24,000-crore Pradhan Mantri Particularly Vulnerable Tribal Groups (PM PVTG) Mission** aimed at the holistic development of around **28 lakh primitive tribals spread across 220 districts across the country, on the occasion of tribal icon Birsa Munda's birth anniversary and the third "Janjatiya Gaurav Diwas.**
- The mission is aimed to **improve the socio-economic conditions of the 75 particularly vulnerable tribal groups (PVTGs)** by saturating PVTG families and habitations with basic facilities such as safe housing, clean drinking water, and sanitation, improved access to education, health and nutrition, road and telecom connectivity, and sustainable livelihood opportunities. **Hence statement 1 is correct.**
- PVTGs are characterized by a **"pre-agriculture level of technology, stagnant or declining population, extremely low literacy, and subsistence level of the economy**. PVTGs were recognized as a separate category based on the findings of the **1961 Dhebar Commission.**



- To ensure coordination and effective implementation, The ministry has appointed **1 nodal officer for each PVTG community** and they are visiting their habitations to understand their requirements. **Hence statement 2 is not correct.**
- The **Ministry of Tribal Affairs is the Nodal Ministry for overall policy planning and coordination** of programs for the development of STs. **Hence statement 3 is not correct.**
- **Hence option (a) is the correct answer.**

Q 45.A

- Central Pollution Control Board is executing a nationwide programme of ambient air quality monitoring known as the National Air Quality Monitoring Programme (NAMP).
- The network consists of 804 operating stations covering 344 cities/towns in 28 states and 6 Union Territories of the country.
- The objectives of the N.A.M.P. are to determine the status and trends of ambient air quality;
  - to ascertain whether the prescribed ambient air quality standards are violated;
  - to Identify Non-attainment Cities;
  - to obtain the knowledge and understanding necessary for developing preventive and corrective measures and
  - to understand the natural cleansing process undergoing in the environment through pollution dilution, dispersion, wind-based movement, dry deposition, precipitation and chemical transformation of pollutants generated.
- Under N.A.M.P., four air pollutants viz ., **Sulphur Dioxide (SO2), Oxides of Nitrogen as NO2, Respirable Suspended Particulate Matter (RSPM / PM10) and Fine Particulate Matter (PM2.5)** have been identified for regular monitoring at all the locations.
- **Monitoring meteorological parameters such as wind speed and wind direction, relative humidity (RH) and temperature were also integrated with monitoring air quality.**
- **Hence, option (a) is the correct answer.**

Q 46.D

- Climate finance is one of the key agenda items up for discussion at the much-awaited 28th Conference of Parties (COP28) to the United Nations Framework Convention on Climate Change to be held in Dubai later this month.
- **Climate Policy Initiative's (CPI) new report Global Landscape of Climate Finance 2023 brings together the latest data and analysis in this regard.**
- The report breaks down the flow of climate finance by its application, geographical distribution and sources, using data from 2021 and 2022. The flows tracked in the report "represent targeted climate mitigation and adaptation-specific project-level allocation of capital"
- **The Climate Policy Initiative:** It is an **independent non-profit research group and international climate policy organization based in San Francisco**, California with other offices worldwide. CPI is supported primarily by philanthropic organizations and government development finance.

Q 47.B

- **Recent context**: The Government of India has given the approval for "Acceptance of Necessity" for Project Kusha recently.
- **Project Kusha focuses on the development of Long-Range Surface-to-Air Missiles (LR-SAM) and ultimately an air defense system for India. Hence statement 1 is not correct.**
- **It is being jointly developed with Israel Aerospace Industries, Israel's major aerospace and aviation manufacturers. Hence statement 2 is correct.**
- The mobile LR-SAM, with its long-range surveillance and fire control radars, would have different types of interceptor missiles designed to hit hostile targets at 150 km, 250 km, and 350 km ranges.
- LR-SAM isn't the only project India is developing with Israel. India's Kalyani Strategic Systems has already entered a joint venture with Israel's Rafael Advanced Systems Ltd for indigenous production of Medium-Range Surface to Air Missile (MRSAM).

Q 48.B

Coal Sector in India:

- **India has the fifth largest coal reserves, is second in coal production (after China) and is among the largest importer of coal (mainly from Indonesia, South Africa and Australia). Hence statement 1 is correct.**

- Coal accounts for almost 50% share in the total installed electricity generation capacity in India.
- **Indian coal has high ash content, high ash fusion temperature but low sulphur content. Hence statement 3 is not correct.**

Distribution of Coal in India:

- **Gondwana Coal Fields (250 million years old): Gondwana coal makes up to 98 % of the total reserves and 99 % of the production of coal in India. Hence statement 2 is correct.**
- Gondwana coal forms India's metallurgical grade as well as superior quality coal.
- It is **found in Damodar (Jharkhand-West Bengal), Mahanadi (Chhattisgarh-Odisha), Godavari (Maharashtra), and Narmada valleys.**
- **Tertiary Coal Fields (15 – 60 million years old): Carbon content is very low but is rich in moisture and Sulphur.**
- Tertiary coalfields are mainly **confined to extra-peninsular regions** Important areas include Assam, Meghalaya, Nagaland, Arunachal Pradesh, Jammu and Kashmir, Himalayan foothills of Darjeeling in West Bengal, Rajasthan, Uttar Pradesh, and Kerala.

Q 49.D

- **Tuberculosis,** often called TB, is a **bacterial infection** that **primarily affects the lungs**. It's caused by **Mycobacterium tuberculosis** and usually spreads through the air when an infected person coughs or sneezes. Symptoms include coughing, chest pain, fatigue, weight loss, and fever.
- **Mycobacterium tuberculosis is the primary agent** responsible for TB and not Staphylococcus aureus. **Hence statement 1 is not correct.**
- The bacteria **usually attack the lungs, but TB bacteria can attack any part of the body** such as the kidney, spine, and brain. Not everyone infected with TB bacteria becomes sick. As a result, two TB-related conditions exist: **latent TB infection (LTBI) and TB disease**. **Hence statement 2 is not correct.**
- **The Mantoux tuberculin skin test (TST)** is one method of **determining whether a person is infected with Mycobacterium tuberculosis,** and not to monitor sugar level. **Hence statement 3 is not correct.**
- **As per the global TB Report 2023**, the **Reduction of TB incidence has almost doubled** the pace of the Decline in global TB Incidence, Improvement in **treatment coverage** to 80% of the estimated TB cases; an increase of 19% over the previous year, In India **TB incidence declined by 16%** and TB **mortality reduction** by 18% since 2015.

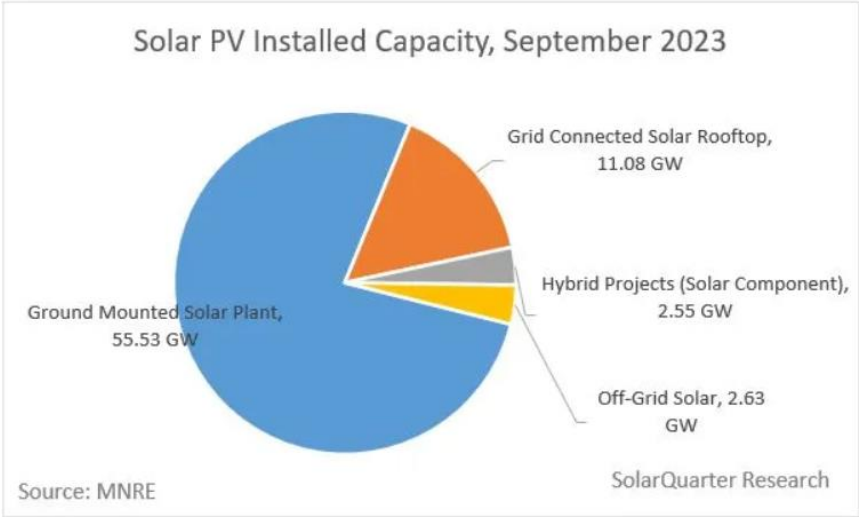
Q 50.B

- With a population of 1.3 billion, India has a massive demand for energy to fuel its rapidly growing economy. From a power deficit nation at the time of Independence, the efforts to make India energy-independent have continued for over seven decades. Today, we are a power surplus nation with a total installed electricity capacity of over four lakh MW.
- Keeping in mind the sustainable development goals, India's power generation mix is rapidly shifting towards a more significant share of renewable energy. Today, **India is the world's third largest producer of renewable energy, with 40% of its installed electricity capacity coming from non-fossil fuel sources.**
- **India has an estimated renewable energy potential of about 900 GW from commercially exploitable sources, viz., wind - 102 GW (at 80-metre mast height); small hydro - 20 GW; bioenergy - 25 GW; and 750 GW solar power, assuming 3 percent wasteland is made available. Hence, option (b) is the correct answer.**

Q 51.B

India's Solar Photovoltaic (PV) Capacity:

- **As of the latest data available from Ministry of New & Renewable Energy (MNRE), India's solar photovoltaic (PV) capacity has surged to an impressive 71,780.74 MW (71.78 GW) and is is fourth largest in the world. Hence statement 1 is not correct.**
- This capacity is distributed across various segments of the solar energy sector, **with rooftop solar, ground-mounted solar, hybrid projects, and off-grid solar playing significant roles in this energy revolution.**
- **Ground-mounted solar plants has the largest share followed by roof-top and hybrid projects respectively. Hence statement 2 is correct.**



Q 52.C

- **The World Heritage Outlook Report-IUCN:**
  - The World Heritage Outlook Report is the flagship assessment of the status of natural World Heritage sites by the International Union for Conservation of Nature (IUCN). The report is produced every 3 years and provides an overview of the conservation status of all natural World Heritage sites, as well as trends and challenges. **Hence option (c) is the correct answer.**
- **The latest World Heritage Outlook Report, 2020:**
  - It found that the overall outlook for natural World Heritage sites is of concern, with only 63% of sites assessed as being in good or good with some concerns condition. The remaining 37% of sites were assessed as being of significant concern or critical condition.
  - The report identified a number of factors that are threatening the status of natural World Heritage sites, including:
    - ✓ Climate change
    - ✓ Habitat loss and fragmentation
    - ✓ Invasive alien species
    - ✓ Pollution
    - ✓ Unsustainable tourism
    - ✓ Overexploitation of natural resources
- The report also found that there has been some progress in conserving natural World Heritage sites in recent years. For example, the number of sites that are well-managed has increased from 25% in 2000 to 38% in 2020. However, the report warned that this progress is not enough to keep pace with the threats that natural World Heritage sites face.

