



## CHAPTER – 16

# ENVIRONMENTAL ISSUES

As the human population grows, so do the needs for food, shelter, water, energy, roads, and vehicles, putting strain on the environment and affecting the natural health of ecosystems. Every day, people all across the world face a slew of new and difficult environmental issues. Pollution, greenhouse effect, ozone depletion, deforestation, and so on are some of them.

**Pollution:** is a change in the physical, chemical, or biological qualities of air, land, water, or soil that is unwanted. Pollutants are agents that produce unfavourable alteration.

**Air Pollution and its Control:** All living species require air for respiration. Pollutants diminish agricultural growth and productivity while also causing plant mortality.

In order to control environmental pollution, the Government of India has passed the Environment (Protection) Act, 1986 to protect and improve the quality of our environment (air, water and soil).

**Pollution's negative impact on all living organisms is determined by-**

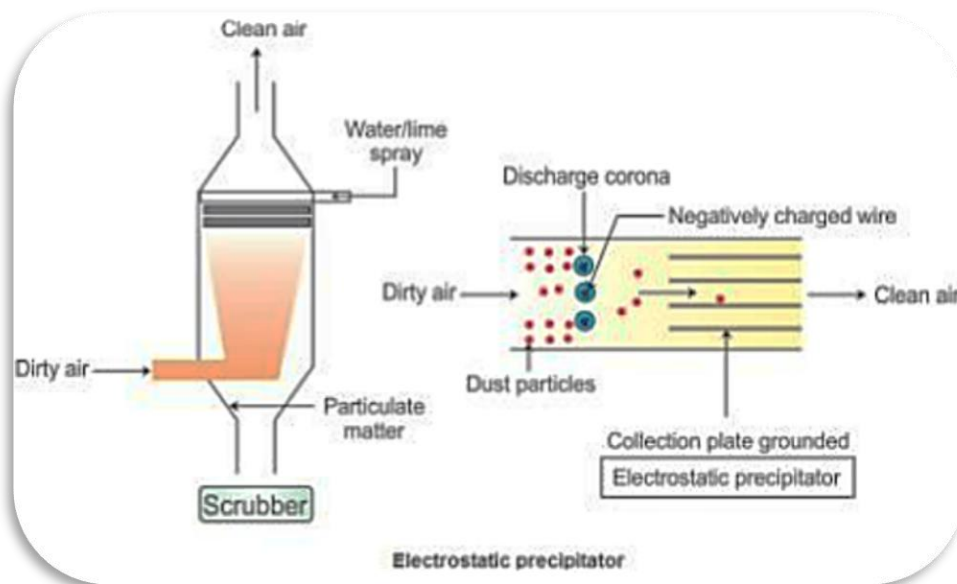
- Pollutant concentration.
- The duration of the exposure.
- Organisms involved.

Thermal power plants, smelters, and other businesses emit particle and gaseous air pollutants, as well as innocuous gases like nitrogen and oxygen. Before releasing the innocuous gases into the environment, these contaminants should be filtered off.

**The electrostatic precipitator is the most extensively used way of eliminating particulate particles.**

**Electrostatic Precipitator:** can eliminate approximately 99 percent of particulate particles from thermal power plant exhaust.

- It contains electrode wires that are kept at thousands of volts to create a corona that releases electrons.
- These electrons bind to dust particles, causing them to have a net negative charge. The collecting plates are grounded, which attracts charged dust particles, allowing clean air to flow through the electrostatic precipitator.
- Scrubbers may remove gases such as sulphur dioxide. The exhaust is subjected to water or lime spray.



### Electrostatic precipitator

- According to the CPCB (Central Pollution Control Board), particulate matter with a diameter of less than 2.5 micrometres (PM 2.5) does the most harm to human health.
- Fine particles can be breathed deeply into the lungs, causing breathing and respiratory discomfort, irritation, inflammation, and lung damage, as well as premature mortality.
- Automobiles are the primary source of pollution in metropolitan areas. Automobile maintenance, as well as the usage of lead-free gasoline or diesel, can help to lessen the toxins they release.
- **Catalytic converters, which use platinum-palladium and rhodium as catalysts, are installed in cars to reduce toxic gas emissions.**
- Unburned hydrocarbons are transformed to carbon dioxide and water when the exhaust travels through the catalytic converter, and carbon monoxide and nitric oxide are converted to carbon dioxide and nitrogen gas.
- Vehicles equipped with catalytic converters should utilise unleaded gasoline since lead in gasoline deactivates the catalyst.
- To lower the rapidly growing pollution level of the metro, the whole fleet of public transportation in Delhi was changed to compressed natural gas (CNG) mode.
- **CNG is superior to diesel because it is less expensive than gasoline and diesel, burns entirely without leaving any residue, and cannot be tainted like gasoline and diesel.**
- The biggest issue with transitioning to CNG is the complexity of building pipes to transport CNG through distribution points/pumps while maintaining continuous supply.
- **Auto Fuel Policy:** The Government of India has outlined a strategy to reduce vehicle air pollution in numerous Indian cities. The purpose of this programme is to lower Sulphur levels in gasoline and diesel to 50 ppm and aromatic hydrocarbon levels to 35 percent of the fuel. On April 1, 2005, all autos in all cities would be subject to Bharat Stage II. Cities such as Delhi, Mumbai, Chennai, and Kolkata will be required to achieve Euro III emission standards beginning April 1, 2005, and Euro IV emission standards beginning April 1, 2010.
- **The Air (Prevention and Control of Pollution) Act of India was passed in 1981** and revised in 1987 to include noise as an air pollutant. Noise is an unwelcome high level of sound. High sound levels of 150 dB or more produced by takeoff, a jet airliner, or a rocket may damage ear drums, permanently affecting hearing capacity.
- Noise also promotes insomnia, elevated heart rate, and changed breathing patterns, all of which significantly stress individuals.
- Noise reduction in industries can be achieved by the use of sound-absorbing materials or through muffled noise.

### Brush Up Your Understanding

- Q1. What harm can particulate size 2.5 micrometers cause to humans?
- (a) Irritation (b) Inflammation of lungs  
(c) Damage to lungs (d) All of the above
- S1. (d)

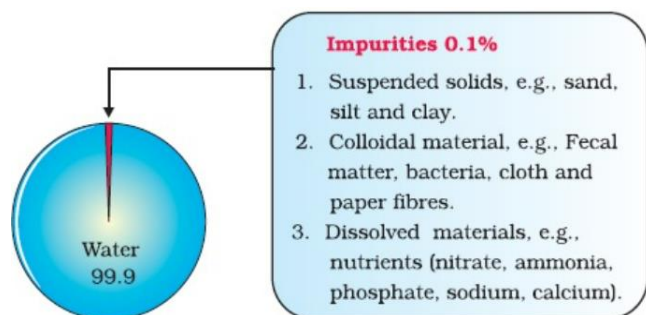
**Q2.** Which of the following metals are found in catalytic converters?

