CHAPTER 14

Natural Resources

EXAM DRILL

ANSWERS

1. Troposphere is the lowest region of atmosphere which contains air and is subject of differential heating. It extends from the surface of earth upto 8 to 20 km. Many important climatic events such as cloud formation, lightning; thundering, thunderstorm formation, etc., all take place in troposphere.

OR

An undesirable change in the physical, biological or chemical qualities of water (due to addition of foreign organic, inorganic, biological or radioactive substances) that adversely affects the aquatic life and makes the water unfit for use, is called water pollution.

2. (i) CFC – Chlorofluorocarbon

(ii) ODS – Ozone depleting substance

3(i) (d)

3(ii) Increase in amount of nutrients reduces the dissolved oxygen and increases biochemical oxygen demand (BOD) of water body, leaving nothing for respiration of fish and other aquatic organisms, therefore, they get killed.

3(iii) (b) : Biochemical oxygen demand (BOD) is the measure of oxygen required by aerobic decomposers for biochemical degradation of organic matter.

3(iv) (b) : Phosphates present in detergents stimulate the growth of algal bloom and this is called eutrophication.

4(i) (a) : In this passage, X and Y respectively represents green house gases and earth.

4(ii) Gases like CO_2, CH_4, CFCs, nitrous oxide, ozone, etc., are some greenhouse gases.

4(iii) (a) : Carbon dioxide

4(iv) 20%

5. (a) : Forest fire, dust storm, pollen, etc., are natural type of air pollution.

OR

(d) : The soil is a complex mixture. It consists of five components :

(i) Mineral matter = 45%

(ii) Organic matter = 5%

(iii) Water = 25%

(iv) Air = 25%

(v) Living organisms ≈ Variable

All these components are essential for proper plant growth.

6. (c) : Eutrophication is the nutrient enrichment of water bodies due to human activities like passage of sewage, industrial effluents, run off from fertilised fields rich in nitrates and phosphates.

7. (b) : Various climatic factors such as temperature (solar radiation), wind, rain water, ice, snow, glaciers and running water contribute to physical weathering.

8. (c) : Minamata human disease is caused due to consumption of mercury contaminated fishes. Biomagnification of mercury in the fishes through a food chain results in Minamata disease in fish- eating human populations of the region.

OR

(c) : Gases such as carbon dioxide (CO_2), methane (CH_4), ozone (O_3), nitrogen oxide (N_2O) and chloroflurocarbons (CFCs) are called greenhouse gases (GHGs). Among them CO_2 is the most important green house gas. Burning of fossil fuels in homes, industries, automobiles, burning associated with agricultural practices, deforestation, etc., all such practices are increasing levels of CO_2 and CH_4 in atmosphere.

9. The symbiotic bacteria *e.g., Rhizobium* occurs in root nodules of leguminous plants such as pea, gram, bean, etc., where they multiply and stimulate the formation of root nodules. Within these nodules the bacteria convert the atmospheric nitrogen gas into nitrogen compounds. The process of biofixation of nitrogen is called nitrogen fixation.

10. (a)

11. The process of formation of soil from rocks into small, fine mineral particles is called pedogenesis.

12. Human activities that leads to soil and water pollution are :

(i) Sewage discharge in both land and water.

(ii) Discharge of hot water from thermal plants into water body. Thermal plants produce fly ash which hampers the growth of crop plants.

13. **(b) :** In coastal areas, during daytime, there is a regular flow of cool air from the sea towards land. At night there is a reverse flow of air from land to sea. This happen because during the daytime, land gets heated faster than water.

14. **(a) :** CFCs depletes the ozone layer, which absorbs harmful ultraviolet (UV) rays from sun. UV rays penetrating the surface of earth leads to various disorders like skin cancer.

15. There is good ozone found in the upper part of the atmosphere called stratosphere. This ozone layer is highly important as it filters out the harmful, high energy UV radiations coming from sun. These UV rays are highly injurious to living organisms since DNA and protein of living organisms preferentially absorb UV rays. Bad ozone is formed in the lower atmosphere (troposphere) that harms plants and animals as it is highly poisonous to living systems.

