CHAPTER › 16

Environmental Issues

NEET KEY NOTES

- **Pollution** is undesirable change in physical, chemical and biological characteristics of environmental components (air, land, water and soil). Agents that brought about such an undesirable change are called as **pollutants**.
- Government of India has passed **Environment** (Protection) **Act, 1986** to protect and improve quality of environment (air, water and soil).

Air Pollution

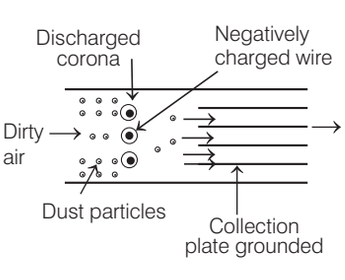
- It occurs due to undesirable changes in the physical, chemical and biological characteristics of air that exerts harmful effects on all living organisms including human beings.
- It results mainly from burning of fossil fuel, automobile exhaust, forest fires and industrial emissions.
- Air pollutants reduce growth and yield of crops and cause premature death of plants. It deteriously affects the respiratory system of humans and animals.
- Harmful effects depend on the concentration of pollutants, duration of exposure and the organism.
- Thermal power plants, smelters and other industries releases particulate and gaseous air pollutants, i.e. carbon dioxide, sulphur and nitrogen oxides, together with harmless gases, such as nitrogen, oxygen, etc.
- Some devices used for controlling air pollution include

1. Electrostatic Precipitator (ESP)

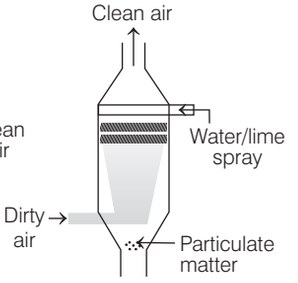
- It can remove over 99% particulate matter present in the exhaust from a thermal power plant. It has electrode wires that are maintained at several thousand volts, which produce a corona that releases electrons.
- These electrons attach to dust particles and give them a net negative charge.
- The collecting plates are grounded and attract these charged particles. The velocity of air between the plates are maintained low enough to allow the dust to fall.

2. Scrubber

- It can remove gases like sulphur dioxide, when the exhaust is passed through a spray of water or lime. Water dissolved gases and lime reacts with sulphur dioxide to form a precipitate of calcium sulphate and sulphide.



Electrostatic Precipitator



Scrubber

- **Drawback** Recently, the dangers of particulate matter (very small particles that cannot be removed by these precipitators) has been found.
- According to **Central Pollution Control Board** (CPCB), Suspended Particulate Matter (SPM) (size 2.5 µm or less) if inhaled can cause breathing problems, irritation, inflammations and even premature deaths.

3. Catalytic Converters

- It reduces the emission of poisonous gases from **automobiles**. Unleaded petrol is used in catalytic converter fitted automobiles, as lead inactivates platinum-palladium and rhodium catalysts used in the device.
- As the exhaust passes through the catalytic converter, it can cause NO_2 to split into N_2 and O_2, oxidation of CO into CO_2 and complete burning of hydrocarbons into CO_2 and H_2O.

Government Steps to Reduce Air Pollution

- **Government steps** include switching of public transport buses, from diesel to Compressed Natural Gas (CNG) and a roadmap to cut down vehicular air pollution through new auto fuel policy.
- According to new auto fuel policy of Government of India, all automobiles must meet the Euro III norms which stipulate that sulphur be controlled at 350 parts per million (ppm) in diesel and 150 ppm in petrol. Aromatic hydrocarbons are to be contained at 42% of the concerned fuel. The goal is to reduce sulphur to 50 ppm in petrol and diesel and bring down the level to 35 per cent.
- Mass Emission Standards (Bharat Stage II which is equivalent to Euro-II norms) are no more applicable in any of the cities of India. Details of the latest Mass Emission Standards in India are provided below

Types of Vehicle	Norms	Cities of Implementation
4 Wheelers	Bharat Stage IV	Throughout the country since April 2017
3 Wheelers	Bharat Stage IV	Throughout the country since 1st April 2017
2 Wheelers	Bharat Stage IV	Throughout the country since April 2017

- Substantial fall in air pollution in Delhi is the result of **Euro norms** enforced by Delhi Government between 1997-2005.

