

Q.1)

Exp) Option a is the correct answer.

Statement 1 is correct. Phytoplankton are responsible for most of the transfer of carbon dioxide from the atmosphere to the ocean. Carbon dioxide is consumed during photosynthesis, and the carbon is incorporated in the phytoplankton, just as carbon is stored in the wood and leaves of a tree. Thus, the complete destruction of the phytoplankton of an ocean would release this sequestered carbon dioxide to the atmosphere and adversely affect the ocean as a carbon sink.

Statement 2 is correct. Phytoplankton and algae form the basis of aquatic food webs. They are eaten by primary consumers like zooplankton, small fish, and crustaceans. Primary consumers are in turn eaten by fish, small sharks, corals, and baleen whales. Thus, the complete destruction of the phytoplankton of an ocean would adversely affect the food chains in the ocean.

Statement 3 is incorrect. Phytoplankton are photosynthesizing microscopic biotic organisms that inhabit the upper sunlit layer of almost all oceans and bodies of fresh water on Earth. **The density of the ocean water depends on heat content and salinity. Thus, the density of ocean water would not be much affected** if the phytoplankton of the ocean is completely destroyed

Q.2)

Exp) Option a is the correct answer.

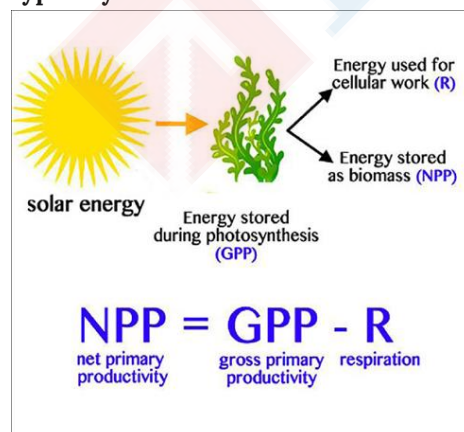
The Green Climate Fund (GCF) is a fund established within the framework of the UNFCCC as an operating entity of the Financial Mechanism to assist developing countries in adaptation and mitigation practices to counter climate change.

The GCF Board is charged with the governance and oversight of the Fund's management. It was established by 194 sovereign governments party to the UN Framework Convention on Climate Change (UNFCCC). The Board is independent and guided by the Conference of the Parties (COP) to the Convention. World Bank provides Trustee services to GCF.

Q.3)

Exp) Option c is the correct answer.

Temperate grasslands have the lowest mean net primary productivity (NPP) of the four biomes listed. NPP is the rate at which organic matter is produced by plants in a given area over a period of time. It is measured in units of grams of carbon per square meter per year. It represents the amount of energy captured by plants through photosynthesis minus the energy they expend for their own respiration. **Temperate grasslands have a lower NPP than temperate forests, tropical forests and tropical savannas because they have a shorter growing season and less precipitation. Temperate grasslands are also typically found in areas with less fertile soils.**



Important Tips	
NPP per unit area:	
Land type	Average NPP (tons per km ² per year)
Algal beds and reefs	2500
Tropical rainforest	2200
Swamp and marsh	2000
Estuaries	1500
Temperate deciduous forest	1200
Boreal forest	800
Cultivated land	650
Temperate grassland	600
Continental shelf	360
Tundra and alpine	140
Open ocean	125
Desert and semi-desert	90

Q.9)

Exp) Option d is the correct answer.

Statement 1 is correct. Typically, coal ash consists of arsenic, lead, mercury, selenium, hexavalent chromium among other carcinogens and neurotoxins.

Coal ash, also referred to as coal combustion residuals or CCRs, is produced primarily from the burning of coal in coal-fired power plants.

Statement 2 is correct. Coal-fired power plants also produce large amounts of nitrogen oxides and sulfur dioxide—the pollutants that cause acid rain.

Statement 3 is correct. India's domestic coal reserves have a high ash content—up to 40 to 45 percent.

Q.11)

Exp) Option c is the correct answer.

Statement 1 is correct: Bagasse is a dry fibrous residue left after the juice is extracted from sugarcane. It is a renewable and sustainable source of energy. Bagasse can be burned directly to generate electricity or heat, or it can be converted into biofuels such as ethanol and biogas.