16. (i) Secondary pollutants : These are the pollutants which are formed as a result of interaction of primary pollutants and environmental constituents. It can be explained by the following example :

NO_2 + Hydrocarbons $\rightarrow$ Peroxyacetyl nitrate (PAN)

Secondary pollutants are often more harmful than primary pollutants as they produce formaldehydes, aldehydes and PAN. All these pollutants collectively form photochemical smog.

(ii) Biomagnification : From soil or water pesticides such as DDT, DDE, dieldrin, etc., enter the food chain *via* the producers. This phenomenon of increase in concentration of harmful non-biodegradable chemical substances in the body of living organisms at each trophic level of the food chain is called biomagnification. At each trophic level, their concentration goes on increasing. Due to biomagnification fish-eating predatory birds such as kingfishers, osprey and loon become poisoned.

(iii) Positive soil pollution : It is a pollution caused by pesticides, herbicides, fumigants, air pollutants washed down from atmosphere through rain. The pesticides are the chemicals which have the ability to kill the insects, so that agriculture output is increased. Herbicides are used to clear the forest to build new buildings, etc.

OR

Mathura refinery produces high amount of oxides of nitrogen (NO_2) and sulphur (SO_2). These oxides get mixed with air and cause acid rain that leads to many harmful effects like corrosion of monuments *e.g.*, Taj Mahal. Acid rain corrodes the stone, surface of building and brick works, etc. It can destroy the marble quality and its colour. Thus, posing a great threat to Taj Mahal.

17. **(a) :** Chlorofluorocarbons (CFCs) are type of ozone depeting substances (ODS) that reduce the concentration of ozone layer. CFCs are commonly used as aerosol propellants, refrigerants, shaving foams, spray agent in scents, etc. Depleting ozone layer allows more ultraviolet (UV) radiations to pass through it, which reach the earth's surface. These UV rays cause various harmful effects on human beings, animals, plants such as :

(i) Skin cancer

(ii) Damage to eyes; also increase in incidence of cataract disease in eyes.

(iii) Damage of immune system.

(iv) Increased embryonic mortality in animals and humans.

(v) Decreased crop yields.

(vi) Reduced populations of phytoplankton, zooplankton and certain fish larvae that are important constituents of aquatic food chains.

(vii) Smog formation.

(b) Ozone, O_3 is a molecule that contains three atoms of oxygen. It is a poisonous gas but is not stable near the earth's surface. It gets dissociated (photodissociation) into molecular oxygen and nascent oxygen under the influence of UV – rays.

It causes corrosion of articles, respiratory diseases and also acts as a greenhouse gas.

18. Water is one of the most unusual and inexhaustible natural resource. It exists in solid (snow), liquid (water) and gaseous (water vapour) forms. Life on earth began in the seas and water in some form or the other is essential for the maintenance of all life. Water is one of the key agent in soil formation and serves as the living medium for several different ecosystems. Humans use water for drinking, washing of utensils and clothes, sewage disposal, irrigation and for various other purposes.

All reactions that take place within our body and within our cells, occurs among water soluble substances. Substances get transported from one part of body to the other in dissolved form. Hence, organisms need to maintain a minimum level of water within their bodies in order to stay alive. Terrestrial – life forms require fresh water for this purpose because their bodies cannot tolerate or get rid of the high amounts of dissolved salts in saline water. Thus, water support the richness of the biodiversity.

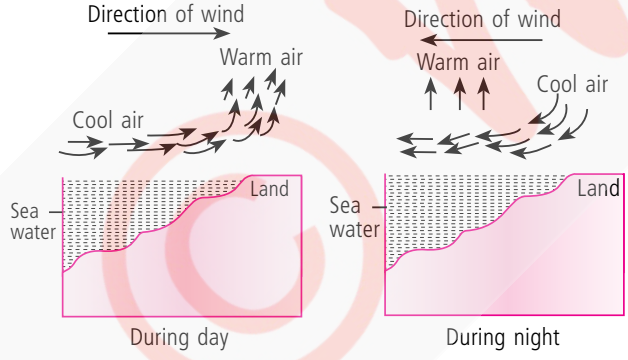
OR

Biotic factors such as lichens and mosses play important role in soil formation. The lichens grow on the surface of rocks and release certain substances that cause the

rock surface to powder down and form a thin layer of soil. This also creates small crevices at places where mosses grow. They cause deepening of the crevices and results in build up of more soil inside them. Deeper crevices form cracks. These cracks become wider and deeper when the roots of short lived herbs pass into them. With the passage of time, the roots of bigger plants, (*e.g.*, peepal, banyan tree) pass into the cracks. Cracks gradually widen and cause slow fragmentation and eventually pulverisation of rocks occur.