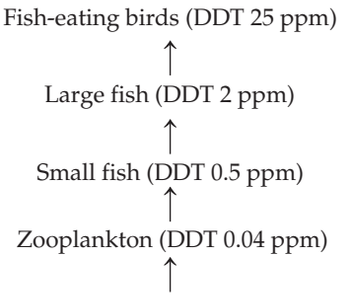
Noise Pollution

- It is undesirable high level of sound.
- **Air (Prevention and Control of Pollution) Act**, 1981 amended in 1987 to include noise as an air pollutant.
- Noise pollution is caused by loudspeakers, music systems used in functions and homes, rockets and jet planes, machines used in industries, etc.
- **Harmful effects** Brief exposure to extremely high sound level, 150 dB or more may cause sleeplessness, increased heart rate, breathing problem, feeling of stress and discomfort, permanent hearing loss and other psychological and physiological disorders.
- **Control measures** Noise pollution can be controlled by promoting use of sound absorbent materials or by sound muffling device by limiting the use of horns or marking horn-free zones around schools and hospitals and by not using loudspeakers for personal and religious functions.

Water Pollution

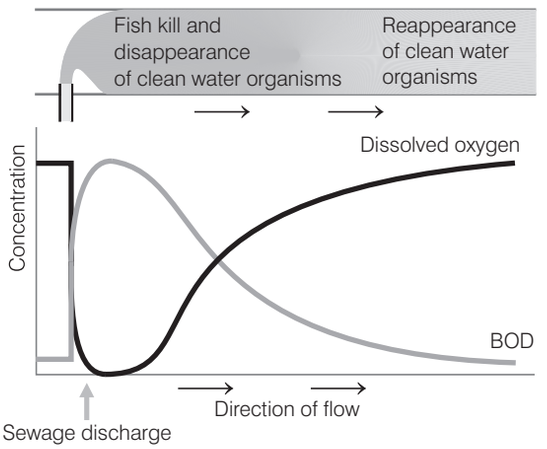
- It is the contamination of water bodies due to the changes in physical, chemical and biological properties of water that can affect the living beings adversely.
- The main sources of water pollution are domestic sewage, industrial wastes and agricultural run-off.
- The government of India has passed the **Water** (**Prevention and Control of Pollution**) **Act** in 1974 to safeguard our water resources.
- Sources of water pollution are as follows
  - **Domestic sewage** constitutes wastewater from our homes and public sewage. A mere 0.1 per cent impurities make domestic sewage unfit for human use.
  - It contains suspended solids (sand, silt and clay) colloidal materials (bacteria, faecal matter, paper, etc.) and dissolved materials (nitrates, ammonia, phosphate, sodium, calcium salt). It also contains biodegradable organic matter that is readily decomposed by microbes.
  - It is easy to remove solids, but very difficult to remove dissolved salts such as nitrates, phosphates and toxic metal ions from wastewater.
  - **Industrial wastes** are released by petroleum, paper manufacturing, metal extraction and processing units. It contains heavy metals like mercury and many organic compounds.
- Effects of water pollution are as follows
  - **Biomagnification** It refers to the increase in concentration of the toxic substance at successive trophic level, in the food chain.
  - The toxic substances accumulated by an organism cannot be metabolised or excreted. When this organism is eaten up by another animal of higher trophic level, it is passed on to this and then to the next higher trophic level and so on, e.g. biomagnification of DDT.

- Biomagnification disturbs calcium metabolism in birds, which causes thinning of egg shell and their premature breaking, eventually causing decline in bird populations.



Biomagnification of DDT in an aquatic food chain

- **Eutrophication** It is the natural ageing of a lake by biological enrichment of its water. In a young lake, the water is cold and clear, that supports little life.
- With time, streams draining into the lake bring nutrients such as nitrogen and phosphorus, which encourage the growth of aquatic organisms.
- As the lake's fertility increases, plant and animal life proliferate and organic matter remains begin to be deposited on the lake bottom.
- Over the centuries, the lake grows shallower and warmer. Eventually, the floating plants (bog), grow in the lake finally converting into land.
- The accelerated ageing of lakes due to the sewage, agricultural and industrial wastes is called **cultural** or **accelerated eutrophication**.
- **Biochemical Oxygen Demand** (BOD) is the amount of oxygen required for microbial breakdown of biodegradable organic matter.
  - It is higher in polluted water and lesser in clean water.