- (a) Palladium (b) Platinum  
(c) Both (a) and (b) (d) None of the above

**S2.** (c)

**Water Pollution and its control:** Humans and other creatures rely on water sources for survival. Ponds, lakes, streams, rivers, estuaries, and seas are becoming contaminated in many regions of the world as a result of garbage dumping and other anthropogenic acts. To conserve water resources, the Indian government enacted the Water (Prevention and Control of Pollution) Act in 1974.

**Domestic Sewage and Industrial Effluents:** Domestic sewage is created by sewage from the home and workplace. Domestic sewage is unsafe for human consumption if it contains even 0.1 percent contaminants. Solid trash is generally easy to remove, but dissolved salts such as nitrates, phosphates, and other nutrients, as well as hazardous metal ions and organic compounds included in household garbage, are more difficult to remove.



**Composition of Waste water**

Domestic sewage mostly comprises biodegradable organic materials that microorganisms such as bacteria and fungus may easily degrade. They utilise organic waste as fertiliser.

**Biological Oxygen Demand:** The bacteria that digest organic wastes in water bodies require a lot of oxygen, resulting in a significant drop in dissolved oxygen downstream from the site of sewage discharge. Fish and other aquatic species die as a result of this.

The quantity of oxygen used if all of the organic matter in one litre of water were oxidised by bacteria is referred to as BOD. The BOD test determines the rate of oxygen consumption by microorganisms in a water sample. BOD is an indirect measure of the organic matter in water. **The higher the BOD of waste water, the more polluting it is.**

### Brush Up Your Understanding

**Q1.** Presence of large amounts of nutrients in waters also causes excessive growth of.

- (a) Bacteria (b) Fungi  
(c) Algae (d) All of the above

**S1.** (c)

**Q2.** Disposal of water containing sewage in water bodies can cause.

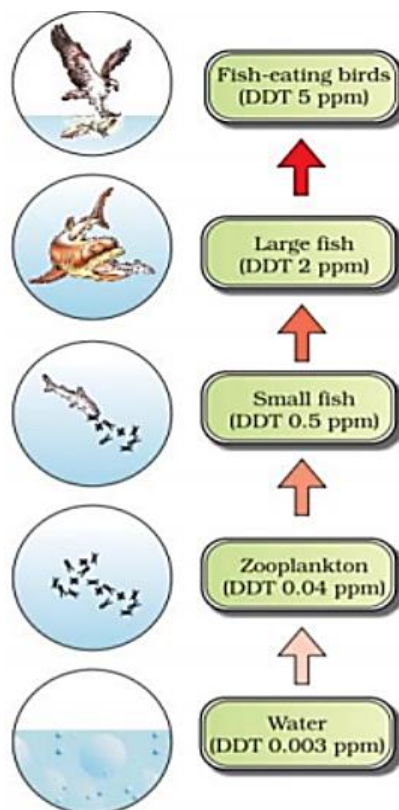
- (a) Dysentery (b) Typhoid  
(c) Cholera (d) All of the above

**S2.** (d)

**Algal Bloom:** The presence of a high concentration of organic nutrients in water produces excessive development of planktonic or free floating algae, known as an algal bloom. The colour of bodies of water changes as a result of this. This may result in water quality degradation and fish death.

The most troublesome aquatic weed in the planet is water hyacinth (*Eichhornia crassipes*). They were imported into India for their lovely blossoms, but their overwhelming growth has created disaster by clogging our water sources. This plant is also known as the '**Terror of Bengal.**'

**Biomagnification or Biological Magnification:** Toxic wastes found in industrial waste and agricultural water including pesticides and weedicides enter the food chain of aquatic creatures. **Biological magnification refers to the rise in toxicant concentration at each succeeding trophic level.** DDT and mercury are the most prevalent toxicants that accumulate at successive trophic levels. DDT in high concentrations disrupts calcium metabolism in birds, causing eggshell thinning and premature breakage, eventually leading to decrease in bird population.



**BIOMAGNIFICATION OF DDT IN AN AQUATIC FOOD CHAIN**



**Eutrophication:** A lake's natural ageing is caused by biological enrichment of its water.

Because of the addition of nutrients such as nitrogen and phosphorus, which support the growth of aquatic organisms, the accumulation of organic residues over time leads to shallowing of lake. Over time, silt and organic detritus accumulate at the lake's bottom, encouraging the growth of marsh plants in the shallows and filling in the original lake basin. Eventually, enormous quantities of floating plants develop and eventually transform into land.

Pollutants from human activities, such as wastewater from factories and residences, dramatically accelerate lake ageing.

**This is known as Cultural or Accelerated Eutrophication.**

The main pollutants are nitrates and phosphates, which function as plant fertilisers. They promote the growth of algae, resulting in ugly scum and unpleasant smells, as well as reducing the dissolved oxygen in water, which is essential for other aquatic life.

### Integrated Waste Management

By integrating artificial and natural processes, wastewater, including sewage, may be treated in an integrated manner. **The community of Arcata, located on California's northern coast, is an example of such an endeavour. In collaboration with Humboldt State University, local people developed an integrated waste water treatment procedure inside a natural system.** The cleaning process is divided into two steps -

- (a) The standard sedimentation, filtration, and chlorine treatments are provided.
- (b) To tackle pollutants such as dissolved heavy metals, biologists created a network of six interconnected wetlands spread across 60 hectares of marshland, where plants, algae, fungus, and bacteria were planted to neutralise, absorb, and assimilate the contaminants.

The water is organically cleansed as it passes through the marshes. The marshes also serve as a heaven for a wide variety of fish, animals, and birds that have settled there. **'Friends of the Arcata Marsh (FOAM)' is a citizen group in charge of the project's safety.** Ecological sanitation is a long-term waste management strategy that use dry composting toilets. This is a practical, sanitary, efficient, and cost-effective method of disposing of human waste. The crucial component is that human excreta may be turned into natural fertiliser using this composting procedure.

**Many sections of Kerala and Sri Lanka have operational 'EcoSan' toilets.**

## Brush Up Your Understanding

- Q1.** Natural ageing of lake is known as.
- (a) Biomagnification
  - (b) Eutrophication
  - (c) Both (a) and (b)
  - (d) None of the above

**S1. (b)**

- Q2.** The harmful effects of thermal waste waters is.
- (a) reduces the number of organisms sensitive to high temperature
  - (b) enhance the growth of plants and fish in extremely cold areas
  - (c) Causes damage to the indigenous flora and fauna.
  - (d) All of the above

**S2. (d)**

**Solid Waste:** Municipal solid wastes are trash collected and disposed of by the municipality from homes, offices, businesses, schools, and hospitals, to other places. It is made up of paper, food waste, plastics, glass, metals, rubber, leather, and textiles, and other things. Burning minimises the volume of garbage, however rubbish is seldom completely burned, and open landfills sometimes serve as breeding grounds for rats and flies. Sanitary landfills were utilised to replace open burning dumps, in which garbage is thrown in a depression or trench after compaction and covered with earth every day. There is a risk of chemical seepage from these wastes damaging subsurface water supplies.