Q 53.C

- The Perform Achieve and Trade Scheme is one of the initiatives under the National Mission on Enhanced Energy Efficiency (NMEEE). **Energy Saving Certificate (ESCert) under the Perform, Trade and Achieve (PAT) scheme is a market-based mechanism** to reduce the specific energy consumption (SEC) in energy-intensive large industries. **Hence statements 1 and 3 are correct.**
- This mechanism is facilitated through the trading of Energy Saving Certificates (ESCerts) which are issued to those plants that have overachieved their targets. Those plants which underachieve their targets are entitled to purchase ESCerts.
- As per PAT rules, when a designated consumer overachieves the notified SEC targets in the compliance year, the ESCerts are to be issued by Central Government for the difference of quantity between notified target and the achieved SEC.
- ESCerts are traded on Indian Energy Exchange (IEX) and Power Exchange India Limited (PXIL). ESCerts trading is regulated by the Central Electricity Regulatory Commission (CERC) with the Bureau of Energy Efficiency (BEE), Ministry of Power as the Administrator. **Hence statement 2 is not correct.**

Q 54.C

- Air pollution control devices (APCD) are a series of devices which are used to prevent a variety of different pollutants, both gaseous and solid, from entering the atmosphere mainly out of the industrial stacks.

- These control devices can be separated into two broad categories namely:
  - devices which control the amount of particulate matter escaping into the environment, and
  - devices which control the acidic gas emissions into the atmosphere.
- **The APCDs collect particulate emissions work on the principle of (i) gravity separation, (ii) cyclonic separation, (iii) filtration, (iv) electrostatic precipitation, and (v) wet scrubbing.**
- The most commonly used APCDs are:
  - dust catchers
  - cyclones or multi-cyclones,
  - fabric filters also known as bag houses,
  - electrostatic precipitators (wet and dry types), and
  - scrubbers.
- The first four control devices control the amount of particulate matter escaping into the environment while scrubbers control the acidic gas emissions into the atmosphere.
- **Hence, option (c) is the correct answer.**

Q 55.A

- **The International Tropical Timber Organization (ITTO):**
  - The International Tropical Timber Organization (ITTO) is an **intergovernmental organization** that promotes the sustainable management and conservation of tropical forests and the expansion and diversification of international trade in tropical timber from sustainably managed and legally harvested forests. **Hence statement 1 is not correct.**
  - **It was established in 1986 under the International Tropical Timber Agreement (ITTA),** which was sponsored by the United Nations Conference on Trade and Development (UNCTAD) and ratified in 1985.
- **The main objectives of the ITTO are to:**
  - Develop internationally agreed policy guidelines and norms to encourage sustainable forest management (SFM) and sustainable tropical timber industries and trade.
  - Assist tropical member countries in adapting such guidelines and norms to local circumstances and to implement them in the field through projects and other activities.
  - Collect, analyze, and disseminate data on the production and trade of tropical timber.

- **Members:**
  ITTO divides its members into two categories - Producer Countries and Consumer Countries.
- **Producer Countries:**
  - Producer countries are countries that are **located between the Tropic of Cancer and the Tropic of Capricorn**, have tropical forest resources, and/or are net exporters of tropical timber in volume terms. These countries are typically developing countries that rely on the export of tropical timber products for a significant portion of their income.
  - **There are 37 Producer Countries which include Bolivia, Nigeria, India,** etc. **Hence statement 3 is correct.**
- **Consumer Countries:**
  - Consumer countries are countries that are located outside of the tropics and generally import more primary tropical wood products than they export. These countries are typically developed countries that have a high demand for tropical timber products.
  - There are 38 Consumer countries including Albania, Australia, China, etc.
    The ITTO is open to all countries, regardless of whether they have tropical forests or engage in the timber trade. As of today, the ITTO has 156 member countries, including developed and developing countries with and without tropical forests. Hence statement 2 is not correct.
- **Structure of the ITTO**
  - The ITTO is governed by the International Tropical Timber Council (ITTC), which is composed of representatives from all ITTO member countries. **The ITTC meets every two years to deliberate and adopt decisions on environmental matters.**

Q 56.A

- **The Graded Response Action Plan is a set of anti-air pollution measures, generally implemented in Delhi-NCR during the winter. Hence, statement 1 is not correct.**
- **The Commission for Air Quality Management (CAQM), an autonomous body tasked with improving the air quality in Delhi and its adjoining areas, made crucial changes to the Graded Response Action Plan (GRAP) last year and again in July. Hence, statement 2 is correct.**

- GRAP for the NCR is implemented in four different stages based on the stages of adverse air quality in Delhi. Stage 1 - 'poor' (AQI 201-300); Stage 2 - 'very poor' (AQI 301-400); Stage 3 - 'severe' (AQI 401-450); and Stage 4 - 'severe plus' (AQI >450).
- Under the new plan, BS-III petrol and BS-IV diesel four-wheelers will be immediately banned in Delhi and Gurugram, Faridabad, Ghaziabad and Gautam Buddh Nagar if the AQI crosses the 400-mark.
- The CAQM, a statutory body formed under an Act in 2021, amended the GRAP in 2022 to ensure proactive implementation of anti-air pollution steps based on forecasts up to three days in advance.
- Earlier, the authorities would implement these measures, including a ban on construction and demolition, entry of high-emission vehicles and the use of coal and firewood, only after the pollution level touched a particular threshold.
- **It also calls for a complete ban on the use of coal and firewood in eateries, restaurants and hotels as soon as the AQI crosses the 200 mark. Earlier, the authorities would implement this measure under Stage 2. Hence, statement 3 is not correct.**New steps suggested as part of the revised GRAP include "strict action to curb air pollution at all identified hotspots in the region under Stage 2".
- Under Stage 3, states will have to impose strict restrictions on the plying of BS-III petrol and BS-IV diesel four-wheelers in Delhi and Gurugram, Faridabad, Ghaziabad and Gautam Buddh Nagar. The authorities may discontinue physical classes in schools for children up to Class 5 in such a scenario, the CAQM suggested.
- At AQI above 450, four-wheelers registered outside Delhi, other than electric vehicles and those using CNG and BS-VI diesel, will not be permitted to enter Delhi. However, those carrying essential commodities or providing essential services are exempt.
- All other existing measures taken under different stages of GRAP will continue.

Q 57.C

- **Champions of the Earth award honour individuals, groups, and organizations whose actions have transformative impact on environment. Hence statement 2 is correct.**
- Awarded annually since its inception in 2005, **it is UN's highest environmental honour which recognizes outstanding leaders from government, civil society and private sector. Hence statement 1 is correct.**
- To **eliminate plastic pollution, 2023 award recognized in four categories**. **Hence statement 3 is correct.**
    - **Policy leadership category**: Mayor Josefina Belmonte of Quezon City (Philippines) to ban single-use plastics, a trade-in programme for plastic pollution etc.
    - **Inspiration and Action category:** Ellen MacArthur Foundation (United Kingdom) in mainstreaming lifecycle approach, including for plastics.
    - **Entrepreneurial Vision category:**
        - ✓ Blue Circle (China) uses blockchain technology and internet of things to track and monitor full lifecycle of plastic pollution.
        - ✓ José Manuel Moller (Chile) is founder social enterprise (Algramo) dedicated to providing refill services that reduce plastic pollution and lower everyday essentials costs.
    - **Science and Innovation category:** Council for Scientific and Industrial Research (South Africa) uses cutting-edge technology and multidisciplinary research to develop innovations to tackle plastic pollution.