19. In coastal areas, during daytime, there is a regular flow of cool air from the sea towards the land. At night, there is a reverse flow of air from land to sea. This happens because during the daytime, land gets heated faster than water. Re-radiation of heat from land heats the air above it. The hot air rises and creates an area of low pressure. Sea water does not get heated so rapidly, so air above the sea is relatively cool. A high pressure area forms above sea water as compared to air over land. Therefore, cooler air over the sea, flows towards the land, where low pressure area exists. The movement of air from one region to the other creates winds. During the night, land cools down rapidly. Air above the land becomes cooler and sea water cools down slowly. The air above the sea is hotter and has a lower air pressure as compared to air pressure above the land. Therefore, cooler air present over land flows towards sea.

The following diagram explains movement of wind from sea to land during day and from land to sea during night :



20. Modern forming practices involve the use of large amounts of fertilisers and pesticides. Use of these substances over long periods of times can destroy the soil structure by killing the soil microorganisms that recycle nutrients in the soil. It also kills the earthworms which are helpful in making the rich humus. Fertile soils can quickly become barren if sustainable practices are not followed. Removal of useful components (nutrients) from the soil and addition of other substances (fertilisers, pesticides, etc) adversely affect the fertility of soil and kills the diversity of organisms that lives in it.

21. Acid rain is the deposition of wet acidic solutions or dry acidic particles in the water droplets present in the air. Rain, snow, fog or dew turns acidic due to the presence of sulphuric acid and nitric acid that results when sulphur and nitrogen oxides combine with O_2 and H_2O in the atmosphere.

These oxides are formed in bulk from burning of fossil fuels, electrical power generation and other industrial activities. Combustion engines of automobiles also contributes in increasing the amount of these oxides in atmosphere.

Smog is a photochemical haze (dark brown or greyish smoky mist) caused by the action of solar ultraviolet radiation on atmosphere polluted with primary pollutants such as hydrocarbons (methane, ethane, toluene, etc.) and oxide of nitrogen (NO_2) from automobile exhaust :

22. (i) Fish in a lake near an industrial city suddenly dies due to eutrophication. Presence of sewage and fertilisers (nitrates and phosphates) in polluted water provide a lot of nutrients to the algae (phytoplankton) present in water body, resulting excessive growth of algae, termed as algal bloom. The algae subsequently die and aerobic decomposers become active. They rapidly consume the dissolved oxygen of the water during decomposition of the dead algae. In the absence of dissolved oxygen, all the aquatic life (including fishes) in the water body dies.

(ii) Lichens do not grow in cities like Delhi because Delhi is a highly polluted city. Lichens are well known sensitive indicators of air pollution. Increased level of air pollutants such as sulphur dioxide in the air around the busy roads of Delhi reduce the incidence of lichens on the trees.

OR

(i) Harmful effects of burning fossil fuels are as follows : Burning of fossil fuels increases the level of CO_2 and methane in atmosphere. This increase the temperature that results in melting of polar ice caps and consequent rise in sea levels. It can also cause change in weather and precipitation patterns on the earth.

(ii) Soil formation : Soil is formed from the rocks undergoing the following two processes : (a) Weathering; (b) Decomposition of organic matter and subsequent humification and mineralisation.

(a) Weathering : Breakdown of bigger rocks into smaller mineral particles is called weathering. It occurs by following three means :

– Physical weathering : Various climatic factors such as temperature (solar radiation), wind, rain water, ice,

snow, glaciers and running water contribute to physical weathering.