Effect of sewage discharge on some important characteristics of a river

- **Algal bloom** is excessive growth of planktonic (free-floating) algae in aquatic bodies.
  - In domestic sewage, nutrients like nitrogen and phosphorus favours the growth of algal bloom.
  - It causes fish mortality and deterioration of water quality.
  - For example, excessive growth of **water hyacinth** (*Eichhornia crassipes*). It is the most problematic aquatic weed, also called **Terror of Bengal**.
  - It grows abundantly in eutrophic water bodies and imbalances water ecosystem.
- Control measures of water pollution are as follows
  - Proper maintenance of water bodies and avoid disposal of waste into water.
  - Reduce use of pesticides and chemical fertilisers in agriculture.
  - Proper sewage treatment before disposal into large waterbodies.
  - **EcoSan toilets** have been developed in areas of Kerala and Sri Lanka for ecological sanitation. This helps in recycling of human excreta into natural fertiliser to reduce need of chemical fertiliser. It is a practical, hygienic, efficient and cost effective method of disposal.
  - A citizen group called **Friends Of the Arcata Marsh** (FOAM) initiated the project of Integrated wastewater treatment, in Arcata (California) to treat wastewater in an integrated manner by utilising mixture of artificial and natural process.

Solid Wastes

It refers to everything that goes out in trash and pollute land. It include various sources as follows

- **Municipal solid wastes** consist of paper, leather, textile, rubber, glass, waste food materials from home, offices, etc.
- **Industrial wastes** contain wastes like scraps, fly ash, etc., generated by industries.
- **Hospital wastes** contain disinfectants and other harmful chemical generated by the hospitals.
- **Fly ash** is formed in thermal power plants and mainly composed of oxides of iron, silica with aluminium with a low concentration of toxic heavy metals.
- **Electronic wastes** (*e*-wates) These consist of the damaged electronic goods and irreparable computers.
- All wastes can categorised into three types
  - Biodegradable
  - Reusable/Recyclable
  - Non-biodegradable

Solid Waste Management

It includes the collection, transport, treatment and disposal of solid wastes. The methods of solid waste management are

- **Open burning** involves burning of municipal waste in open dumps to reduce volume.

- **Sanitary landfills** are areas, where wastes are dumped in a depression or trench after compaction and covered with dirt.
- **Rag-pickers** and **kabadiwala** collect and separate out wastes into reusable or recyclable categories.
- **Natural breakdown** by dumping biodegradable materials into deep pits for natural degradation.
- **Recycling of e-wastes** can be done to recover important metals.
- **Incineration** is a method of *e*-waste and hospital waste disposal. It is carried out at very high temperature, i.e. 900°C-1300°C.

> - **Ahmed Khan**, a plastic sack manufacturer in Bengaluru gave a remedy for the plastic waste, i.e. polyblend, a fine powder of recycled modified plastic from any plastic film waste developed by his company.
> - This mixture is mixed with bitumen and used to lay roads, enhanced the bitumen's water repellant properties and helped to increase road life by a factor of three.

Soil Pollution

- It may be defined as the presence of materials in the soil, which are harmful to the living beings when they cross their threshold concentration level.
- It can be causes by
  - Chemical seepage from industries.
  - Excessive use of inorganic fertilisers, pesticides, herbicides, fungicides etc.
- **Harmful effects** of soil pollution are as follows
  - Soil becomes infertile.
  - Non-targeted organisms are killed in the soil due to harmful pesticides intake.
  - Pesticides can result in biomagnification as well as eutrophication.
- **Control measures** of soil pollution are as follows
  - Strict ways should be adopted by the industries and other sources for waste disposal.
  - Use of organic farming, i.e. a cyclic zero waste method, where waste products from one process are cycled in as nutrients for other processes, allowing maximum utilisation of resources and increasing the efficiency of production.

> **Integrated organic farming** is done by Ramesh Chandra Dagar, a farmer in Sonipat (Haryana). It included bee-keeping, dairy management, water harvesting, composting and agriculture in a chain of processes. This chain supports each other and allow an extremely economical and sustainable venture.

Radioactive Wastes

- These are wastes which release radioactivity (emission of α-particles, β-particles or γ rays) from nucleotides of their elements.
- Traces of radioactive elements occur in a number of products, e.g. polonium in tobacco and several ores.
- Nuclear energy was once thought to be a non-polluting way of producing energy. Later, it was found that nuclear energy has two major drawbacks. These are
  - Accidental leakage of radioactive wastes as happened in Chernobyl and Three Mile Island.
  - Safe disposal of radioactive wastes.
- Radiation from nuclear material/waste is extremely harmful for the living organisms. It causes mutations at high rate and also increases the risk of cancer.
- At lower concentrations, it creates various disorders in the body, mainly cancer whereas at higher doses, it can be lethal.
- It has been recommended that nuclear waste before disposal should be pre-treated and then buried about 500 m deep below, within the rocks under the earth's crust, in suitably shielded containers. However, this method of disposal is also facing criticism.