Q 58.C

- **Recent context**: Six Indian restaurants from around the world serving desi cuisine have been chosen for this year's Annapurna Certificate Programme.
- **It is an initiative by the Indian Council for Cultural Relations (ICCR) to recognize Indian restaurants abroad that are contributing to the country's cultural cause in the culinary way**. **Hence both statements 1 and 2 are correct**.
- Those who were shortlisted from a total of 115 nominations received from Indian missions abroad are Balaji Dosa, Kandy, Sri Lanka; Indian Street Food & Co., Stockholm, Sweden; Amber India Restaurant, San Francisco, USA; Naans and Curries, An Ethnic Indian Restaurant, San Jose, Costa Rica; Mumtaz Mahal Restaurant, Muscat, Oman; and Namaste Indian Restaurant, Ulaanbaatar, Mongolia.
- **The Indian Council for Cultural Relations, is an autonomous organization of the Government of India, involved in India's global cultural relations, through cultural exchange with other countries and their people.**

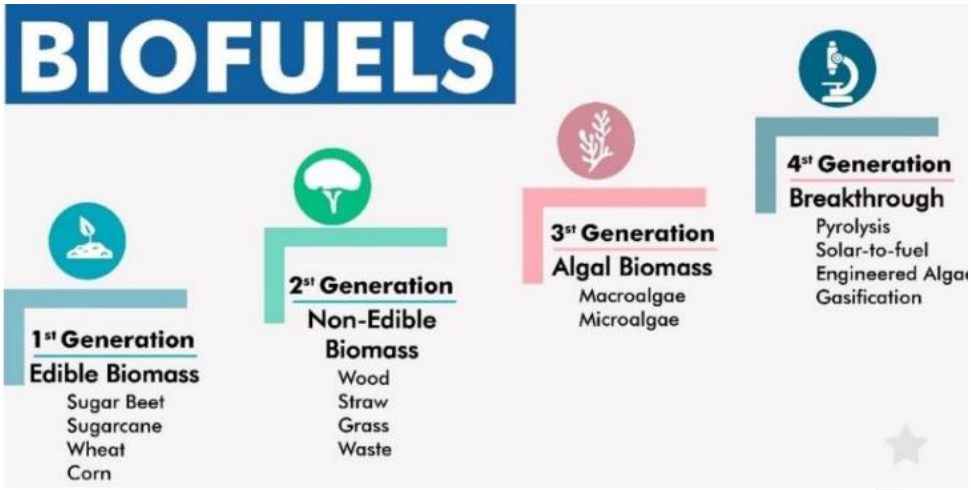
- The Indian Council for Cultural Relations (ICCR) was founded in 1950 by Maulana Abul Kalam Azad, independent India's first Education Minister.
- Its objectives are to actively participate in the formulation and implementation of policies and programs about India's external cultural relations
- To foster and strengthen cultural relations and mutual understanding between India and other countries; to promote cultural exchanges with other countries and people, and to develop relations with nations.

Q 59.B

- **BHARAT TAP initiative and Nirmal Jal Prayas initiative are under the Ministry of Housing and Urban Affairs.**
- **BHARAT TAP initiative:**
  - **Focus:** Promotes low-flow fixtures and sanitaryware to reduce water usage.
  - Goal: Aim to achieve a minimum 40% reduction in water consumption through taps, showers, and other fittings.
  - Implementation: Encourages the use of Bureau of Indian Standards (BIS) certified water-efficient plumbing fixtures.
  - Benefits: Reduced water usage, lower water bills, lessened strain on water resources, and potentially decreased energy consumption for water treatment and pumping.
  - Launched by: Ministry of Housing and Urban Affairs (MoHUA) in collaboration with the Indian Plumbing Association (IPA).
- **Nirmal Jal Prayas:**
  - Focus: Tackles wastewater management and promotes sustainable water reuse.
  - Goal: Aim to save 500 crore litres of water per year through wastewater treatment and reuse.
  - Implementation: Supports development and adoption of wastewater treatment technologies, encourages rainwater harvesting, and promotes public awareness campaigns.
  - Benefits: Reduced reliance on freshwater sources, improved sanitation and hygiene, potential for agricultural irrigation or industrial use of treated wastewater.
  - Launched by: National Real Estate Development Council (NAREDCO) through its MAHI (Municipal Authorities Helping Infrastructure) initiative.
- The National Real Estate Development Council(NAREDCO) was established as an autonomous self-regulatory body in 1998 under the aegis of the Ministry of Housing and Urban Affairs.
- **Hence, option (b) is the correct answer.**

Q 60.D

- **About Biofuels**
  - Refers to liquid transportation fuels, such as ethanol and biodiesel, derived from agricultural produce, forests or any other organic material (feedstock).
  - Based on the feedstock (raw materials) used to produce biofuels they are classified into four generations.
  - **Presently, first-generation biofuels are the main source of biofuels globally despite 140 billion tonnes of agro-waste or biomass generated from agriculture every year.**
  - **First Generation Biofuels: These are made from food sources such as sugar, starch, vegetable oil, or animal fats using conventional technology.** They include Bioalcohols, Biodiesel, Vegetable oil, Bioethers, Biogas. **Hence pair 1 is correctly matched.**
  - **Second Generation Biofuels:** These are produced **from non-food crops or portions of food crops that are not edible and considered as wastes, e.g., stems, husks, wood chips, and fruit skins and peeling. Hence pair 2 is correctly matched.**
  - **Third Generation Biofuels: These are produced from micro-organisms like algae. Hence pair 3 is correctly matched.**
  - **Fourth Generation Biofuels:** In the production of these fuels, **crops that are genetically engineered to take in high amounts of carbon are grown and harvested as biomass. The crops are then converted into fuel using second-generation techniques. Hence pair 4 is correctly matched.**
  - The fuel is pre-combusted, and the carbon is captured. Then the carbon is geo-sequestered, meaning that the carbon is stored in depleted oil or gas fields or in unmineable coal seams.



Q 61.D

- **The State of the World's Forests Report:** The State of the World's Forests Report, is a flagship publication of the **Food and Agriculture Organization of the United Nations (FAO)**. It is published **every two years** and provides a comprehensive overview of the state of the world's forests. The recent publication is released in 2022 which focuses on the potential of forests to contribute to green recovery and a transition to sustainable economies. **Hence option (d) is the correct answer.**
- **Key Findings**
- The 2022 edition of The State of the World's Forests found that:
  - Deforestation and forest degradation are continuing at an alarming rate.
  - Forests are facing a number of other threats, including climate change, wildfires, and invasive species.
  - Despite these threats, forests still provide a wide range of benefits to people and the planet.
  - Forests can play a key role in green recovery and a transition to sustainable economies.
- **Recommendations**
  - The report makes a number of recommendations for how to protect and sustainably manage forests, including:
    - ✓ Halting deforestation and restoring degraded lands
    - ✓ Investing in sustainable forest management
    - ✓ Promoting forest-based livelihoods
    - ✓ Strengthening international cooperation on forest issues

Q 62.D

- **The Bharat Stage** emission standards are standards instituted by the government to **regulate the output of air pollutants** from motor vehicles from internal combustion engine equipment, including motor vehicles. India has been following **European (Euro) emission norms**, although with a time lag of five years.
- In 2016, the government said India would directly progress from **BS-IV norms to BS-VI, skipping the intermediary stage of BS-V.** In April 2020, India moved towards more stringent BS-VI norms. **Hence statement 1 is not correct.**
- The main difference in standards between the existing BS-IV and the new BS-VI auto fuel norms is the presence of sulphur. **The BS-VI fuel** is estimated to bring around an 80 per cent reduction of sulphur, from 50 parts per million to **10 ppm. Hence statement 3 is not correct.**
- While the difference in emission levels is **not that drastic for petrol engines, it is significant for diesel vehicles.** For example, the **nitrous oxide emission levels** (responsible for acid rain) will drop by **25 percent** in the case of **petrol vehicles** and **68 percent for diesel vehicles.** Hence getting a BS-IV diesel engine to comply with BS-VI emission norms requires major changes to the hardware and layout of a diesel engine compared to a petrol engine. That is why many car manufacturers in India are already rolling out BS-VI compliant petrol models, but holding back on diesel models. **Hence statement 2 is not correct.**
- The new technologies needed to be included in the vehicles include **Diesel Particulate filter** to expel particulate matters, **Selective catalytic reduction** and exhaust gas regulator to reduce **NOx emissions.**

Fuel Type	Pollutant Gases	BS6 (BSVI)	BS4 (BSIV)
Petrol Passenger Vehicle:	Nitrogen Oxide (NOx) Limit	<60mg>	<80mg>
	Particulate Matter (PM) Limit	<4.5mg/km	-
Diesel Passenger Vehicle:	Nitrogen Oxide (NOx) Limit	<80mg>	<250mg>
	Particulate Matter (PM) Limit	<4.5mg/km	<25mg>
	HC + NOx	170mg/km	<300mg>

Q 63.B

- **Short-lived climate pollutants are powerful climate forcers that remain in the atmosphere for a much shorter period of time than carbon dioxide, yet their potential to warm the atmosphere can be many times greater. Hence, statement 1 is not correct.**
- Certain short-lived climate pollutants are also air pollutants that have harmful effects on people, ecosystems and agricultural productivity.
- **The short-lived climate pollutants black carbon, methane, tropospheric ozone, and hydrofluorocarbons (HFCs) are the most important contributors to anthropogenic global warming after carbon dioxide, responsible for up to 45% (according to CCAP a UN convened initiative) of current global warming. Hence, statement 2 is correct.**
- If no action to reduce emissions of these pollutants is taken in the coming decades, they are expected to account for as much as half of the warming caused by human activity.
- In 2011 The United Nations Environment Programme (UNEP) and the World Meteorological Organisation (WMO) found that readily available solutions targeting compounds known as short-lived climate pollutants (SLCPs) would slow the rate of global warming much faster than action on carbon dioxide alone. These solutions would also reduce air pollution, representing “win-win” results for the climate, air quality, and human well-being within a relatively short timeframe.
- In 2012, the importance of seizing this opportunity to reduce SLCPs and achieve the associated climate and development benefits led to action by the governments of Bangladesh, Canada, Ghana, Mexico, Sweden, and the United States, along with UNEP. They jointly set out to treat short-lived climate pollutants as an urgent and collective challenge. **Together, they formed the Climate & Clean Air Coalition (CCAC)** – with its Secretariat and Trust Fund hosted by UNEP – to support fast action and deliver benefits across climate, public health, energy efficiency, and food security.
- Since its founding, the CCAC has raised awareness of the need to act on these pollutants to rapidly reduce the rate of warming in the near term, improved the science behind them, and carried out activities in emitting sectors to prove the feasibility of available solutions.
- **It is the only international body working to connect climate and clean air action. Hence, statement 3 is correct.**

Q 64.D

- **Incineration is a waste treatment process that involves the combustion of organic substances contained in waste materials. Incineration and other high-temperature waste treatment systems are described as "thermal treatment". Hence the correct option is (d)**
- Incineration of waste materials converts the waste into ash, flue gas and heat. The ash is mostly formed by the inorganic constituents of the waste and may take the form of solid lumps or particulates carried by the flue gas. The flue gases must be cleaned of gaseous and particulate pollutants before they are dispersed into the atmosphere. In some cases, **the heat that is generated by incineration can be used to generate electric power.**
- As of July 2017, **thermal-based waste-to-energy (WTE)** plants in India have the capacity to process 5,300 tonnes of garbage and produce 63.5 MW per day.
- According to a 2015-16 report by the **Ministry of New and Renewable Energy (MNRE),** this capacity can be enhanced to 1,075 MW by 2031 and to 2,780 MW by 2050.
- The new policy seeks to increase the energy generated from solid waste to 330 MW per day in the next five months, and over 400 percent increase from the current installed capacity, and to 511 MW by 2018-19. To this end, five WTE plants are already under construction in the country and tenders have been floated to build another 47.