– Chemical weathering : It involves a variety of chemical processes such as hydrolysis, hydration, oxidation and reduction.

– Biological weathering : Biological weathering is done by living organisms such as lichens and bryophytes (mosses).

(b) Decomposition of organic matter and subsequent humification and mineralisation : It involves stepwise decomposition by bacteria and fungi, during which organic materials are broken down, leading to humification and mineralisation.

(iii) Human activities which lead to water pollution includes dumping of sewage, fertilisers and pesticides from agricultural fields and other wastes into the waterbodies affect the water quality. Industries release hot water into waterbodies that causes sudden changes in the temperature of waterbody and affect the breeding of aquatic organisms and may also lead to death. Leakage of petroleum oil during oil mining results in water pollution.

23. The removal and transportation of the top layer of soil from its original position to another place, under the effect of strong winds and fast running rainwater, is called soil erosion.

Activities that cause soil erosion are :

(i) Strong winds – soil which is uncovered and loose, is eroded, when it is exposed to strong winds.

(ii) Heavy rains – heavy rainfall wash away the unprotected top soil.

(iii) Improper farming and suspended cultivation – farmers loosen the top soil of the agricultural fields either for cultivation or for removing the weeds. Such soil can get eroded, due to the winds or rains.

(iv) Human actions – human activities such as expansion of urban areas has led to removal of vegetation from certain regions. The bare land is thus exposed to agencies (winds, rains) of soil erosion.

The preventive measures are :

(i) Intensive cropping : If the fields remain covered with crops throughout the year, their top soil will not be exposed to winds or rains and soil will not get erode.

(ii) Sowing grasses and planting xerophytes : Soil should not be left uncovered. Sowing grasses on barren soil or planting of xerophytes will bind the loose soil.

(iii) Terrace farming (terracing) : In terracing the slopes are divided into a number of flat fields to slow down the flow of water.

(iv) Wind breaks : Rows of trees and shrubs are planted at right angles to the prevailing wind flow, to check erosion of soil by the wind.

24. Greenhouse effect is a naturally occurring phenomenon that is responsible for heating of earth's surface and atmosphere due to presence of certain gases in the atmosphere. Some gases such as CO_2, CH_4, water vapours, CFCs, etc. prevent the escape of heat from the earth. These gases when present in correct concentration in the atmosphere are responsible for heating of earth's surface. This is called greenhouse effect. An increase in the percentage of greenhouse gases leads to global warming.

Some strategies should be followed to deal with increasing environment temperature. These are :

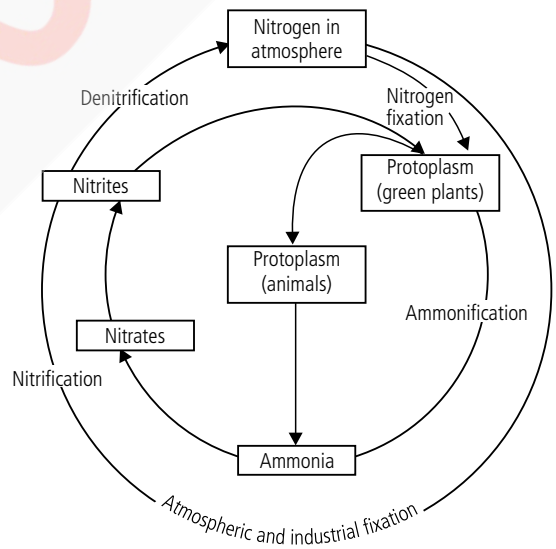
(i) Vegetation cover should be increased for photosynthetic utilisation of carbon dioxide.

(ii) Minimising the use of nitrogen fertilisers to reduce nitrous oxide emission.

(iii) Chlorofluorocarbon (CFCs) should be replaced with some other substitute.

(iv) The use of fossil fuel should be reduced to over come the greenhouse gas emission.