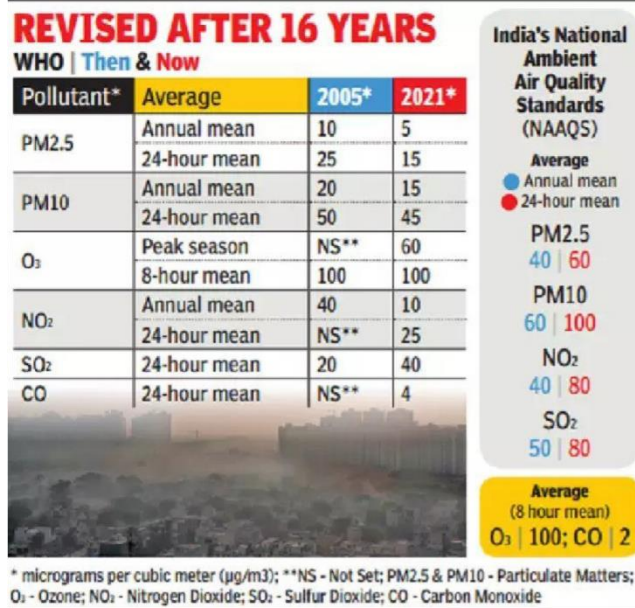
Statement 2 is incorrect: Molasses is a thick, syrupy liquid that remains after sugar crystals have been extracted from sugarcane juice. It is a valuable source of nutrients, including nitrogen, phosphorus, and potassium. However, molasses cannot be used to produce synthetic chemical fertilizers.

Statement 3 is correct: Molasses contains a high concentration of sugar, which can be fermented to produce ethanol. Ethanol is a renewable biofuel that can be used as a transportation fuel or as an additive to gasoline.

Q.14)

Exp) Option b is the correct answer.

Statement 1 is correct: The World Health Organization (WHO) has released the Global Air Quality Guidelines (AQGs). The new guidelines recommend air quality levels for six pollutants particulate matter (PM) 2.5 and PM 10, ozone (O₃), nitrogen dioxide (NO₂), sulfur dioxide (SO₂) and carbon monoxide (CO).



Statement 2 is incorrect: Ozone at ground level is formed by the reaction with sunlight (photochemical reaction) of pollutants such as nitrogen oxides (NO_x) from vehicle and industry emissions and volatile organic compounds (VOCs) emitted by vehicles, solvents and industry. **As a result, the highest levels of ozone pollution occur during periods of sunny weather and not during inclement weather.**

Statement 3 is incorrect: PM is a common proxy indicator for air pollution. It affects more people than any other pollutant. The major components of PM are sulfate, nitrates, ammonia, sodium chloride, black carbon, mineral dust and water. It consists of a complex mixture of solid and liquid particles of organic and inorganic substances suspended in the air. **While particles with a diameter of 10 microns or less, (≤ PM₁₀) can penetrate and lodge deep inside the lungs,** the even more health-damaging particles are those with a diameter of 2.5 microns or less, (≤ PM_{2.5}). **PM_{2.5} can penetrate the lung barrier and enter the blood system.** Chronic exposure to particles contributes to the risk of developing cardiovascular and respiratory diseases, as well as of lung cancer.

Statement 4 is correct: Excessive ozone in the air can have a marked effect on human health. It causes breathing problems, trigger asthma, reduce lung function and cause lung diseases. Ozone triggers asthma because it is very irritating to the lungs and airways

Q.16)

Exp) Option c is the correct answer.

Statement 1 is correct: BirdLife International is a global partnership of conservation organisations that strives to conserve birds, their habitats and global biodiversity, working with people towards sustainability in the use of natural resources.

Statement 2 is incorrect :In 1988, British ecologist Norman Myers published a seminal paper identifying 10 tropical forest “hotspots.” These regions were characterized both by exceptional levels of plant endemism and serious levels of habitat loss.

Statement 3 is correct The Important Bird and Biodiversity Areas (IBA) programme of Birdlife International aims to identify, monitor and protect a global network of IBAs for conservation of the world’s birds and associated biodiversity.

Q.22)

Exp) Option b is the correct answer.

Asbestos dust is a type of air pollutant that can cause lung diseases such as asbestosis, lung cancer, and mesothelioma. Asbestos dust can be inhaled into the lungs and damage the lung tissue, leading to inflammation, scarring, and cancer.

Lead is a toxic metal that can affect the brain and the nervous system. Lead can interfere with the development and function of the brain, causing cognitive impairment, behavioral problems, and neurological disorders.

Mercury is a chemical element that can have harmful effects on the stomach and the digestive system. Mercury can be present in the air as a result of industrial activities, such as coal burning, mining, and waste incineration. Mercury can also be found in some fish and seafood that have accumulated mercury from the water. Mercury can damage the lining of the stomach and intestines, causing ulcers, bleeding, and inflammation.