Greenhouse Effect and Global Warming

- The term, **'Greenhouse effect'** has been derived from a phenomenon, which occurs inside a greenhouse. In a greenhouse, the glass panel lets the light in, but does not allow heat to escape. This results in warming up of the greenhouse.
- The greenhouse effect is a naturally occurring phenomenon that is responsible for heating of Earth's surface and its atmosphere. Without greenhouse effect, the average temperature at surface of earth would have been chilly, i.e. approximately –18°C rather than the present average of 15°C.
- To understand greenhouse effect it is necessary to know the fate of energy of sunlight that reaches the outermost atmosphere.
  - Clouds and gases reflect about one-fourth of the incoming solar radiation and absorb some of it.
  - Almost half of the incoming solar radiation falls on the surface of earth and heats it and a small proportion of the radiation is reflected back.
  - Earth's surface re-emits heat mostly in the form of infrared radiations. This re-emitted radiation is absorbed by the gases present in the upper atmosphere (e.g. carbon dioxide, methane, etc.). These gases are called **greenhouse gases** because they are responsible for the greenhouse effect.

Global Warming

- The gradual and continuous increase in average temperature of surface of the earth has resulted in **global warming**.

- High levels of greenhouse gases (CO_2 , CFCs, etc.) in the atmosphere allow the heat waves to reach earth, but prevent their escape and the earth becomes warm.
- All living plants are capable of storing carbon, but as the number of plants on the planet declines, the amount of CO_2 in the atmosphere increases. Thus, deforestation is also a major cause of global warming.
- Increase in population also leads to deforestation and ultimately to global warming.
- The major effects of global warming include
  - Earth's temperature has increased by 0.6° C during past century, most of it in last three decades. This increased temperature cause changes in precipitation patterns.
  - Scientists have proposed that this rise in temperature causes deleterious changes in the environment, resulting in odd climatic changes (e.g. El Nino effect). Thus, leading to melting of the polar ice caps and Himalayan snow caps. This causes a rise in sea level that can submerge many coastal areas.

Ozone Depletion in the Stratosphere

- Ozone is found in the upper part of the atmosphere (**stratosphere**) and acts as a shield absorbing ultraviolet radiation from the sun. This is knwon as '**good ozone**' and the ozone formed in the lower atmosphere (troposphere) harms plants and animals and called as '**bad ozone**'.
- The thickness of the ozone in a column of air from the ground to the top of the atmosphere is measured in terms of **Dobson Units** (DU).
- Ozone gas is continuously formed by the action of UV rays on molecular O_2 and also degrade into molecular O_2 in the stratosphere. There is a balance between production and degradation of ozone in the stratosphere, but it is disrupted due to enhancement of ozone degradation by **chlorofluorocarbons** (CFCs).
- In stratosphere, UV rays acts on CFCs and release Cl atoms. Cl degrades ozone releasing molecular O_2 , with these atoms acting as catalysts. UV-B damages DNA and cause mutation. It causes ageing of skin, i.e. skin cancer. In human eye, cornea absorbs UV-B radiations which causes inflammation of cornea, called snow-blindness, cataract, etc.
- Release of **CFC** (Chlorofluorocarbon) and aerosols is depleting ozone in stratosphere by reacting with O_3. The depletion is particularly marked over the Antarctic region. This has resulted in the formation of a large area of trimed ozone layer called **ozone hole**.
- **UV-A** and **UV-B** rays reach on earth and affect life forms. An international treaty, known as the **Montreal Protocol** was signed at Montreal (Canada) in 1987 (effective in 1989) to control the emission of ozone depleting substances.

Degradation due to Improper Resource Utilisation and Maintenance

- Degradation of natural resources can occur, not just by the action of pollutants, but also by improper resource utilisation practices.

Soil Erosion and Desertification

- Top soil is the most fertile layer and it takes centuries to build. Improper human activities can remove it easily resulting in arid patches of land. Soil erosion is caused by human activities like over cultivation, unrestricted grazing, deforestation and poor irrigation practices.
- Desertification is also a major problem these days, that occurs mainly due to increased Urbanisation. When large barren patches extend and meet over time, a desert is created.