25. **(a)** : The diagrammatic representation of nitrogen cycle is as follows :



(b) The two processes involved in nitrogen cycle are as follows :

(i) Biological nitrogen fixation : It is the process of converting atmospheric nitrogen into water soluble nitrates and nitrites. This is done by nitrogen-fixing bacteria that may be free-living (*e.g.*, *Azotobacter* and *Clostridium*), symbiotic (*e.g.*, *Rhizobium*) and blue-green algae (Cyanobacteria). Most commonly the

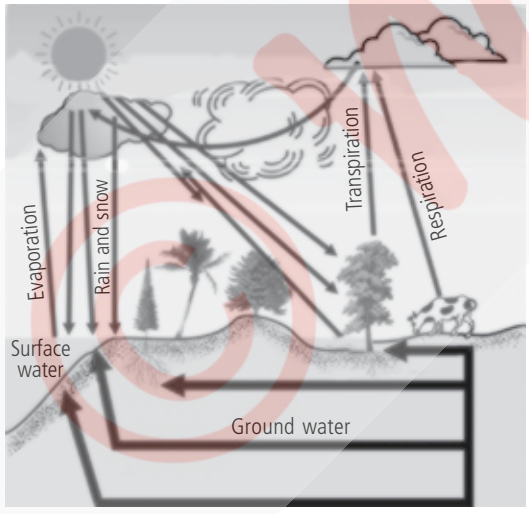
nitrogen-fixing bacteria are found in the root nodules of leguminous plants such as cereals, peas, beans, etc.

(ii) Nitrogen assimilation : It is carried out by plants. Plants absorb nitrate and nitrites and form amino acids, that are used to make proteins. Other complex compounds containing nitrogen are formed in other biochemical pathways. Animals can take organic nitrogen from plants directly or indirectly.

26. **(a)** There is a constant exchange of water between air, land, ocean and the living organisms. The whole process by which water evaporates and falls on the land as rain and later flows back into sea *via* rivers is called the water cycle.

All the water that falls on the land does not immediately flow back into the sea. Some of it seeps into the soil and becomes a part of the underground reservoir of freshwater. Some of this underground water comes up to the surface through springs or through wells or tubewells for use. Water is also released by plants through the process of transpiration into the atmosphere. Water, during the water cycle flows through or over rocks containing soluble minerals, some of these minerals get dissolved in the water. Thus, river carry many nutrients from the land to the sea. These nutrients are then used by marine organisms.

The labelled diagram water cycle in nature of is as follows :



(b) Increase in CO_2 concentration is warning because when concentration of CO_2 from its specified level rises, it starts acting like pollutant and causes air pollution and global warming. Due to this, temperature of the earth will increase and polar ice and glaciers will melt leading to floods. Global warming include change in precipitation pattern, odd climatic changes, decreased crop production, etc.,

OR

(a) (i) Carbon is a basic constituent of all living organisms. There are three main reservoirs of carbon: (a) atmosphere, (b) oceans (water) and (c) carbonate rocks (limestone), coal and petroleum.

Carbon is present in gaseous form in the atmosphere which is its main reservoir. Carbon dioxide enters atmosphere through respiration and combustion process. The volume of carbon dioxide in the atmosphere is 0.03 percent. The carbon in the oceans is present in lesser quantities. However, the carbon dioxide in the atmosphere remains in a dynamic equilibrium with that of oceans. The carbon enters the living system through producers during photosynthesis in the form of carbohydrates and travels to other trophic levels (animals). At each level the respiratory activities return the CO_2 to the atmosphere. When the animals and plants die, decomposition takes place and the carbon is again released in the atmosphere and hydrosphere as carbon dioxide.

(b) The absorbed carbon dioxide is released back to the atmosphere by following ways:

(i) Respiration by plants and animals

(ii) Decomposition of dead bodies and organic waste by decomposers

(iii) Combustion of fossil fuels like coal and petroleum.

27. (i) Water cycle : The organisms get water from and return it to the global water cycle. Plants absorb water from the soil or water reservoir and add it to the air in vapour form by a process called transpiration. Water transpired by trees cools the surrounding air and plays an important role in determining the microclimate around them. Animals take water from the water reservoir or with food (plants or other animals or their products). They return it to the air as vapours by respiration or to the soil as fluid by excretion. Mammals, also excrete water as sweat, which evaporates from their bodies. Water is also added to the environment by death and decay of organisms.