Carbon monoxide is a colorless, odorless gas that can affect the bloodstream and reduce the oxygen delivery to the organs and tissues. Carbon monoxide can be produced by incomplete combustion of fossil fuels, such as in car engines, generators, fireplaces, and stoves. Carbon monoxide can bind to hemoglobin, the protein that carries oxygen in the blood, and prevent it from releasing oxygen to the cells. This can cause symptoms such as headache, dizziness, nausea, fatigue, chest pain, and confusion

Q.29)

Exp) Option b is the correct answer.

Statement 1 is incorrect: H-CNG can significantly reduce carbon monoxide emissions, but it does not eliminate them entirely. Carbon monoxide is a byproduct of incomplete combustion, so any fuel that is burned will produce some carbon monoxide emissions. However, H-CNG burns more efficiently than conventional CNG, so it produces less carbon monoxide overall.

Statement 2 is correct. H-CNG burns cleaner than conventional CNG, so it produces less carbon dioxide and hydrocarbon emissions. Carbon dioxide is a greenhouse gas that contributes to climate change, and hydrocarbon emissions are a major source of air pollution.

Statement 3 is correct. Hydrogen can be blended with CNG in any proportion up to one-fifth by volume. This means that H-CNG can be used in existing CNG buses with only minor modifications.

Statement 4 is incorrect. H-CNG is more expensive to produce than CNG. This is because hydrogen is a more expensive fuel than natural gas. However, the improved fuel efficiency of H-CNG can offset the higher cost of the fuel

Q.32)

Exp) Option a is the correct answer.

Benzene is a colourless liquid with a sweet Odour. It evaporates into the air very quickly and dissolves slightly in water. It is highly flammable. Human exposure to benzene has been associated with a range of acute and long-term adverse health effects and diseases, including cancer and aplastic anaemia.

Option 1 is correct. Automobile exhaust accounts for the largest source of benzene in the general environment.

Option 2 is correct. Active and passive exposure to tobacco smoke is also a significant source of exposure. Benzene is highly volatile, and exposure occurs mostly through inhalation.

Option 3 is correct. Benzene is one of the main organic compounds emitted by wood-burning, that has the potential to cause cancer.

Options 4 and 5 are incorrect. Automobile exhaust, tobacco smoke, and wood burning are all sources of benzene pollution. Varnished wooden furniture and products made of polyurethane may also contain benzene, but they are not as significant sources of exposure as the other three sources.

Q.36)

Exp) Option d is the correct answer.

Option a is correct- Ozone is a **potent oxidizer** with the ability to rapidly **neutralize biological substances** like **bacteria, viruses, and parasites**. It possesses **superior disinfection capabilities** compared to chlorine. Additionally, ozone's **oxidative power** is effective in removing persistent metals from water.

Option b is correct- **Chlorine dioxide (ClO₂)** is a chemical compound that is used as a disinfectant in water treatment. It is a powerful **oxidizer and biocide**, and it is effective against a wide range of **bacteria, viruses, and protozoa**. Chlorine dioxide is also effective at **removing taste and odor** compounds from water.

Option c is correct- **Chloramine** is a chemical compound that is used as a disinfectant in water treatment. It is formed by combining **chlorine and ammonia**. Chloramine is a **less aggressive disinfectant than chlorine**, but it is **more persistent**, meaning that it can stay in the water distribution system for longer and provide continuous disinfection.

Q.40)

Exp) Option b is the correct answer.

Statement 1 is incorrect. Central Pollution Control Board (CPCB), is statutory organization, was constituted in September, 1974 under the Water (Prevention and Control of Pollution) Act, 1974.

Statement 2 is correct. National Green Tribunal (NGT) was set up in 2010 under the NGT Act, 2010, for the purpose of effective and expeditious disposal of cases relating to environmental protection. The Tribunal shall not be bound by the procedure laid down under the Code of Civil Procedure, 1908, but shall be guided by principles of natural justice.

CPCB serves as a field formation and also provides technical services to the Ministry of Environment and Forests of the provisions of the Environment (Protection) Act, 1986. Principal Functions of the CPCB, as spelt out in the Water (Prevention and Control of Pollution) Act, 1974, and the Air (Prevention and Control of Pollution) Act, 1981, (i) to promote cleanliness of streams and wells in different areas of the States by prevention, control and abatement of water pollution, and (ii) to improve the quality of air and to prevent, control or abate air pollution in the country.

Q.44)

Exp) Option c is the correct answer.

A **pycnocline** is a **layer of water** where the **density changes rapidly with depth**. This is usually due to changes in **temperature and/or salinity**. Pycnoclines are found in both **oceans and lakes**. In the **ocean**, the pycnocline is typically found at a **depth of about 100 meters**. It separates the warm, less dense surface water from the colder, more dense deep water. In **lakes**, the pycnocline is typically found at a **depth of about 10 meters**. It separates the warm, less dense surface water from the colder, more dense deep water.