**Municipal Waste:** Municipal solid wastes are trash collected and disposed of from homes, offices, retailers, schools, and hospitals, among other places.

The biodegradable materials can be placed in deep trenches in the earth and let to decompose naturally.

Kabadiwallahs and rag-pickers perform an excellent job of separating materials for recycling various types of garbage.

**Polyblend:** Polyblend is the most effective solution to fight the ever-increasing problem of plastic waste accumulation. It's a thin powder of recycled modified plastic combined with bitumen. When polyblend and bitumen were used to lay roads, they improved the bitumen's water repellent characteristics and increased road longevity by a factor of three.

Hospitals produce hazardous wastes containing disinfectants and other chemicals, as well as harmful microorganisms. Such wastes need meticulous treatment and disposal. Hospital garbage is disposed of using **incinerators**.

**Electronic Waste:** Electronic wastes are unrepairable computers and other electronic devices (e-wastes). E-waste is either buried or burnt. Over half of the developed world's e-waste is sent to developing nations, mostly China, India, and Pakistan, where metals such as copper, iron, silicon, nickel, and gold are recovered during the recycling process. **Recycling is the sole answer for e-waste treatment as long as it is done in an environmentally sustainable manner.**

**Agro-chemicals and their effects:** The use of inorganic fertilisers and insecticides for agricultural production has expanded dramatically as a result of the green revolution. Pesticides and insecticides are hazardous to non-target species that are key components of the soil ecosystem. They

are biomagnified in the terrestrial environment and produce eutrophication in aquatic habitats.

**Organic Farming:** Integrated organic farming is a cyclical, zero-waste approach in which waste products from one phase are recycled as nutrients for other processes to maximise resource use and boost production efficiency. It combines beekeeping, dairy management, water harvesting, composting, and agriculture in a chain of operations that support one another and allow for an exceptionally cost-effective and long-term business. In this procedure, no chemical fertiliser is utilised.

**Radio-active waste:** Nuclear energy has two big issues:

- (a) Unintentional leaks
- (b) Radioactive waste disposal that is safe

The radiation emitted by nuclear waste is particularly harmful to living beings because it induces rapid mutations. It has been advised that nuclear wastes be stored in appropriately insulated containers and buried 500m below the earth's surface in rock.

### Brush Up Your Understanding

**Q1.** Blends of Polyblend and bitumen, when used to lay roads, enhanced the bitumen's water repellant properties, and helped to increase road life by a factor of.

- (a) 1
- (b) 2
- (c) 3
- (d) 4

**S1. (c)**

**Q2.** At low doses, radiation from nuclear waste causes.

- (a) Diabetes
- (b) Hypertension
- (c) Cancer
- (d) All of the above

**S2. (c)**

### Greenhouse effect and Global warming

The greenhouse effect is a naturally occurring phenomenon that is responsible for heating of Earth's surface and atmosphere due to increase in concentration of carbon dioxide and methane gas. Clouds and gases reflect about one-fourth of the incoming solar radiation and absorb some of it but almost half of incoming solar radiation falls on Earth's surface heating it, while a small proportion is reflected back. The surface of earth re-emits heat in the form of infrared radiation but part of this is not reflected back due to greenhouse gases that leads to heating of earth atmosphere.

**Global warming is caused due to greenhouse effect.**

Scientists think that the rising temperature is causing negative changes in the ecosystem and causing unusual meteorological fluctuations (e.g., the El Nino effect), which is causing accelerated melting of the polar ice caps.

**We can control global warming by:**

- (a) Reduced use of fossil fuels
- (b) Improving energy usage

- (c) Reducing deforestation
- (d) Planting more trees
- (e) Controlling population growth

### Ozone depletion in the stratosphere

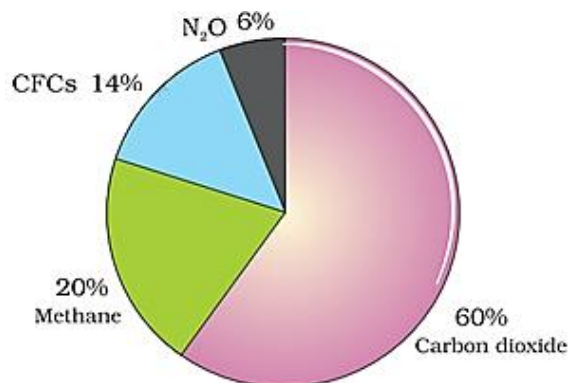
Ozone in the high atmosphere, known as the stratosphere, works as a barrier, absorbing UV energy from the sun. UV rays are extremely harmful to biological creatures.

The ozone-layer thickness in a column of air from the ground to the top of the atmosphere is measured in **Dobson units (DU)**. The ozone layer absorbs dangerous UV radiation. It causes skin ageing, skin cell damage, and many forms of skin cancer. The cornea of the human eye absorbs UV-B radiation, and a high dosage of UV-B induces corneal inflammation, which is known as snowblindness, cataract, and so on. Such exposure has the potential to irreversibly damage the cornea.

The ozone layer is depleted by chlorofluorocarbons. The ozone hole is the area in the atmosphere with the lowest concentration of ozone.

**The following contribute to ozone depletion:**

- (a) UV rays degrade CFCs and liberate atomic chlorine (Cl)
- (b) UV-rays also break down ozone into oxygen.
- (c) Because chlorine atoms capture oxygen atoms, ozone is not produced from oxygen again. This causes ozone depletion in the stratosphere.



**The concentration of various greenhouse gases to total global warming**

### Brush Up Your Understanding

**Q1.** Greenhouse gases absorb.

- (a) Infrared radiations
- (b) Long wave radiations
- (c) Ultraviolet radiations
- (d) Both (a) and (b)

**S1. (d)**

**Q2.** High doses UV-B radiation causes.

- (a) Inflammation of the cornea
- (b) Cataract
- (c) Snow blindness
- (d) All of the above

## S2. (d)

**Deforestation:** It refers to the change of wooded regions to non-forested areas as a result of human activity such as slash and burn. Farmers cut down trees and burn the plant remnants in agriculture, commonly known as **Jhum farming**. The ash is utilised as a fertiliser, and the land is subsequently used for farming or cattle grazing; fertiliser usage, and tree cutting for industries and residential use. The following are the primary consequences of deforestation:

- (a) Carbon dioxide concentration has increased.
- (b) Biodiversity loss
- (c) Hydrological cycles have been disrupted.
- (d) Erosion of soil
- (e) Desertification.

**Reforestation:** The process of restoring a forest that was cut down at some point in the past.

**The Government of India has just established the Amrita Devi Bishnoi Wildlife Protection Award to recognise individuals or groups from rural regions who have demonstrated outstanding courage and devotion to wildlife conservation.**

**Chipko Movement:** In 1974, native ladies in the Garhwal Himalayas demonstrated amazing bravery by clutching trees to defend them from the axes of contractors. The Chipko movement has been embraced by people all around the world.