(ii) Oxygen cycle : Green plants are the major sources of oxygen. During the process of photosynthesis, they take up carbon dioxide from the atmosphere (produced as a result of respiration and combustion) and give out oxygen as a by product. This is true for both terrestrial and aquatic plants. Thus, living beings, plants and animals play a very important role in oxygen cycle. Oxygen is

taken by animals and plants from the air or as dissolved in water for use in oxidative reactions (respiration). It is returned to the environment, either in combination with carbon as carbon dioxide or with hydrogen as water. When the organisms die, the oxygen contained in their bodies gets released in the atmosphere due to their decomposition.

(iii) Nitrogen cycle : In nitrogen cycle, organisms such as *Rhizobium*, *Azotobacter* and blue green algae are involved in nitrogen fixation. Putrefying bacteria and fungi helps in ammonification. Nitrifying bacteria in nitrification and denitrifying bacteria is involved in denitrification.

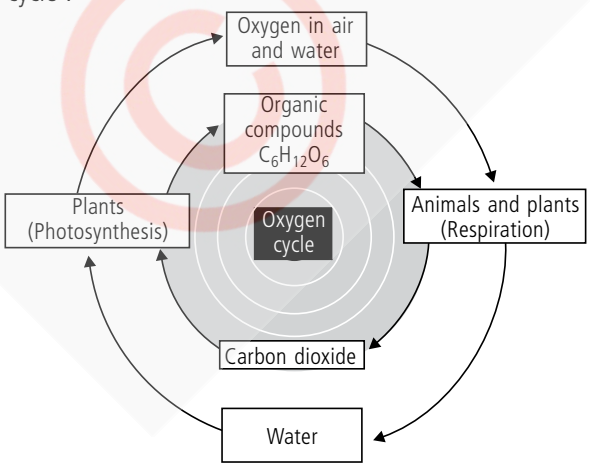
OR

Oxygen is an abundant element, it forms about 21 percent of the atmospheric air. It is also a constituent of water molecule. In addition to atmosphere, the hydrosphere also becomes a major source of oxygen. Oxygen is essential for all living beings as they continuously utilise it for respiration.

Green plants are the major sources of oxygen. During the process of photosynthesis, they take up carbon dioxide from the atmosphere (produced as a result of respiration and combustion) and give out oxygen as a by product. This is true for both terrestrial and aquatic plants. Thus, living beings, plants and animals play a very important role in oxygen cycle.

Oxygen is taken by animals and plants from the air or as dissolved in water for use in oxidative reactions (respiration). It is returned to the environment, either in combination with carbon as carbon dioxide or with hydrogen as water.

This can be explained by the given diagram of oxygen cycle :



28. **(a)** As a consequence of population explosion, we need more food, cloth, shelter and other resources. In order to meet the increasing demand of food, more grains, vegetables and fruits, etc., are to be grown by using fertilisers and pesticides. For providing shelter and cloth, forests are cut to build houses and establish industries. All this leads to ecological imbalances and becomes a big cause of pollution.

(b) The pollutants which decompose and do not cause much harm because they are rendered harmless by natural biological agents, are called biodegradable pollutants, *e.g.*, vegetable peels. The pollutants which do not decompose and can cause harm are called non-biodegradable pollutants *e.g.*, plastic.

29. **(a)** The harmful effects of water pollution are:

(i) Human diseases : Phathogens such as viruses, bacteria, fungi, protozoan, etc., cause diseases in humans such as typhoid, cholera, dysentery and jaundice.

(ii) Disturbance in ecological balance : All types of water pollutants affect the life-forms living in the water. The pollutants can encourage the growth of some life forms and can harm some other lifeforms. This affects the balance between various organisms that persists in that system.

(iii) Removal of desirable substances from water bodies : With increase in the amount of organic wastes in water, bacteria multiply rapidly and use up the available oxygen. Lack of oxygen kills the fish and other aquatic animals.

(iv) Effect of thermal pollution or change in temperature : Aquatic organisms are used to a certain range of temperature in the water-body where they live; a sudden marked change in this temperature can be dangerous for them, *e.g.*, it affects breeding of aquatic animals.