Q 65.A

- **Recent context**: Lebanon accuses Israel of white phosphorus attacks.
- White phosphorus is a chemical waxy solid substance typically appearing yellowish or colorless, and some have described its odor as resembling garlic.
  - **It ignites instantly upon contact with air. Hence statement 1 is correct.**
  - It is often used by militaries to illuminate battlefields, generate a smokescreen, and as an incendiary.
  - Once ignited, white phosphorus is very difficult to extinguish. It sticks to surfaces like skin and clothing.
  - White phosphorus is harmful by all routes of exposure.
  - White phosphorus can cause deep and severe burns, penetrating even through bone, and has been known to reignite after initial treatment. After exposure, the priority is to stop the burning process.
- **Convention on Certain Conventional Weapons (CCW) imposes restrictions on the use of white phosphorus**, to safeguard civilians. **It is not banned. Hence statement 2 is not correct.**
- The United Nations Convention on Certain Conventional Weapons, concluded in Geneva on October 10, 1980, and entered into force in December 1983, seeks to prohibit or restrict the use of certain conventional weapons that are considered excessively injurious or whose effects are indiscriminate.

Q 66.B

- **The Fagradalsfjall system is related to the volcanic system**. It is situated on the **Reykjanes Peninsula in Iceland,** a region known for its remarkable geological and geothermal features. **It is the "world's newest baby volcano." It had been dormant for eight centuries before erupting in 2021, 2022 and 2023.**
- The **Reykjanes Peninsula is located in the southwestern part of Iceland** and is known for its proximity to the Mid-Atlantic Ridge, a **tectonic boundary where the North American and Eurasian tectonic plates meet**. This geological setting makes the Reykjanes Peninsula a hub of dynamic volcanic and geothermal activity.
- The eruption marked the **first time in over 800 years** that a volcanic event had occurred in this particular area. The eruption is characterized by its **effusive style**, where molten lava flows out relatively calmly compared to more explosive volcanic eruptions.
- **Deep under the Earth's surface, intense heat melts rocks to form magma**, a thick flowing substance lighter than solid rock. This drives it upwards and most of it gets trapped in magma chambers deep underground. Over time, this viscous liquid cools and solidifies once again. However, a tiny fraction erupts through vents and fissures on the surface, causing volcanic eruptions. The movement of magma close to the Earth's surface exerts a force on the surrounding rock, which often causes **earthquake swarms.**
- **Hence option (b) is the correct answer.**

Q 67.B

- **Background**
  - India is grappling with a severe air pollution crisis, with many cities consistently exceeding safe limits for particulate matter (PM) and other pollutants. In response to this growing concern, **the Government of India launched the National Clean Air Programme (NCAP) in 2019.**
- **What are the Target Levels?**
  - The NCAP initially set a target of reducing key air pollutants PM10 and PM2.5 by 20-30% in 2024, taking the pollution levels in 2017 as the base year to improve upon.
  - However, in September 2022, the Centre moved the goalposts and set a new target of a 40% reduction in particulate matter concentration, by 2026. **Hence Statement 1 is not correct.**
- **Objectives**
  - The NCAP is a comprehensive national-level program aimed at addressing air pollution across the country. Its primary objectives are:
  - **Reduce Particulate Matter (PM) Concentrations:** The NCAP aims to reduce PM concentrations by 20-30% in cities across India by 2024, and by 50% in non-attainment cities by the same year.
  - Improve Air Quality: The NCAP aims to improve air quality in all cities to meet the National Ambient Air Quality Standards (NAAQS) by 2024.
  - Strengthen Air Quality Monitoring: The NCAP aims to strengthen air quality monitoring infrastructure and data management across India.
- **Key Components**
  The NCAP encompasses a range of measures to achieve its objectives, including:

- Strengthening Emission Standards: The NCAP proposes stricter emission standards for vehicles and industries to reduce their contribution to air pollution.
- **Promoting Cleaner Fuels and Technologies:** The NCAP encourages the adoption of cleaner fuels, such as compressed natural gas (CNG) and electric vehicles, and promotes the use of energy-efficient technologies.
- **Improving Urban Planning and Transportation Systems:** The NCAP emphasizes the need for better urban planning and transportation systems to reduce traffic congestion and associated emissions.
- **Strengthening Monitoring and Enforcement Mechanisms:** The NCAP aims to strengthen monitoring and enforcement mechanisms to ensure compliance with emission standards and regulations.

- **Implementation**
  The NCAP is being implemented by the **Ministry of Environment, Forest and Climate Change (MoEFCC)** in collaboration with various state governments, municipal corporations, and industry stakeholders. **Hence statement 2 is correct.**
  - The program has a two-phase implementation plan:
    - ✓ Phase 1 (2019-2024): Focus on reducing PM concentrations and improving air quality in non-attainment cities.
    - ✓ Phase 2 (2024-2028): Expand the scope of the program to cover all cities in India and achieve further reductions in air pollution.

Q 68.B

- **The Bank for International Settlements (BIS), in collaboration with the central banks of France, Singapore, and Switzerland, has announced the successful conclusion of Project Mariana. Hence statement 1 is not correct.**
  - Project Mariana was jointly developed by three BIS Innovation Hub centers, including the Swiss, Singapore, and Eurosystem Hub Centers, in partnership with the Bank of France, the Monetary Authority of Singapore, and the Swiss National Bank.
- **This innovative project focused on testing the cross-border trading and settlement of wholesale central bank digital currencies (wCBDCs) between financial institutions while incorporating decentralized finance (DeFi) technology concepts on a public blockchain. Hence statement 2 is correct.**
- The project explored how multi-currency settlement may be performed atomically while maintaining the independence of respective domestic settlement systems.
- The project's proof of concept achieved successful cross-border trading and settlement of hypothetical euro, Singapore dollar, and Swiss franc WCBDCs between simulated financial institutions.
- Project Mariana's architectural design addresses the balance between central banks' need for domestic oversight and autonomy and financial institutions' desire for efficient cross-border wCBDC management.
  - This equilibrium is maintained through the use of a common token standard on a public blockchain, facilitating interoperability and seamless exchange of wCBDCs across various local payment and settlement systems managed by participating central banks.
  - Consequently, Mariana offers possible strategies for incorporating an international dimension into current wCBDC design explorations.

Q 69.C

- **'SATAT' (Sustainable Alternative Towards Affordable Transportation) scheme on Compressed Bio Gas (CBG) was launched in 2018.** The scheme envisages **target production of 15 MMT (million tons) of CBG 2023 from 5000 Plants**. Independent entrepreneurs shall set up the CBG Plants. **Hence, statement 1 is correct.**
- **It encourages entrepreneurs to set up CBG plants, produce & supply CBG to Oil Marketing Companies (OMCs) for sale as automotive & industrial fuels. Hence, statement 2 is correct.**
- **The SATAT initiative has the potential to boost the availability of more affordable transport fuels, better use of agricultural residue,** cattle dung and municipal solid waste, and provide additional revenue sources to farmers. It will also benefit vehicle users as well as farmers andentrepreneurs. **Hence, statement 3 is correct.**
- It will **boost entrepreneurship, rural economy and employment and provide additional sources of revenue to farmers.** It will also help achievenation's climate change goals and bring down dependency on natural gas and crude oil imports and act as a buffer against crude oil and gasprice fluctuations.

- It will also **help to integrate with existing networks such as city gas distribution (CGD) networks** to boost supplies to domestic and retail users in existing and upcoming markets. Besides retailing from OMC fuel stations, CBS can at a later date be injected into CGD pipelines too forefficient distribution and optimized access of cleaner and more affordable fuel.

Q 70.A

- The Invasive Species Specialist Group (ISSG) is a global network of scientific and policy experts on invasive species, organized under the auspices of the Species Survival Commission (SSC) of the International Union for Conservation of Nature (IUCN). **Hence option (a) is the correct answer.**
- The ISSG promotes and facilitates the exchange of invasive species information and knowledge across the globe and ensures the linkage between knowledge, practice and policy so that decision making is informed. The two core activity areas of the ISSG are policy and technical advice, and information exchange through our online resources and tools and through networking.