Recognizing the importance of local community engagement, the Government of India created the idea of Joint Forest Management (JFM) in the 1980s in order to work closely with local people to conserve and manage forests.

## SUMMARY

Pollution is any undesirable change in physical, chemical or biological characteristics of air, land, water or soil. Agents that bring about such an undesirable change are called as pollutants.

Air pollution is harmful for both plants and animals.

Particulate and gaseous air pollutants are released from thermal power plants, smelters and other industries. These pollutants are very harmful, they should be filtered out before they are released into the environment. The most widely used method for the removal of the particulate matter is electrostatic precipitator.

With the increase in pollution in water, the government has passed Water (Prevention and Control of Pollution) Act, 1974 to safeguard our water resources.

Biological oxygen demand can be used to measure amount of biodegradable organic matter in sewage water.

Biomagnification refers to the increase in concentration of toxicant at successive trophic levels.

Eutrophication is defined as ageing of the lakes due to nutrient enrichment.

Waste from the offices, schools, stores, hospitals constitute the municipal solid wastes. Waste is categorized as biodegradable, non-biodegradable and recyclable. Biodegradable wastes can be buried in soil and allowed to decompose into harmless by-products. Non-biodegradable wastes cannot be naturally broken down. Their use therefore must be reduced. Recyclable wastes are substances that can be used to retrieve at least few useful substances.

Integrated organic farming is an eco-friendly and cyclical procedure that generates zero-waste. In this waste, products from one process are cycled in as nutrients for other processes.

Radiations emitted from the nuclear waste is extremely harmful. It affects both plants and animals as it causes mutations.

Sun rays reaches the earth and warms the earth atmosphere. The earth atmosphere traps the sun rays which increases the temperature of the earth. This is known as greenhouse effect.

Soil erosion takes place due to human activities like over-grazing, over-cultivation, deforestation and poor irrigation practices.

The complete removal of forest and tree cover due to reckless felling of trees is called deforestation. It is the result of human activities.

The process of restoring forest cover to a place where forests once existed but were cleared off is called reforestation.

## MIND MAP

Particulate size 2.5 micrometers or less in diameter (PM 2.5) are responsible for causing the greatest harm to human health. These fine particulates can be inhaled deep into the lungs and can cause breathing and respiratory symptoms, irritation, inflammations and damage to the lungs and premature deaths. They can be removed by electrostatic precipitator.

In metro cities, catalytic converters, having expensive metals namely platinum-palladium and rhodium as catalysts, are fitted into automobiles for reducing emission of poisonous gases.

The advantage of CNG is that it burns efficiently in the automobiles and very little of it is left unburnt. Moreover, CNG is cheaper than petrol or diesel, cannot be siphoned off by thieves and adulterated like petrol or diesel.

Presence of large amounts of nutrients in waters also causes excessive growth of planktonic (free-floating) algae, called an algal bloom.

Carbon-dioxide, methane, nitrous acid, water vapor acts as greenhouse gases.

Ozone is present in the stratosphere which protects the atmosphere from the harmful ultraviolet radiations. Ultraviolet radiations are very harmful for living organisms. They are harmful for DNA and proteins present in the living organisms. Dobson unit is used to measure the thickness of the ozone layer in a column of air from the ground to the top of the atmosphere.

The Government of India instituted an award called as "Amrita Devi Bishnoi Wildlife Protection Award". This is awarded to individuals or communities that show exemplary courage and dedication in protecting wildlife.

Chipko Movement is a movement in which local women of Garhwal region in 1974 protected the trees against felling by hugging them.

Joint Forest Movement was an initiative by Government of India in 1980s. It aims towards the involvement of local communities and people in sustainable development of forests.

## MULTIPLE CHOICE QUESTIONS

- Q1.** The extent to which any pollution affects an organism depends on.  
 (a) Concentration of the pollutants  
 (b) Duration of exposure  
 (c) The organism  
 (d) All of the above
- Q2.** Which of the following measures can be adopted to reduce the emission of poisonous gases from automobiles in cities?  
 (a) Use of lead-free petrol/diesel  
 (b) Use of catalytic converters  
 (c) Use of electric vehicles if possible  
 (d) All of the above
- Q3.** Which of the following metals are used in catalytic converters fitted in automobiles to reduce the emission of poisonous gases?  
 (a) Iron (b) Platinum  
 (c) Palladium (d) Both (b) and (c)
- Q4.** When was the Air Prevention and Control of Pollution act came into force in India?  
 (a) 1980 (b) 1981  
 (c) 1982 (d) 1983
- Q5.** What are the harmful effects of noise?  
 (a) It causes sleeplessness  
 (b) It causes increase heartbeat  
 (c) It alters breathing patterns  
 (d) All of the above
- Q6.** What are the advantages of CNG?  
 (a) It burns efficiently  
 (b) Very little is left unburnt  
 (c) It is cheaper than petrol or diesel  
 (d) All of the above
- Q7.** What percentage of impurities make domestic sewage unfit for human use?  
 (a) 0.05% (b) 0.1%  
 (c) 0.2% (d) 0.3%
- Q8.** Which of the following is the most difficult to be removed from sewage water?  
 (a) Dissolved salts  
 (b) Toxic metal ions  
 (c) Organic compounds  
 (d) All of the above
- Q9.** What are planktons?  
 (a) They are free-floating bacteria  
 (b) They are free-floating algae  
 (c) They are free-floating fungus  
 (d) None of the above
- Q10.** Which of the following is also called as 'terror of Bengal'?  
 (a) *Gajar ghas* (b) Water hyacinth  
 (c) China rose (d) All of the above
- Q11.** Discharge of sewage from hospitals contains many undesirable pathogenic microorganisms, its disposal into the water without proper treatment may cause the outbreak of which of the following serious diseases?  
 (a) Typhoid  
 (b) Dysentery  
 (c) Cholera  
 (d) All of the above
- Q12.** Which of the following chemical underwent bio-magnification?  
 (a) Palladium (b) Mercury  
 (c) DDT (d) Both (b) and (c)
- Q13.** What is eutrophication?  
 (a) it is the natural aging of a river by nutrient enrichment of its water  
 (b) it is the natural aging of an ocean by nutrient enrichment of its water  
 (c) it is the natural aging of a lake by nutrient enrichment of its water  
 (d) it is the natural aging of a stream by nutrient enrichment of its water
- Q14.** What are the harmful effects of nitrates and phosphates dissolved in water?  
 (a) They overstimulate the growth of algae  
 (b) They cause the development of scum  
 (c) Development of scum causes unpleasant odors  
 (d) All of the above
- Q15.** What are the harmful effects of thermal wastewaters?  
 (a) Eliminates the number of organisms sensitive to high temperature.  
 (b) Enhance the growth of plants in extremely cold areas  
 (c) Damage to indigenous flora and fauna  
 (d) All of the above
- Q16.** FOAM stands for.  
 (a) Foul of the Arcata Marsh  
 (b) Frame of the Arcata Marsh  
 (c) Friends of the Arcata Marsh  
 (d) Fame of the Arcata Marsh
- Q17.** What are EcoSan?  
 (a) They are toilets in Kerala and Srilanka  
 (b) They are toilets in Tamilnadu and Srilanka  
 (c) They are toilets in Kerala and Arunachal Pradesh  
 (d) They are toilets in Kerala and Orissa
- Q18.** All the waste generated has been categorised into.  
 (a) Bio-degradable  
 (b) Recyclable  
 (c) Non-biodegradable  
 (d) All of the above