(v) Destruction of useful microorganisms : When untreated industrial wastes get mixed with water in rivers and lakes, etc., the acids, alkalies and heavy metals present in the industrial wastes kill the useful organisms present in water bodies.

(vi) Eutrophication : It is the process in which dissolved oxygen in water gets reduced due to excessive growth of algae as a result of extra loading of nutrients in the water body.

(vii) Biomagnification : The phenomenon of increase in concentration of harmful non-biodegradable chemical substances in the body of living organisms at each trophic level of the food chain is called biomagnification.

(viii) Decomposition of organic matter : Microorganisms bring about decomposition of organic matter brought about by sewage and other organic remains.

(b) Harmful effects of air pollution on human beings are :

(i) SPM causes asthma, bronchitis and allergic cold.

(ii) Pollutant gases cause irritation in eyes, throat and lungs. They causes injury to lungs, liver, kidneys, spleen and nervous system. Heart related diseases tend to increase. Many people may develop terminal ailments such as cancer.

(iii) Hydrocarbon vapours not only damage the internal organs, but also cause cancer.

30. **(a)** It is interesting to note that some forms of life, especially, bacteria are poisoned by element oxygen. Also the process of fixation of nitrogen by bacteria does not take place in the presence of oxygen.

(b) Carbon in elemental form occurs as diamond and graphite. Carbon in combined state occurs as carbon dioxide, carbonates and hydrogen carbonate salts in various minerals. It occurs in carbon containing molecules like carbohydrates, fats, proteins, etc.

(c) The burning fossil fuel increase the amount of CO_2 in the atmosphere causing air pollution. Plants control air pollution because during the process of photosynthesis they take CO_2 from the atmosphere and in turn release O_2. Thus, decreasing the level of CO_2 in the atmosphere.

OR

(i) Clouds and dust particles can produce greenhouse effect. This is the reason why cloudy, dusty and humid nights are warmer than the clear, dust-free and dry nights.

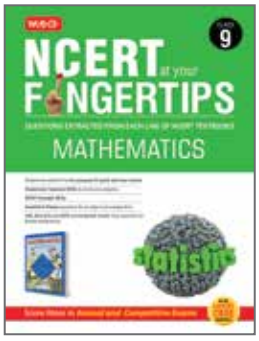
(ii) Radiation damages cells by destroying genetic material (DNA) that controls cell's growth and division. Hence, it kills the cancer cells.

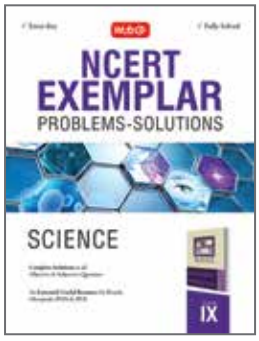
(iii) Warm water can hold much less dissolved oxygen than cold water. Also, rise in temperature speeds up animal metabolism, increasing O_2 requirement, thus further aggravating O_2 problem for aquatic animals.

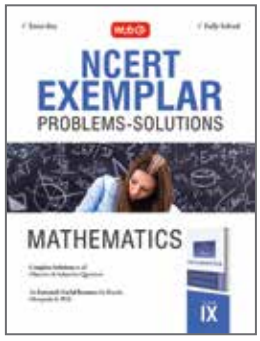
(iv) Nitrate pollutants in drinking water are reduced in the stomach to nitrite; the latter combines with haemoglobin and reduces its oxygen carrying capacity. In this way, nitrite poisoning may prove fatal in children.

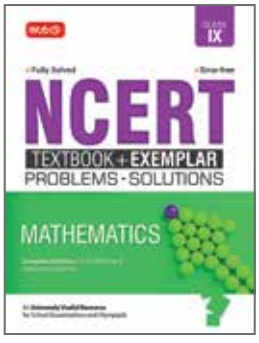
(v) Noise pollution is loud, disturbing sound, thus, unwanted sound is noise, and is a pollutant. Noise pollution is caused by crackers, agricultural machines, defence equipments, etc. Noise pollution can cause hearing problems, anxiety, sleeplessness, etc.