Q 71.D

- **Recent context**: National Organ and Tissue Transplant Organisation data shows four out of five organ recipients in the country are men highlighting gender disparity.
- **National Organ and Tissue Transplant Organization (NOTTO) is a National level organization set up under the Directorate General of Health Services, Ministry of Health and Family Welfare.** It has the following two divisions :
    - National Human Organ and Tissue Removal and Storage Network
    - National Biomaterial Centre
- **Hence statement 1 is not correct.**
- **National Organ and Tissue Transplant Organization functions as an apex center for All India activities of coordination and networking not just for procurement but the distribution of Organs and Tissues and registry of Organs and Tissues Donation and Transplantation in the country**. **Hence statement 2 is not correct**.
    - The following activities would be undertaken to facilitate Organ Transplantation most safely in the shortest possible time and to collect data to develop and publish the National registry:
        - ✓ Lay down policy guidelines and protocols for various functions.
        - ✓ Network with similar regional and state-level organizations.
        - ✓ All registry data from States and Regions would be compiled and published.
        - ✓ Creating awareness, and promotion of organ donation and transplantation activities.
        - ✓ Co-ordination from procurement of organs and tissues to transplantation when the organ is allocated outside the region.
        - ✓ Dissemination of information to all concerned organizations, hospitals, and individuals.
        - ✓ Monitoring of transplantation activities in the Regions and States and maintaining data in this regard.
        - ✓ To assist in data management for organ transplant surveillance & organ transplant and Organ Donor registry.
        - ✓ Consultancy support on the legal and non-legal aspects of donation and transplantation.
        - ✓ Coordinate and Organize trainings for various cadre of workers.

Q 72.B

- **Recent context**: Recently a 5 judge bench of the Supreme Court has started hearing the petitioner's case challenging the constitutional validity of electoral bonds.
- Electoral bonds are interest-free bearer bonds or money instruments that can be purchased by companies and individuals in India from authorized branches of the State Bank of India (SBI).
    - These bonds are sold in multiples of Rs 1,000, Rs 10,000, Rs 1 lakh, Rs 10 lakh, and Rs 1 crore. They can be purchased through a KYC-compliant account to make donations to a political party. The political parties have to encash them within a stipulated time.

- The name and other information of the donor are not entered on the instrument and thus electoral bonds are said to be anonymous. **There is no cap on the number of electoral bonds that a person or company can purchase.**
- Political parties that secured at least 1% of the votes polled in the recent Lok Sabha or State Assembly elections and are registered under the RPA can get a verified account from the Election Commission of India (ECI). The bond amounts are deposited in this account within 15 days of their purchase.
    - The political party has to encash the amount within those 15 days, and the amount received as a donation gets deposited into the Prime Minister's Relief Fund. These bonds, however, are not available for purchase all the time.
- In India, there are no donation limits on individuals. Moreover, the Finance Act, of 2017 also removed any official contribution limits on companies. **In other words, an individual or a company can donate as much as they want to a political party**. **Hence statement 1 is correct and statement 2 is not correct.**
- **Similarly, there is no legal expenditure limit on expenditure by political parties. A party can spend as much as it wants for its national or state-level campaign as long as it does not spend that money on the election of any specific candidate. Hence statement 3 is correct.**
- However, parties are required to disclose donations of more than Rs 20,000, unless they are made through electoral bonds.
    - Parties are not required to disclose the sum or the source of any single donation that is below Rs 20,000.
    - This is where the legal loophole steps in — parties generally break large donations from a single donor into multiple small donations. This practice exempts them from any disclosure requirement.

Q 73.A

- **India's updated Nationally Determined Contribution (NDC) the United Nations Framework Convention on Climate Change (UNFCCC).**
    - It would protect the interests of the country and safeguard its future development needs based on the principles and provisions of the UNFCCC.
- **India at the 26th session of the Conference of the Parties (COP26) to the UNFCCC held in Glasgow, United Kingdom, expressed to intensify its climate action by presenting to the world five nectar elements (Panchamrit) of India's climate action.**
- This update to India's existing NDC translates the 'Panchamrit' announced at COP 26 into enhanced climate targets.
- **As per the updated NDC, India now stands committed to reduce Emissions Intensity of its GDP by 45 percent by 2030, from 2005 level. Hence statement 1 is not correct.**
- **India aims to achieve about 50 percent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030. Hence statement 2 is not correct.**
- **It targets net zero emissions by 2070 and it does not bind it to any sector specific mitigation obligation or action. Hence statement 3 is correct.**
- India's goal is to reduce overall emission intensity and improve energy efficiency of its economy over time and at the same time protecting the vulnerable sectors of economy and segments of our society.

Q 74.A

- **Just Energy Transition Partnerships (JETP) aim to bridge the gap between developed and developing nations in moving towards clean energy. Essentially, JETP is a financing mechanism. In a Partnership, wealthier nations fund a coal-dependent developing nation to support the country's own path to phase out coal and transition towards clean energy while addressing the social consequences. Hence, statement 1 is correct.**
- JETP funding can go through grants, loans, or investments. As of March 2023, the donor pool includes the International Partners Group (IPG) and the Glasgow Financial Alliance for Net Zero (GFANZ) Working Group. The IPG consists of Japan, the USA, Canada, Denmark, France, Germany, Italy, Norway, the EU, and the UK. The GFANZ Working Group comprises multilateral and national development banks and finance agencies such as HSBC and Citi Bank.
- **The first Just Energy Transition Partnership was with South Africa and was announced at COP 26 Glasgow in November 2021. The funders, five of the current IPG members, pledged 8.5 billion USD in the first financing round. A year later, at COP 27 Sharm El Sheikh, South Africa published its JETP Implementation Plan (JETP IP). This JETP is expected to prevent up to 1-1.5 gigatons of emissions from the atmosphere over the next 20 years. Hence, statement 2 is not correct**.
- The second Partnership was announced at the G20 Bali Summit in November 2022. Indonesia is set to receive an initial 20 billion USD in public and private financing over the next three to five years. The

donors will assist via grants, concessional loans, market-rate loans, guarantees, private investments, and technical assistance. In February 2023, **Indonesia launched the Secretariat for the Just Energy Transition Partnership.**

- **The next one was Vietnam. The Vietnam JETP was announced in December 2022 after a lengthy negotiation process.** This Partnership will assist Vietnam in finance, technology, and capacity building. It will also support the country's policy and regulation improvement to increase private investment in renewable energy. **Hence, statement 3 is not correct.**

Q 75.C

- The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention; CMS) **is an environmental treaty under the aegis of the United Nations Environment Programme. Hence, statement 2 is correct.**
- It provides a global platform for the conservation and sustainable use of migratory animals and their habitats. **CMS is the only global and UN-based intergovernmental organisation established exclusively for the conservation and management of terrestrial, aquatic and avian migratory species throughout their range. Hence, statement 1 is correct.**
- Migratory species threatened with extinction are listed on Appendix I of the Convention. CMS Parties strive towards strictly protecting these animals, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them. Besides establishing obligations for each State joining the Convention, CMS promotes concerted action among the Range States of many of these species.
- Migratory species that need or would significantly benefit from international co-operation are listed in Appendix II of the Convention. For this reason, the Convention encourages the Range States to conclude global or regional agreements.

Q 76.A

- **Recent Context:** Indian Army successfully test-fired rocket and turret guns of **indigenous Light Combat Helicopter (LCH) Prachand (means fierce).**
  - It was inducted into Indian Air Force in 2022.
  - LCH Prachand is a multi-role combat helicopter, **designed and developed by Hindustan Aeronautics Ltd.**
  - **Only attack helicopter in the world that can land and take off at an altitude of 5,000 metres.**
  - **Capable of firing air-to-ground and air-to-air missiles.**
  - Fitted with 5.8-tonne twin-engine named Shakti engine**, primarily designed for deployment in high-altitude areas (like Siachen glacier).**
  - It has best stealth features, armored-shield systems, and dark-mode attack capability.
- **Hence option (a) is the correct answer.**

Q 77.B

- **The ''Vajra Mushti Kalaga'' is a form of wrestling** different from conventional grappling and entails two jettys taking a swipe at each other's head with a knuckleduster.
  - The fight is real and the jettys make all efforts to draw blood from the opponent's head and a referee intervenes on noticing the first drop.
- Whosoever draws the blood from the opponent's head first is declared the winner. **Though this form of wrestling was popular during the period of the Vijayanagar rulers who reigned between the 14th and the 17th centuries,** it has gone extinct and takes place only during Dasara. **It is not associated with the Vajrayana form of Buddhism**.
- Medieval travelers from the Portuguese noticed this form of wrestling during the Navaratri celebrations in the Vijayanagar empire and have left detailed accounts of it. Historically this form of martial art was popular and has a hoary past but has been on a decline and has gone out of vogue in modern times.
- **Hence option (b) is the correct answer.**

Q 78.C

- **Ministry of Environment, Forest and Climate Change (MoEFCC) launched National Clean Air Programme (NCAP) in January, 2019 with an aim to improve air quality in 131 cities (non-attainment cities and Million Plus Cities) in 24 States/UTs by engaging all stakeholders.** The programme envisages to achieve reductions up to 40% or achievement of National Ambient Air Quality Standards for Particulate Matter10 (PM 10) concentrations by 2025-26.