**Q19.** Which of the following is/are greenhouse gases?

- (a) CO<sub>2</sub>
- (b) CH<sub>4</sub>
- (c) Both (a) and (b)
- (d) None of the above

**Q20.** What are the harmful effects of Global Warming?

- (a) El Nino effect
- (b) Increased melting of polar ice caps
- (c) Rise in sea levels
- (d) All of the above

**Q21.** How can we control Global Warming?

- (a) Reducing the use of fossil fuels
- (b) Improving energy use
- (c) Reducing deforestation
- (d) All of the above

**Q22.** Pollution is any undesirable change in physical, chemical or biological characteristics of.

- (a) Air
- (b) Land
- (c) Water and soil
- (d) All of the above

**Q23.** In which of the following year, the Government of India pass the Environment Protection Act so as to protect and improve the quality of our environment?

- (a) 1980
- (b) 1982
- (c) 1986
- (d) 1990

**Q24.** What are the harmful effects of air pollution?

- (a) Causes injury to all living organisms
- (b) Reduce growth and yield of crops
- (c) Cause premature death of plants
- (d) All of the above

**Q25.** How much particulate matter present in the exhaust released from a thermal power plant can be removed with the help of an electrostatic precipitator?

- (a) 90%
- (b) 95%
- (c) 99%
- (d) 100%

**Q26.** According to the Central Pollution Control Board(CPCB) which of the following particular size particulate matter is responsible for causing the greatest harm to human health?

- (a) 1.5 micrometre
- (b) 2.5 micrometre
- (c) 3.5 micrometre
- (d) 4.5 micrometre

**Q27.** What harm does particulate matter of size 2.5 micrometres cause to the respiratory system when they are inhaled with air?

- (a) Cause breathing and respiratory problem
- (b) Irritation and inflammation to the lungs
- (c) Premature death
- (d) All of the above

**Q28.** Which of the following is the correct full form of CNG?

- (a) Combined Natural Gas
- (b) Colourful Natural Gas
- (c) Coal Natural Gas
- (d) Compressed Natural Gas

**Q29.** In which of the following year the Government of India passed the Water Prevention and Control of Pollution act to safeguard our water resources?

- (a) 1974
- (b) 1984
- (c) 1994
- (d) 2004

**Q30.** The presence of large amounts of nutrients in water causes excessive growth of which of the following?

- (a) Fungal bloom
- (b) Algal bloom
- (c) Bacterial bloom
- (d) All of the above

**Q31.** What is bio-magnification?

- (a) it refers to an increase in the concentration of the toxic substances at successive trophic level
- (b) it refers to an increase in the concentration of the toxic substances in a food chain
- (c) it refers to an increase in the concentration of the toxic substances in a food web
- (d) it refers to an increase in the concentration of the toxic substances inside a house

**Q32.** Which of the following is the lower atmosphere?

- (a) Stratosphere
- (b) Troposphere
- (c) Ionosphere
- (d) None of the above

**Q33.** Which of the following is a site of formation of good ozone?

- (a) Ionosphere
- (b) Troposphere
- (c) Stratosphere
- (d) All of the above

**Q34.** The thickness of ozone in a column of air from the ground to the top of the atmosphere is measured in which of the following units?

- (a) dB
- (b) ppm
- (c) DU
- (d) All of the above

**Q35.** Which of the following has disrupted the balance between production and degradation of ozone?

- (a) Oxygen
- (b) Chlorofluorocarbons
- (c) Hydrogen
- (d) All of the above

**Q36.** What are the harmful effects of UV-B radiations?

- (a) Aging of skin
- (b) Damage to DNA and mutation
- (c) Causes skin cancer
- (d) All of the above

**Q37.** What is snow-blindness?

- (a) Inflammation of the cornea of the eye due to UV-B
- (b) Inflammation of the retina of the eye due to UV-B
- (c) Inflammation of the pupil of the eye due to UV-B
- (d) Inflammation of the iris of the eye due to UV-B

**Q38.** The Montreal protocol, to control the emission of ozone depleting substances was signed in the year.

- (a) 1985
- (b) 1986
- (c) 1987
- (d) 1988

- Q39.** Which of the following can lead to soil erosion?  
 (a) Over-cultivation (b) Unrestricted grazing  
 (c) Deforestation (d) All of the above
- Q40.** Which of the following are the causes of deforestation?  
 (a) Increase in population  
 (b) Jhum cultivation  
 (c) Demand of plant based products  
 (d) All of the above
- Q41.** What are the after effects of deforestation?  
 (a) Enhanced CO<sub>2</sub> concentration  
 (b) Loss of biodiversity  
 (c) Disturbed hydrological cycle  
 (d) All of the above
- Q42.** The Chipko movement took place in.  
 (a) Uttarakhand (b) Himalayas  
 (c) Jammu and Kashmir (d) None of the above

### ASSERTION AND REASON

**Direction:** in the following questions, a statement of assertion (A) is followed by a statement of reason (R). Choose the correct option among a, b, c and d.

- Q1.** **Assertion (A):** Nitrate and phosphate discharge in a water body causes eutrophication.  
**Reason (R):** This increases the inorganic content in water body and hence the growth of algal blooms.  
 (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)  
 (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A)  
 (c) Assertion (A) is true but reason(R) is false  
 (d) Assertion (A) is false but reason(R) is true
- Q2.** **Assertion (A):** Biomagnification of DDT can enhance the decline in bird population.  
**Reason (R):** DDT causes thickening of egg shell and their delayed breaking by disturbing their calcium metabolism.  
 (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)

- (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A)  
 (c) Assertion (A) is true but reason(R) is false  
 (d) Assertion (A) is false but reason(R) is true

- Q3.** **Assertion (A):** Ecological sanitation is sustainable system for handling human excreta.  
**Reason (R):** It is a practical and hygienic method of using dry composting toilets.  
 (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)  
 (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A)  
 (c) Assertion (A) is true but reason(R) is false  
 (d) Assertion (A) is false but reason(R) is true
- Q4.** **Assertion (A):** Intensive agriculture leads to negative soil pollution.  
**Reason (R):** It increases useful mineral content in top layer of soil.  
 (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)  
 (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A)  
 (c) Assertion (A) is true but reason(R) is false  
 (d) Assertion (A) is false but reason(R) is true

### TRUE AND FALSE

- Q1.** Good ozone is found in the upper part of the atmosphere called the stratosphere.
- Q2.** E-wastes are wastes from homes, offices, stores, schools, hospitals, etc., that are collected and disposed by the municipality.
- Q3.** Presence of large amounts of nutrients in waters also causes excessive growth of planktonic (free-floating) algae, called an algal bloom.
- Q4.** Hospitals generate hazardous wastes and can be disposed of by use of incinerators.