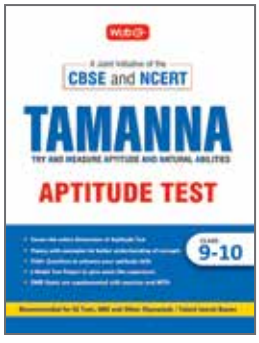
mtG BEST SELLING BOOKS FOR CLASS 9

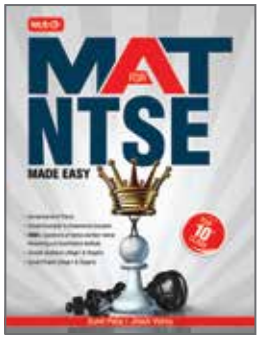


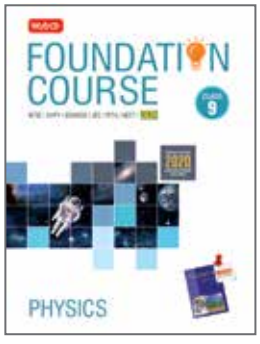


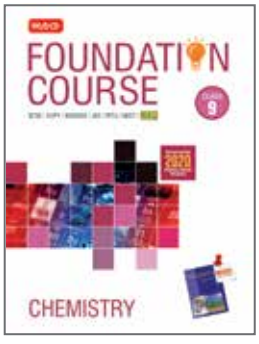


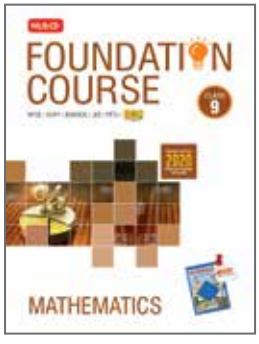


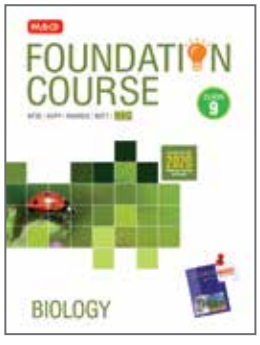


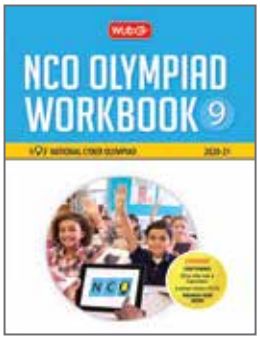


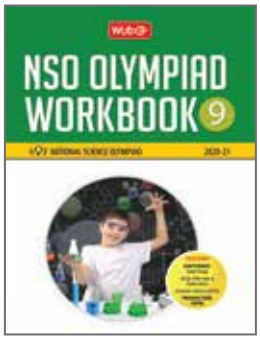


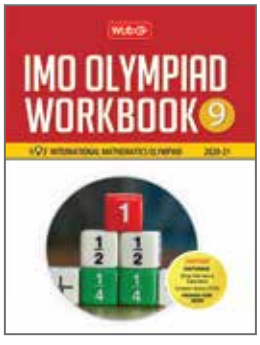


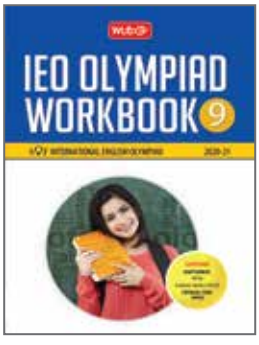


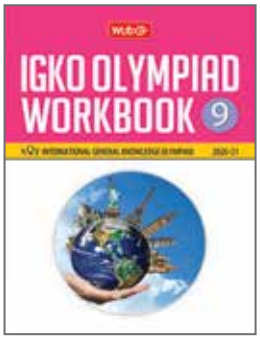


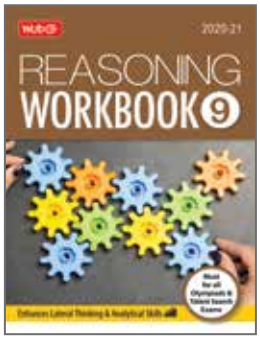












Visit www.mtg.in for complete information