- The NCAP targets to achieve 20% to 30% reduction in concentrations of PM10(particulate matter of diameter between 10 and 2.5 micrometer) and PM2.5(particulate matter of diameter 2.5 micrometer or less) by the year 2024, keeping 2017 as the base year for comparison of concentration.
- **Non-attainment cities (NAC)- Cities are declared nonattainment if over a 5-year period they consistently do not meet the National Ambient Air Quality Standards (NAAQS) for PM 10 (Particulate matter that is 10 microns or less in diameter) or N02 (Nitrogen Dioxide).**
- Central Pollution Control Board (CPCB) identified 94 non-attainment cities (NAC) while circulating the draft NCAP in 2018 that was revised to 102 NAC's in January 2019. Two more were added to the list in 2020, taking the total to 124. **The list of cities under NCAP focus now stands at 131 cities in 2021 with a million-plus population.**
- **Hence, option (c) is the correct answer.**

Q 79.D

- Smog is air pollution that reduces visibility. The term "smog" was first used in the early 1900s to describe a mix of smoke and fog. The smoke usually came from burning coal. Smog was common in industrial areas and remains a familiar sight in some cities today.
- Today, most of the smog we see is photochemical smog. Photochemical smog is produced when sunlight reacts with nitrogen oxides and at least one volatile organic compound (VOC) in the atmosphere. Nitrogen oxides come from car exhaust, coal power plants, and factory emissions. VOCs are released from gasoline, paints, and many cleaning solvents. When sunlight hits these chemicals, they form airborne particles and ground-level ozone—or smog.
- Smog is still a problem in many places. Everyone can do their part to reduce smog by changing a few behaviours, such as:
  - **Drive less. Walk, bike, carpool, and use public transportation whenever possible.**
  - **Take care of cars. Getting regular tune-ups, changing oil when scheduled, and inflating tires to the proper level can improve gas mileage and thus reduce emissions.**
  - **Fuel up during the cooler hours of the day—night or early morning. This prevents gas fumes from heating up and producing ozone.**
  - **Avoid products that release high levels of VOCs. For example, use low-VOC paints.**
  - **Avoid gas-powered yard equipment, like lawnmowers. Use electric appliances instead.**
- **Hence, option (d) is the correct answer.**

Q 80.A

- **The Mouvement Du 23 Mars (M23)** is an armed group operating in the **Democratic Republic of the Congo (DRC).** The prominent rebel groups in the DRC, **besides M23 include the Allied Democratic Forces (ADF) and the Cooperative for Development of the Congo (CODECO).**
- **Recently,** the UN International Organization of Migration (IOM) reported that the number of people who have been internally displaced in the Democratic Republic of Congo (DRC) has risen to **6.9 million**. In the eastern province of North Kivu, nearly a million people have been displaced due to the ongoing conflict with the rebel group, Mouvement du 23 Mars (M23).
- The conflict in the DRC dates back to the 1990s when it went through two civil wars in 1996 and 1998. The conflict erupted in the wake of the **Rwandan genocide in 1994 where ethnic Hutu extremists killed nearly one million minority ethnic Tutsis and non-extremist Hutus.**

- The armed groups have been **supported by the governments of Rwanda, Uganda, and Burundi** at various points, acting as proxies for each country's interests in the region.
- **Hence option (a) is the correct answer.**

Q 81.C

- These Bio-Medical Waste (Management and Handling) Rules apply to all persons who generate, collect, receive, store, transport, treat, dispose of, or handle bio-medical waste in any form including hospitals, nursing homes, clinics, dispensaries, veterinary institutions, animal houses, pathological laboratories, blood banks, and Ayush. These rules shall apply to all persons who generate, collect, receive, store, transport, treat, hospitals, clinical establishments, research or educational institutions, health camps, medical or surgical camps, vaccination camps, blood donation camps, first aid rooms of schools, forensic laboratories and research labs.
- **Only Pair 1 is not correctly matched.**

Table 3: Colour Coding and Type of Container/ Bags of BMW

S. No.	Category	Type of waste	Colour & Type of Container
1.	Yellow Category	▪ Human Anatomical Waste ▪ Animal Anatomical Waste ▪ Soiled Waste ▪ Discarded or Expired Medicine ▪ Microbiology, Biotechnology and other clinical laboratory waste ▪ Chemical Waste ▪ Chemical Liquid Waste	Yellow Coloured Non Chlorinated Plastic Bags **(having thickness equal to more than 50 µ) or containers**  **Note** ▪ Chemical liquid waste such as spent hypo of X-Ray should be stored in yellow container and sold to recycler authorised by SPCB/PCC. ▪ Infected secretions, aspired body fluids etc from laboratory should be disinfected before mixing with other wastewater from hospital. ▪ Liquid chemical wastes should be pre treated/neutralised before mixing with other wastewater from hospital.
2.	Red Category	Contaminated Waste (Recyclable)	Red Coloured Non Chlorinated Plastic Bags (having thickness equal to more than 50 µ) and Containers 
3.	White Category	Waste Sharps including metals	White Coloured translucent, puncture proof, leak proof, Temper Proof containers 
4.	Blue Category	Glassware Metallic Body Implants	Cardboard boxes with blue colored marking or blue colored puncture proof, temper proof containers  Cardboard Box with Blue marking

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

Q 82.B

- **Recent context:** The National Aeronautics and Space Administration (NASA) is set to launch the Atmospheric Waves Experiment (AWE) to study one of the important drivers of Space weather – the Earth's weather.
- **AWE is a first-of-its-kind NASA experimental attempt aimed at studying the interactions between terrestrial and Space weather. Hence statement 1 is correct but statement 2 is not correct.**
- It is planned under NASA's Heliophysics Explorers Program, the $42 million mission will study the links between how waves in the lower layers of the atmosphere impact the upper atmosphere, and thus, Space weather.
- **AWE will be launched and mounted on the exterior of the Earth-orbiting International Space Station (ISS)**. From the vantage point, it will look down at the Earth and record the colorful light bands, commonly known as airglow. **Hence statement 3 is correct.**
    - AWE will measure the airglow at mesopause (about 85 to 87 km above the Earth's surface), where the atmospheric temperatures dip to minus 100 degrees Celsius.
    - At this altitude, it is possible to capture the faint airglow in the infrared bandwidth, which appears the brightest enabling easy detection.
- Onboard AWE is an Advanced Mesospheric Temperature Mapper (ATMT), an instrument that will scan or map the mesopause

Q 83.A

- The crackdown on fossil fuel emissions continues, with the recent implementation of CAFE II norms (April 2022).
- **In short, more stringent emission regulations are designed to get car manufacturers to cut down on their overall CO2 levels,** chiefly through software and hardware-related upgrades and by shifting to electrified or hybridized powertrains**. Hence, statement 1 is not correct.**
- **CAFE stands for Corporate Average Fuel Efficiency/Economy,** so it is not the emission and economy of the individual models that are considered, **but the weighted average of emissions and fuel economy for the entire fleet sold in the country. Hence, statement 2 is correct.**
- This means, that the manufacturer can very well sell heavy, highly polluting and fuel-efficient cars, but then they will have to make that up by selling huge volumes of much more efficient and light cars.
- The Corporate Average Fuel Economy (CAFE) norms are primarily designed to increase fuel efficiency, which, in turn, will lower a company's overall CO2 footprint.
- **At present, the existing limit for average CO2 emissions happens to be 130g/km. Hence, statement 4 is not correct.**
- With CAFE II in effect, the target has been lowered to 113g/km. The key difference between CAFE norms and BS6 II is that the former focuses on reducing all manner of harmful by-products from a car's exhaust (sulphur, nitrogen oxide, etc), while the latter focuses exclusively on CO2 emissions.
- However, both norms force manufacturers to lower fuel consumed by their vehicles, and simultaneously, move towards electric mobility.
- **These standards were released by the Union Ministry of Power (MoP) for the first time in 2017, under the Energy Conservation Act, of 2001. They apply to petrol, diesel, LPG and CNG vehicles. Hence, statement 3 is not correct.**

Q 84.A

- **Air (Prevention and Control of pollution) Act,1981**
- The act Provides for the prevention, control and abatement of air pollution. It makes provisions, Interalia, for Central and State Boards, power to declare pollution control areas, restrictions on certain industrial units, the authority of the Boards to limit the emission of air pollutants, power of entry, inspection, taking samples and analysis, penalties, offences by companies and Government and cognizance of offences etc.
- The Act specifically empowers the State Government to designate air pollution areas and to prescribe the type of fuel to be used in these designated areas.
- **Power to declare air pollution areas: Section 19**
    - The Act states that the State Government, after consulting the State Board, may declare an area within the State as an air pollution area.
    - The State Government may also order for the extension or reduction of an air pollution area or may even merge one or more areas to make a new pollution area or any part or parts thereof.
    - **The State Government after consulting the State Board, may also by notification in the Official Gazette, prohibit the use of any fuel or appliance that may cause or is likely to cause air pollution. Hence, statement 1 is not correct.**

- The State Government may also prohibit the burning of any material (which is not a fuel) if it causes or is likely to cause air pollution. This is also done after consultations with the respective State Board.

- **Powers and Functions**
  - **Central Board- Section 16**
    - ✓ The main function of the Central Board shall be to improve the quality of air and to prevent, control or abate air pollution in the country.
    - ✓ It may:
      - Advise the Central Government on any matter concerning the improvement of the quality of air.
      - Plan and cause to be executed a nation-wide programme for the prevention, control or abatement of air pollution
      - Co-ordinate the activity of the State and resolve disputes among them
      - Provide technical assistance and guidance to the state boards, carry out and sponsor investigations and research relating to problems of air pollution
      - Organize through mass media a comprehensive programme regarding the prevention, control or abatement of air pollution
      - **The Central Board may establish or recognize a laboratory to enable the Central Board to perform its functions under this section efficiently. Hence, statement 3 is correct.**
  - **State Board - Section 17**
    - ✓ To plan a comprehensive programme for the prevention, control or abatement of air pollution;
    - ✓ Advise the State Government on any matter concerning the prevention of air pollution;
    - ✓ **To inspect, at all reasonable times, any control equipment, industrial plant or manufacturing process, and to give by order such directions to such person as it may be necessary to take steps for the prevention of air pollution. Hence, statement 2 is not correct.**
    - ✓ It shall collect and disseminate information regarding air pollution. It shall organise training and mass awareness programmes regarding air pollution control, prevention and abatement.
    - ✓ It shall lay down standards for the emission of air pollutants into the atmosphere from automobiles or industries, or any other pollutant from any source. However, a ship or aircraft cannot come into the ambit of a source.
    - ✓ The State Boards shall also advise the State Government regarding the suitability of any location which is to be used for setting up any industry, keeping in mind the air quality which would be impacted if that industry is set up.
    - ✓ The Boards shall also set up labs in their States, to enable the State Board to perform its functions effectively.
- **Hence, option (a) is the correct answer.**