## PRACTICE QUESTIONS (MCQ)

- Q1.** Which of the following is an incorrect match?  
 (a) Biodegradable pollutant: Domestic sewage  
 (b) Non-degradable pollutant: DDT  
 (c) Secondary pollutant: SO<sub>2</sub>  
 (d) Quantitative pollutant: Nitrogen oxides
- Q2.** The pollutant that induces respiratory distress, inhibits ETS in chloroplast and causes glazing of leaves is.  
 (a) H<sub>2</sub>S (b) PAN  
 (c) CO (d) NO<sub>2</sub>

- Q3.** Acid rain is a rainfall with a pH of.  
 (a) 7 (b) 6.56  
 (c) Less than 5.65 (d) 11
- Q4.** Which of the following device is used to remove over 99% particulate matter in the exhaust from a thermal power plant?  
 (a) Scrubber  
 (b) Electrostatic precipitator  
 (c) Trajectory separator  
 (d) Catalytic convertor

- Q5.** Euro norms and Bharat stages were given in new auto fuel policy for steadily reducing which of the following in petrol and diesel?  
 (a) Sulphur and particulate matter  
 (b) Sulphur and ozone  
 (c) Sulphur and aromatic contents  
 (d) Aromatic contents and  $\text{NO}_x$
- Q6.** Thinning of egg shells is a major effect in many species of predatory birds because of.  
 (a) Natural eutrophication  
 (b) Cultural eutrophication  
 (c) Biological magnification  
 (d) Reduced BOD
- Q7.** Which of the following is a correct option with respect to thermal pollution?  
 (a) Speeds up biodegradation of organic matter  
 (b) Death of temperature sensitive organism  
 (c) It increases rate of metabolism and microbial activity  
 (d) All of the above
- Q8.** Irreparable computers and other electronic goods are called as.  
 (a) Radioactive waste (b) Chemical weed  
 (c) e-waste (d) Mist
- Q9.** Select an incorrect match.  
 (a) Incinerator: aerobic burning at 900-1200 degree  
 (b) Eutrophication: unnatural ageing of a lake  
 (c) Sanitary landfills: solid waste  
 (d) Polyblend: recycled modified plastic
- Q10.** During the past century, the temperature of the earth has increased by.  
 (a) 15 degree (b) 33 degree  
 (c) 0.6 degree (d) 1.6 degree
- Q11.** What percentage of forest cover for the plains has been recommended by National Forest Policy (1988) of India?  
 (a) 33% (b) 67% (c) 30% (d) 19.4%
- Q12.** Which of the following pair does not represent greenhouse gases?  
 (a)  $\text{CO}_2$  and  $\text{CH}_4$  (b)  $\text{CH}_4$  and  $\text{N}_2\text{O}$   
 (c)  $\text{O}_3$  and  $\text{SO}_2$  (d)  $\text{N}_2\text{O}$  and CFCs
- Q13.** Which of the following international treaty was signed, recognising the deleterious affects of ozone depletion?  
 (a) Montreal treaty, Canada  
 (b) Kyoto Protocol, Brazil  
 (c) Earth summit, Montrcal  
 (d) World summit, South Africa
- Q14.** What percentage of particulate matter can be removed by an electrostatic precipitator?  
 (a) 97% (b) 98%  
 (c) 99% (d) 100%
- Q15.** An incorrect statement about the catalytic converter among the following is.  
 (a) Platinum-palladium and rhodium are catalyst  
 (b) Lead in petrol activates the catalyst  
 (c) Reduced the emission of poisonous gases  
 (d) CO and  $\text{NO}_x$  changed to  $\text{CO}_2$  and  $\text{N}_2$
- Q16.** In the 1990s, what was the rank of Delhi among the 41 most polluted cities of the world?  
 (a) First (b) Second  
 (c) Third (d) Fourth
- Q17.** The parallel steps taken Delhi for reducing vehicular pollution?  
 (a) Phasing out of old vehicles  
 (b) Use of unleaded petrol  
 (c) Buses were converted to run on CNG  
 (d) All of the above
- Q18.** Most hazardous pollutant of automobiles exhaust is.  
 (a) Mercury (b) Copper  
 (c) Arsenic (d) Lead
- Q19.** The raw material for making polyblend is.  
 (a) Bitumen  
 (b) Plastic film waste  
 (c) Recycled plastic  
 (d) Any biodegradable waste
- Q20.** Hospital waste are.  
 (a) Hazadrous and disposed by incinerator  
 (b) Non-hazadrous and disposed by incinerator  
 (c) Hazadrous and disposed in water  
 (d) Non-hazadrous and disposed in the water
- Q21.** Government of India has introduced a concept to work closely with local communities for protection and management of forests called.  
 (a) Chipko movement  
 (b) Jhum cultivation  
 (c) Joint Forest management  
 (d) Appiko movement
- Q22.** Chipko movement is related to conservation of forests in.  
 (a) Garhwal Himalaya (b) South India  
 (c) Rajasthan (d) Gujarat
- Q23.** Jhum cultivation leads to.  
 (a) Afforestation (b) Deforestation  
 (c) Soil pollution (d) Conservation of forest
- Q24.** Over-cultivation and un-restricted grazing are examples of.  
 (a) Improper resource utilisation  
 (b) Deforestation  
 (c) Greenhouse effect  
 (d) Jhum cultivation
- Q25.** Eutrophication includes all of the following except.  
 (a) Heavy growth of BGA  
 (b) Decreased dissolved oxygen  
 (c) Death of submerged organism  
 (d) Increased dissolved oxygen

- Q26.** Release of phosphates and nitrates in water bodies leads to.  
 (a) Nutrient enrichment  
 (b) Reduced algal growth  
 (c) Increased algal growth  
 (d) Increased growth of decomposers
- Q27.** Prolonged water logging in an agricultural field is likely to create the problem of.  
 (a) Poor aeration and low salinity  
 (b) Poor aeration and high salinity  
 (c) Poor aeration and high acidity  
 (d) Metal toxicity and proper aeration
- Q28.** Eutrophication of water bodies leading to killing of fishes is mainly due to non-availability of.  
 (a) Oxygen (b) Food  
 (c) Light (d) Essential minerals
- Q29.** Global warming can be controlled by.  
 (a) Reduced reforestation, increasing the use of fossil fuel  
 (b) Increased deforestation, slowing down the growth of human population  
 (c) Increased deforestation, reducing the efficiency of energy usage  
 (d) Reducing deforestation, cutting down the use of fossil fuel
- Q30.** The air prevention and control of pollution act came into force in the year.  
 (a) 1981 (b) 1985  
 (c) 1990 (d) 1975

### ASSERTION AND REASON

**Direction:** in the following questions, a statement of assertion (A) is followed by a statement of reason (R). Choose the correct option among a, b, c and d.

- Q1. Assertion (A):** Pollution is any undesirable change in physical, chemical or biological characteristics of air, land, water or soil.  
**Reason (R):** In order to control environmental pollution, the Government of India has passed the Environment (Protection) Act, 1986 to protect and improve the quality of our environment (air, water and soil).  
 (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)

- (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A)  
 (c) Assertion (A) is true but reason(R) is false  
 (d) Assertion (A) is false but reason(R) is true

- Q2. Assertion (A):** Smokestacks of thermal power plants, smelters and other industries release particulate and gaseous air pollutants together with harmless gases, such as nitrogen, oxygen, etc  
**Reason (R):** Human beings have been abusing the water-bodies around the world by disposing into them all kinds of waste.  
 (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)  
 (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A)  
 (c) Assertion (A) is true but reason(R) is false  
 (d) Assertion (A) is false but reason(R) is true
- Q3. Assertion (A):** With its very large population of vehicular traffic, Delhi leads the country in its levels of air-pollution – it has more cars than the states of Gujarat and West Bengal put together.  
**Reason (R):** All the buses of Delhi were converted to run on CNG by the end of 2002.  
 (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)  
 (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A)  
 (c) Assertion (A) is true but reason(R) is false  
 (d) Assertion (A) is false but reason(R) is true
- Q4. Assertion (A):** Biomagnification refers to increase in concentration of the toxicant at successive trophic levels.  
**Reason (R):** This happens because a toxic substance accumulated by an organism gets metabolised and excreted, and is thus passed on to the next higher trophic level.  
 (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)  
 (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A)  
 (c) Assertion (A) is true but reason(R) is false  
 (d) Assertion (A) is false but reason(R) is true



## SOLUTIONS MULTIPLE CHOICE

- |  |   |
|--|---|
| <p><b>S1. (d)</b> air pollutants deleteriously affect the respiratory system of humans and animals, not only this it also affects plants. The concentration of pollutants, the duration of exposure decides what type of effect they will have on the organisms.</p> <p><b>S2. (d)</b> automobiles are a major cause of atmospheric pollution in metro cities, adopting the above-mentioned measures can reduce the emission of poisonous gases from automobiles.</p> <p><b>S3. (d)</b> as the exhaust passes to the catalytic converter, unburnt hydrocarbons are converted into carbon dioxide and water and carbon monoxide and nitric oxide are changed to carbon dioxide and nitrogen gas, this is how pollutants are avoided from being exploded into the atmosphere from automobiles.</p> <p><b>S4. (b)</b> the Air Prevention and Control of Pollution act came into force in 1981 but it was also amended in 1987 to include noise as an air pollutant.</p> <p><b>S5. (d)</b> Besides the above harmful effects, noise also causes stress, sometimes it may also cause loss of hearing ability.</p> <p><b>S6. (d)</b> CNG was introduced in New Delhi as a measure to reduce uncontrolled air pollution.</p> <p><b>S7. (b)</b> the point 0.1% impurities present in water that makes it unfit for human use contains suspended solids, colloidal matter and dissolved materials.</p> <p><b>S8. (d)</b> sewage due to the presence of stringent pollutants can be treated by decomposers like bacteria and other microorganisms. They can utilise some of its components and thus help in its treatment.</p> <p><b>S9. (b)</b> presence of large amounts of nutrients in water causes excessive growth of planktonic algae that is also called algal blooms that causes the deterioration of water quality and fish mortality.</p> <p><b>S10. (b)</b> water hyacinth due to its mauve-colour flowers was introduced in India have cause havoc by its excessive growth in water bodies, the lead to imbalance in the ecosystem dynamics of water bodies.</p> <p><b>S11. (d)</b> dysentery, typhoid, cholera as well as jaundice are all water-borne diseases, once their outbreak occurs their control becomes very difficult.</p> <p><b>S12. (d)</b> the concentration of DDT increases at successive trophic levels and ultimately reached 25 ppm at the highest trophic level in fish eating birds</p> | <p>through bio-magnification, high concentrations of DDT disturbed calcium metabolism in birds that automatically caused thinning of cells and their premature breaking.</p> <p><b>S13. (c)</b> During the past century, lakes in many parts of the earth have been severely eutrophied by sewage and agricultural wastes. The prime contaminants are nitrates and phosphates with act as plant nutrients.</p> <p><b>S14. (d)</b> growth of algae, scum along with other pollutants flowing into a lake depletes the oxygen content that is vital for aquatic life. At the same time, other pollutants flowing in a lake may poison the populations of fish whose decomposing remains for deplete the water's dissolved oxygen content, in such fashion a lake dies.</p> <p><b>S15. (d)</b> heated thermal wastewater flowing out of electricity generating units also constitutes another important category of pollutants, they also damage aquatic life.</p> <p><b>S16. (c)</b> FOAM is a wonderful project that was started by the collaboration between the town Arcata and biologists from the Humboldt State University. The project has created an integrated waste water treatment process within a natural system.</p> <p><b>S17. (a)</b> EcoSan toilet is a closed system that does not need water so is an alternate to leach pit toilet in places where water is scarce or where the water table is high and the risk of groundwater contamination is increased.</p> <p><b>S18. (d)</b> categorisation of waste leads to its easy disposal, the recyclable material is recycled and biodegradable materials are put into the pits in the ground and then left for natural breakdown.</p> <p><b>S19. (c)</b> The greenhouse gases heat the surface of the earth. The increase of greenhouse gases has led to considerable heating of Earth leading to global warming.</p> <p><b>S20. (d)</b> Global warming is causing the increase of sea levels that may cause the coastal areas to submerge in water.</p> <p><b>S21. (d)</b> International initiatives are also being taken to reduce the emission of greenhouse gases into the atmosphere to prevent global warming.</p> <p><b>S22. (d)</b> Agents that bring about any undesirable change in the environment are called pollutants and they cause pollution.</p> |
|--|---|

- S23. (c)** the Act was passed to improve the quality of the environment, air, water and soil
- S24. (d)** air pollution deleteriously effects not only the humans but also the plants. The smokestacks of thermal power plants, metal and other industries release large quantities of particulate and gaseous air pollutants that harm everybody.
- S25. (c)** electrostatic precipitators are helpful in removing the particulate matter from air up till 99%.
- S26. (b)** according to Central Pollution Control Board, particulate size 2.5 micrometres or less in diameter are responsible for causing the greatest harm to human health, these fine particles can be inhaled deep into the lungs and can cause harm to the respiratory system.
- S27. (d)** The particulate matter can cause intense harm to the human respiratory system.
- S28. (d)** compressed natural gas (CNG) is a important alternative for petrol and diesel, it does not cause any pollution, is cheaper than petrol and diesel and does not leave any Residue after burning.
- S29. (a)** due to the continuous pollution of the water bodies, the Government of India passed the Water Prevention and Control of Pollution Act in the year 1974 so as to safeguard the water resources.
- S30. (b)** presence of excess amount of nutrients in the water bodies causes excessive growth of free floating algae, these are called algal blooms.
- S31. (a)** biomagnification happens because a toxic substance gets accumulated by an organism as it cannot be metabolized or excreted and is just passed on to the next higher trophic level.
- S32. (b)** lower atmosphere or the troposphere is the site of formation of bad Ozone that harms plants and animals.
- S33. (c)** good ozone is found in the upper part of the atmosphere that is the stratosphere and it acts as a shield in absorbing the ultraviolet radiation from the Sun.
- S34. (c)** Sound is measured in dB, ppm for salinity etc. and DU (Dobson Unit) is used to measure thickness of ozone.
- S35. (b)** Ozone is continuously formed by the action of UV rays on molecular oxygen and is also degraded into molecular oxygen in the stratosphere, there should be a balance between the production and degradation of ozone but this

has been disrupted due to enhancement of ozone degradation by chlorofluorocarbons.