Q 85.C

Global Methane Pledge

- **The Global Methane Pledge was launched at COP (Conference of Parties) 26 in November 2021 in Glasgow, Scotland to catalyse action to reduce methane emissions and is led by the United States and the European Union. Hence statement 2 is correct.**
- It has 111 country participants who together are responsible for 45% of global human-caused methane emissions.India, which is not a part of the Global Methane Pledge, is among the top five methane emitters globally. Most emissions can be traced back to agriculture.
- **By joining the Pledge, countries commit to work together in order to collectively reduce methane emissions by at least 30% below 2020 levels by 2030. Hence statement 1 is correct.**
- **India did not sign the pledge** because of its concerns over the impact on trade, on the country's vast farm sector, and the role of livestock in the rural economy. **Hence statement 3 is correct.**

Q 86.C

- **Environmental Impact Assessment (EIA):**
  - The UNEP defines **Environmental Impact Assessment (EIA) as a tool used to identify the environmental, social and economic impacts of a project prior to decision-making**. It aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision-makers.
  - **EIA comes under the Notification on Environmental Impact Assessment (EIA) of developmental projects 1994 under the provisions of the Environment (Protection) Act, 1986.**

- **"Public Consultation"** refers to the process by which the concerns of locally affected persons and others who have a plausible stake in the environmental impact of the project or activity are ascertained with a view to taking into account all the material concerns in the project or activity design as appropriate.

- **2022 Amendments in EIA rules**
  - **Thermal power plants up to 15 MW based on biomass or non-hazardous municipal solid waste** using auxiliary fuel such as coal, lignite or petroleum products up to 15 per cent have also been exempted — as long as the fuel mix is eco-friendly.
  - **Fish handling ports and harbours**-Taking into account issues of livelihood security of fishermen involved at fish handling ports and harbours, and the less pollution potential of these ports and harbours compared to others, increasing the threshold of ports which exclusively deals in fish handling, and cater to small fishermen, will be exempted from environmental clearance.
  - **Toll plazas** that need more width for the installation of toll collection booths to cater to a large number of vehicles are exempted.
  - **Airport-Expansion activities in existing airports** related to terminal building expansion without an increase in the airport's existing area, rather than expansion of runways also exempted.
  - **Strategic Projects-For projects of strategic importance-**"Highway projects related to defence and strategic importance in border States are sensitive in nature and that needs to be executed on priority keeping in view strategic, defence and security considerations.
  - Exemption of such projects from the requirement of Environmental Clearance in border areas, subject to specified Standard Operating Procedure along with standard environmental safeguards for such projects for self-compliance by the agency executing such projects.Any project which is 100 km from the Line of Control, among other locations, will be exempted from an environmental clearance before construction.
- **Hence option (c) is the correct answer.**

Q 87.B

- **Global Energy Transition Index** is released by **World Economic Forum (WEF)**.In the latest published index, India has moved up two places to rank 76th out of 115 economies. **Hence option (b) is the correct answer.**
- It ranks economies on how well they are able to balance energy security and access with environmental sustainability and affordability. The WEF index considers both the current state of the countries' energy system and their structural readiness to adapt to future energy needs.
- The 'transition readiness' component of the index has taken into account six individual indicators:
  - capital and investment
  - regulation and political commitment
  - institutions and governance
  - institutions and innovative business environment
  - human capital and consumer participation
  - energy system structure
- **India's Performance-** India is amongst the countries with high pollution levels and has a relatively high CO2 intensity in its energy system. India has made significant strides to improve energy access in recent years, and currently scores well in the area of regulation and political commitment towards energy transition. However, India is the only amongst the five economies to improve its rank since last year.
- Global Rankings: Sweden remains on the top on this annual list and is followed by Switzerland and Norway in the top three.

Q 88.D

- **Composition, Generation and Utilization of Fly Ash in India**
- Fly ash is a by-product of coal-based power plants.
- **It is a fine powder with substantial amounts of oxides of silica, aluminium and calcium. It also contains traces of Arsenic, Boron, Chromium, lead etc. which leads to air and water pollution if disposed on land. Hence option (d) is the correct answer.**
- With low grade of Indian coal, its ash content is as high as 30-45% in comparison to imported coal with 10- 15%.
- With nearly 55% of our total power production through coal and lignite based Thermal Power Plants (TPP), the fly ash generation in India is very high.

Q 89.C

- Renewable diesel can be produced by several different technology pathways. Currently, commercial production facilities are using the hydrotreating pathway and fats, oils, and greases are the most common feedstocks. **It is made from fats and oils, such as soybean oil or canola oil, and is processed to be chemically the same as petroleum diesel. Hence, pair 2 is correctly matched.**
- Renewable gasoline (also called green or drop-in gasoline) is a fuel produced from biomass sources through a variety of biological, thermal, and chemical processes. The fuel is chemically identical to petroleum gasoline. **It can be produced from various biomass sources. These include lipids (such as vegetable oils, animal fats, greases, and algae) and cellulosic material (such as crop residues, woody biomass, and dedicated energy crops). Hence, pair 1 is correctly matched.**
- Sustainable aviation fuel (SAF), made from non-petroleum feedstocks, is an alternative fuel that reduces emissions from air transportation. SAF can be blended at different levels with limits of 10% to 50%, depending on the feedstock and how the fuel is produced. **SAF can be produced from non-petroleum-based renewable feedstocks including, but not limited to, the food and yard waste portion of municipal solid waste, woody biomass, fats/greases/oils, and other feedstocks. Hence, pair 3 is correctly matched.**

Q 90.C

- **The Rotterdam Convention** (formally, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade) is a **multilateral treaty to promote shared responsibilities in relation to the importation of hazardous chemicals. Hence, statement 1 is correct.**
- The convention promotes an open exchange of information and calls on exporters of hazardous chemicals to use proper labelling, include directions on safe handling, and inform purchasers of any known restrictions or bans.
- Signatory nations can decide whether to allow or ban the importation of chemicals listed in the treaty, and exporting countries are obliged to make sure that producers within their jurisdiction comply.
- **The movements of hazardous chemicals listed in Annex III are subject to the Prior Informed Consent procedure ("PIC procedure"). Hence, statement 2 is correct.**
- **Exports are only allowed if the State of import has consented to the future import of the specific chemical through an Import Response. Hence, statement 3 is correct.**
- To achieve its objectives the Convention includes two key provisions, namely the Prior Informed Consent (PIC) Procedure and Information Exchange.
    - The Prior Informed Consent (PIC) procedure – The PIC procedure is a mechanism for formally obtaining and disseminating the decisions of importing Parties as to whether they wish to receive future shipments of those chemicals listed in Annex III of the Convention and for ensuring compliance with these decisions by exporting Parties.
    - Information Exchange - The Convention facilitates information exchange among Parties for a very broad range of potentially hazardous chemicals. The Convention requires each Party to notify the Secretariat when taking a domestic regulatory action to ban or severely restrict a chemical.
- **The Convention does not apply to chemicals imported for the purpose of research and analysis. Hence, statement 4 is not correct.**
- What is the maximum quantity of a chemical that can be imported for such purposes?
    - The Convention does not specify an amount that is considered for the purpose of research or analysis. Some Parties in implementing the Convention have set a level of 10 kilograms whereas others have set lower amounts.
    - Whatever amount Parties choose to apply, it is important to recognize that these should be small amounts compared to commercially traded quantities and must not be likely to affect human health and the environment.

Q 91.D

- The Climate Neutral Now Initiative is one of several initiatives launched by the UNFCCC secretariat to increase climate action by engaging non-party stakeholders (sub-national governments, companies, organizations, and individuals). **It was launched in 2015 based on a mandate to promote the voluntary use of carbon market mechanisms recognized under the Convention.**
- The Climate Neutral Now Initiative encourages and supports organizations to act now in order to achieve a climate-neutral world by 2050, as enshrined in the Paris Agreement. It is a tool to promote additional voluntary action on climate and to provide recognition for it.

- The initiative is not a certification scheme for its participants. An organization can become a participant by signing the Climate Neutral Now Pledge, following the three steps (Measure, Reduce, Contribute) and reporting on its actions and achievements annually.
- **Hence, option (d) is the correct answer.**

Q 92.B

- **The chemical oxygen demand (COD) determines the amount of oxygen required for the chemical oxidation of organic matter using a strong chemical oxidant, such as potassium dichromate under reflux conditions. Hence, statement 1 is correct.**
- This test is widely used to determine: a) the Degree of pollution in water bodies and their self-purification capacity, **b) the Efficiency of treatment plants, c) Pollution loads,** and d) Provides a rough idea of Biochemical oxygen demand (BOD) which can be used to determine sample volume for BOD estimation. **Hence, statement 3 is correct.**
- **The limitation of the test lies in its inability to differentiate between the biologically oxidizable and biologically inert material and to find out the system rate constant of aerobic biological stabilization. Hence, statement 2 is not correct.**
- Most of the organic matter is destroyed when boiled with a mixture of potassium dichromate and sulphuric acid producing carbon dioxide and water.
- A sample is refluxed with a known amount of potassium dichromate in sulphuric acid medium and the excess of dichromate is titrated against ferrous ammonium sulphate.
- The amount of dichromate consumed is proportional to the oxygen required to oxidize the oxidizable organic matter.