- S36. (d)** UV radiation of wavelength shorter than UV-B are almost completely absorbed by Earth's atmosphere given that Ozone Layer is intact but UV-B damages the human DNA and other cells of the body.
- S37. (a)** Exposure to high dose of UV-B radiation causes inflammation of the cornea of the eye and cause a condition called snow blindness.
- S38. (c)** The Montreal protocol was an international treaty that was signed in 1987, because of the deleterious effects of the ozone depletion, however it came into effect in the year 1989.
- S39. (d)** the development of the fertile topsoil takes centuries but it can be removed very easily due to human activities like over-cultivation and restricted grazing, deforestation and poor irrigation practices resulting in arid patches of land.
- S40. (d)** Basically, human activities are the common cause of deforestation.
- S41. (d)** Deforestation causes soil erosion and this leads to desertification in extreme cases.
- S42. (b)** The Chipko movement took place in Garhwal, Himalayas, where local women showed bravery in protecting the trees from the axe of contractors by hugging them.

#### ASSERTION AND REASON

- S1. (a)**
- S2. (c)** High concentrations of DDT disturb calcium metabolism in birds, which causes thinning of eggshell and their premature breaking, eventually causing decline in bird population.
- S3. (a)**
- S4. (c)** Intensive agriculture leads to negative soil pollution this decreases useful mineral content in top layer of soil.

#### TRUE AND FALSE

- S1. (True)**
- S2. (False)** Municipal solid wastes are wastes from homes, offices, stores, schools, hospitals, etc., that are collected and disposed by the municipality.
- S3. (True)**
- S4. (True)**

## PRACTICE SOLUTIONS

- S1. (c)** SO<sub>2</sub> is a primary pollutant
- S2. (b)**
- S3. (c)**
- S4. (b)** There are several ways of removing particulate matter; the most widely used of which is the electrostatic precipitator.
- S5. (c)** The Government of India through a new auto fuel policy has laid out a roadmap to cut down vehicular pollution in Indian cities. More stringent norms for fuels means steadily reducing the sulphur and aromatic content in petrol and diesel fuels.
- S6. (c)** High concentrations of DDT disturb calcium metabolism in birds, which causes thinning of eggshell and their premature breaking, eventually causing decline in bird populations.
- S7. (d)** Thermal wastewater eliminates or reduces the number of organisms sensitive to high temperature, and may enhance the growth of plants and fish in extremely cold areas but, only after causing damage to the indigenous flora and fauna.
- S8. (c)** Irreparable computers and other electronic goods are known as electronic wastes (e-wastes). E-wastes are buried in landfills or incinerated.
- S9. (b)** Eutrophication is the natural aging of a lake by nutrient enrichment of its water.
- S10. (c)** During the past century, the temperature of Earth has increased by 0.6 °C, most of it during the last three decades.
- S11. (a)** the National Forest Policy (1988) of India has recommended 33 per cent forest cover for the plains and 67 per cent for the hills.
- S12. (c)** CH<sub>4</sub>, CO<sub>2</sub>, N<sub>2</sub>O and CFCs are green house gases.
- S13. (a)** Recognising the deleterious affects of ozone depletion, an international treaty, known as the Montreal Protocol, was signed at Montreal (Canada).
- S14. (c)** There are several ways of removing particulate matter; the most widely used of which is the electrostatic precipitator, which can remove over 99 per cent particulate matter present in the exhaust from a thermal power plant.
- S15. (b)** Catalytic converters, having expensive metals namely platinum-palladium and rhodium as the catalysts, are fitted into automobiles for reducing emission of poisonous gases.
- S16. (d)** With its very large population of vehicular traffic, Delhi leads the country in its levels of air-pollution – it has more cars than the states of Gujarat and West Bengal put together. In the 1990s, Delhi ranked fourth among the 41 most polluted cities of the world.
- S17. (d)** parallel steps taken in Delhi for reducing vehicular pollution include phasing out of old vehicles, use of unleaded petrol, use of low-sulphur petrol and diesel, use of catalytic converters in vehicles, application of stringent pollution-level norms for vehicles, etc.
- S18. (d)** Lead, cadmium, copper and mercury are common heavy metal pollutants. Lead is the most immobile heavy metal pollutant. Because of its immobility, lead poisoning is localised.
- S19. (b)** Polyblend is any plastic film waste. Polyblend, a fine powder of recycled modified plastic, was developed then by his company. This mixture is mixed with the bitumen that is used to lay roads.

- S20. (a)** Hospitals generate hazardous wastes that contain disinfectants and other harmful chemicals, and also pathogenic micro-organisms. Such wastes also require careful treatment and disposal. The use of incinerators is crucial to disposal of hospital waste.
- S21. (c)** Realising the significance of participation by local communities, the Government of India in 1980s has introduced the concept of Joint Forest Management (JFM) so as to work closely with the local communities for protecting and managing forests.
- S22. (a)** Chipko Movement of Garhwal Himalayas in 1974 in which local women showed enormous bravery in protecting trees from the axe of contractors by hugging them. People all over the world have acclaimed the Chipko movement.
- S23. (b)** Slash and burn agriculture, commonly called as Jhum cultivation in the north-eastern states of India contributes to deforestation
- S24. (a)**
- S25. (d)** Eutrophication is the natural aging of a lake by nutrient enrichment of its water, it leads to overstimulate the growth of algae, causing unsightly scum and unpleasant

odours, and robbing the water of dissolved oxygen vital to other aquatic life. At the same time, other pollutants flowing into a lake may poison whole populations of fish, whose decomposing remains further deplete the water's dissolved oxygen content.

- S26. (c)** With time, streams draining into the lake introduce nutrients such as nitrogen and phosphorus, which encourage the growth of aquatic organisms.

**S27. (b)**

- S28. (a)** it is due to non-availability of oxygen.

**S29. (d)**

**S30. (a)**

#### ASSERTION AND REASON

**S1. (a)**

**S2. (b)**

**S3. (a)**

- S4. (c)** This happens because a toxic substance accumulated by an organism cannot be metabolised or excreted, and is thus passed on to the next higher trophic level.