Q 93.A

- **Recent context**: Countries reinforced their commitment to combat Transnational Organized Crime at a Ministerial Conference in Palermo, Sicily (Italy).
- **The Palermo Convention, officially known as the "United Nations Convention against Transnational Organized Crime," is an international treaty adopted by the United Nations in 2000. It is supplemented by three protocols that address specific issues related to transnational organized crime**. These protocols are often referred to as the "Palermo Protocols."
    - **Protocol to Prevent, Suppress, and Punish Trafficking in Persons, Especially Women and Children**: This protocol, also known as the "Trafficking in Persons Protocol," addresses the prevention and suppression of human trafficking, particularly the trafficking of women and children. It outlines measures to be taken by countries to combat human trafficking and protect the rights of victims.
    - **Protocol against the Smuggling of Migrants by Land, Sea, and Air**: This protocol, also known as the "Migrant Smuggling Protocol," focuses on the prevention and suppression of the illegal smuggling of migrants, which is often associated with transnational organized crime. It aims to prevent and combat migrant smuggling and protect the rights of smuggled migrants.
    - **Protocol against the Illicit Manufacturing of and Trafficking in Firearms, Their Parts and Components and Ammunition**: This protocol, known as the "Firearms Protocol," addresses the illicit manufacturing and trafficking of firearms, their parts, and ammunition. It aims to prevent the proliferation of illicit firearms and combat-related criminal activities.
- The Palermo Convention and its protocols collectively provide a framework for international cooperation in combating transnational organized crime. They emphasize the importance of legal measures, law enforcement cooperation, and the protection of the rights of victims in addressing various forms of organized criminal activities, including human trafficking, migrant smuggling, and illicit firearms trafficking.
- **Hence option (a) is the correct answer.**

Q 94.A

- **Recent context : The Election Commission of India has designed in-house software for complete Candidate and election management through 'ENCORE' which stands for Enabling Communications on Real-time Environment.**
- **This provides a seamless facility for Returning Officers to process candidate nomination, affidavit, Voter turnout, counting, results and data management.**
- The ENCORE counting application is an end-to-end application for returning officers to digitize the votes polled, tabulate the round-wise data and then take out various statutory reports of counting.

- Another application called ENCORE Scrutiny Application allows Returning Officers to do scrutiny of the nominations filed by the candidates on-line.
    - After verification of the nomination the status is marked as Accepted, Rejected or Withdrawn helping the Returning Officer to prepare the final list of contesting candidates and assign the symbols.
- The National Technical Research Organisation is a technical intelligence agency of India. It was set up in 2004. The agency reports to the National Security Advisor and to the Prime Minister's Office.
- **Hence statement 1 is correct but statement 2 is not correct.**

Q 95.B

- **The Ocean thermal energy conversion (OTEC) technology uses the temperature difference between the cold water in the deep sea (5°C) and the warm surface seawater (25°C) to generate clean, renewable electricity. Warm surface water is pumped through an evaporator containing a working fluid. Hence, statement 1 is not correct.**
- The vaporized fluid drives a turbine/generator. The vaporized fluid is condensed back to liquid in a condenser cooled with cold ocean water pumped from deeper in the ocean. OTEC systems using seawater as the working fluid can use the condensed water to produce desalinated water.
- **The National Institute of Ocean Technology, an autonomous institute under the Union Ministry of Earth Sciences (MoES) is establishing an Ocean Thermal Energy Conversion plant with a capacity of 65 kilowatts (kW) in Kavaratti, the capital of Lakshadweep. It will be the first ocean thermal energy plant in India. Hence, statements 2 and 3 are correct**.

Q 96.A

- **Global Tiger Forum**
    - Global Tiger Forum is an international intergovernmental body exclusively set up for the **conservation of tigers in the wild in the tiger range countries**.
    - **Out of the 13 tiger range countries, seven are currently members of GTF: Bangladesh, Bhutan, Cambodia, India, Myanmar, Nepal and Vietnam besides non-tiger range country U.K. The secretariat is based in New Delhi, India.**
    - **The other six tiger range countries but not members of GTF are** China, **Russia, Malaysia, Indonesia and** Thailand. **Hence option (a) is the correct answer.**
    - GTF's goal is to highlight the rationale for tiger preservation and provide leadership and a common approach throughout the world in order to safeguard the survival of the tiger, its prey, and its habitat.
- **Global Tiger Initiative (GTI): All 13 Tiger range countries are members of GTI**
    - The Global Tiger Initiative (GTI) is a worldwide alliance of governments, international organizations, civil society, the conservation and scientific community, and the private sector dedicated to collaborating on a common agenda to save wild tigers from extinction.
- **Origins**
    - In 2008, the GTI was founded by founding partners the World Bank, Global Environment Facility, Smithsonian Institution, Save the Tiger Fund, and the International Tiger Coalition (representing more than 40 non-government organizations).
- **Goals**
    - **Double the wild tiger population by 2022.**
    - **Conserve tiger habitats and corridors.**
    - Reduce human-tiger conflict.
    - Enhance public support for tiger conservation.
- **Achievements**

  The GTI has made significant progress in its efforts to conserve tigers, including:
    - **Increasing the global tiger population from 3,159 in 2010 to 3,949 in 2022.**
    - **Expanding tiger habitat by over 10% since 2010.**
    - **Reducing poaching by over 50% since 2010.**
    - Raising awareness of tiger conservation through public awareness campaigns and education programs.
- **Global Tiger Recovery Program (GTRP)** was launched in 2010 under the Global Tiger Initiative (GTI) by the World Bank to save wild tigers. This initiative set up the ambitious target of **reversing the rapid decline of wild tigers across their range and doubling their population numbers by 2022.**

Q 97.B

- **Carbon Credit Trading Scheme 2023 :**
  - The Indian Parliament passed the Energy Conservation (Amendment) Bill 2022, which modifies the 2001 Energy Conservation Act. The Ministry of Power notified the Carbon Credit Trading Scheme 2023 and will soon notify entities obligated to comply with GHG emission regulations. To ensure that the identified entities' percentage of total energy requirements come from non-fossil fuel sources, the government will release the modalities based on the Bureau of Energy Efficiency (BEE) recommendations.
  - MoEFCC will notify the emission intensity target for obligated entities upon the recommendation of the Ministry of Power. Emission intensity is the total amount of greenhouse gas emitted for every unit of GDP.

Key Features of the CCTS 2023

- **Cap-and-trade system:**
  The CCTS employs a cap-and-trade system, where a cap is set on the total amount of greenhouse gas (GHG) emissions allowed from a group of entities. Entities covered under the scheme have emission intensity reduction targets. Entities that achieve or exceed their targets earn carbon credit certificates, while those that fall short need to purchase credits from the market.
- **Trading mechanism:**
  Obligated entities will earn a carbon credit certificate if they surpass the target assigned to them. T**he certificate will be issued by BEE.** Then the Carbon credit certificates are traded on designated power exchanges. **Hence statement 1 is not correct.**
- **Governance and oversight:**
  - **The National Steering Committee for the Indian Carbon Market (NSCICM)** oversees the overall functioning of the carbon market.
  - **The Bureau of Energy Efficiency (BEE)** will act as the administrator for the ICM, responsible for developing GHG emissions trajectory and targets for obligated entities.
  - **The Grid Controller of India Limited** will be the designated agency for maintaining the ICM Registry and overseeing transactions among obligated entities.
  - **The Central Electricity Regulatory Commission (CERC**) will act as the regulator for carbon credit trading. They will register power exchanges for trading carbon credit certificates, protect buyer and seller interests, and prevent fraud or mistrust. **Hence statement 2 is correct.**

Q 98.A

- Cocoyoc declaration was signed in October 1974 by an international group of social scientists, natural scientists and economists. It was based on the theme of **'Sustainable development'** and became the first declaration to use the term. It also discussed themes of patterns of resource use, environment and development strategies.
- **Hence option (a) is the correct answer.**

Q 99.C

- **Basel Convention**
  - The Basel Convention is an international treaty that aims to control the **transboundary movement of hazardous wastes and their disposal.** It was adopted in 1989 and entered into force in 1992. As of today, there are 189 parties to the Basel Convention. **Hence pair 1 is correctly matched.**
  - The Basel Convention's main objectives are to:
    - ✓ Reduce the transboundary movement of hazardous wastes
    - ✓ Ensure the environmentally sound management of hazardous wastes
    - ✓ Protect human health and the environment from the adverse effects of hazardous wastes
- **Hong Kong International Convention**
  - The Hong Kong Convention is an international treaty that aims to **ensure the safe and environmentally sound recycling of ships.** It was adopted in 2009 and entered into force in 2015. As of today, there are 15 parties to the Hong Kong Convention. **Hence pair 2 is correctly matched.**
  - **The Hong Kong Convention's main objectives are to**:
    - ✓ Prevent the uncontrolled disposal of ships
    - ✓ Ensure that ships are recycled in a way that protects human health and the environment
    - ✓ Promote the use of environmentally sound recycling technology
- **Stockholm Convention on Persistent Organic Pollutants** is an international environmental treaty, signed on 22 May 2001 in Stockholm and effective from 17 May 2004, that aims to eliminate or restrict the **production and use of persistent organic pollutants (POPs). Hence pair 3 is correctly matched.**

Q 100.D

- Climate-smart agriculture (CSA) is an approach that helps to guide actions needed to transform and reorient agricultural systems to effectively support development and ensure food security in a changing climate.
- CSA aims to tackle three main objectives:
  - Adapting and building resilience of crops and livestock to climate change. **Hence, statement 1 is correct.**
  - Sustainably increasing agricultural productivity and incomes. **Hence, statement 2 is correct.**
  - Reducing and/or removing greenhouse gas emissions wherever possible. Hence, help India is meeting its Intended Nationally Determined Commitments under Paris Climate Agreement. **Hence, statement 3 is correct.**