Waterlogging and Soil Salinity

- Irrigation without proper drainage of water leads to waterlogging in the soil. It draws salt to the surface of the soil apart from affecting the crops.
- Deposited salt starts collecting at the roots of the plants or forms a thin crust on land surface. This affects the plant growth and productivity. It is extremely damaging to the agriculture.
- Waterlogging and soil salinity are some of the problems that have come in the wake of the **green revolution**.

Deforestation

- It is the conversion of forested areas to non-forested areas by cutting down trees for timber, agriculture or grazing practices is called deforestation.
  - It can be causes by Urbanisation, overgrazing, forest fires, demand of forest products, etc.
  - **Jhum cultivation** is a technique in which tribal population slash and burn forests to make it agriculture land. It results in deforestation.
  - **Reforestation** is the process of restoring forest that once existed, but was removed at some point of time in the past.

People Participation in Forest Conservation

- Amrita Devi Bishnoi in 1731 had shown exemplary courage by hugging a tree and daring king's people to cut her first. Government of India instituted **Amrita Devi Bishnoi Wildlife Protection Award** for individuals or communities, which protect and save forests.
- **Chipko movement** was launched by **Chandi Prasad Bhatt** and **Sundar Lal Bahuguna** against large scale falling of trees by timber contractor in Uttarakhand hills.
- These all protection movements led to introduction of **Joint Forest Management** (JFM) concept in 1980s for protecting and managing forests.

Mastering NCERT

MULTIPLE CHOICE QUESTIONS

TOPIC 1 ~ *Air Pollution and its Control Measures*

1 Which of the following is a secondary pollutant?

NEET 2018

(a) SO_2 (b) CO_2
(c) CO (d) O_3

2 Fine organic or inorganic particles suspended in air is called

(a) gaseous pollutant (b) particulate pollutant
(c) aerosols (d) None of these

3 In plants, air pollution causes

(a) reduce growth and yield
(b) leads to premature death
(c) Both (a) and (b)
(d) None of the above

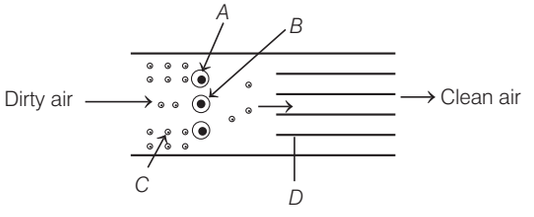
4 The harmful effects of the air pollution on organism depends on

(a) size of bollutant particles present in air
(b) concentration of air pollutants
(c) duration of exposure and the organism
(d) All of the above

5 Which method is used to remove particulate matter present in exhaust of thermal power plant?

(a) Wet scrubbers
(b) Absorption
(c) Electrostatic precipitator
(d) Gravitational method

6 The diagram given below shows electrostatic precipitator. Identify *A, B, C, D* and select the correct option.



(a) A–Dust particle, B–Negatively charged wire, C–Discharge corona, D–Collection plate grounded
(b) A–Discharge corona, B–Collection plate grounded, C–Dust particle, D–Negatively charged wire
(c) A–Discharge corona, B–Negatively charged wire, C–Dust particle, D–Collection plate grounded
(d) A–Discharge corona, B–Dust particle, C–Negatively charged wire, D–Collection plate grounded

7 ..... are used in electrostatic precipitator.

Choose the most appropriate option to fill in the blank.

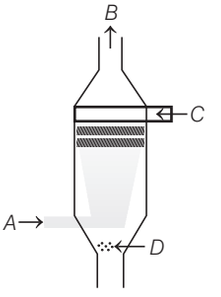
(a) Catalysts
(b) Absorbers
(c) Electrodes
(d) Chemicals

8 In electrostatic precipitator, electrode wires are provided with an electric current of several thousand volts, to produce a corona that release ...*A*... .

These particles attaches to dust particle and given them a ...*B*... charge within a very small fraction of a second. Here, *A* and *B* refer to

(a) A–electron, B–positive
(b) A–neutron, B–negative
(c) A–electron, B–negative
(d) A–proton, B–positive

9 The below diagram shows a scrubber. Identify *A, B, C* and *D*.



(a) A–Particulate matter, B–Clean air, C–Dirty air, D–Dust particle
(b) A–Dirty air, B–Clean air, C–Water/lime spray, D–Particulate matter
(c) A–Clean air, B–Dirty air, C–Particulate matter, D–Water/lime spray
(d) A–Dust particle, B–Clean air, C–Particulate matter, D–Collection plate grounded

10 A scrubber in the exhaust of a chemical industrial plant removes ***CBSE-AIPMT 2014***
(a) gases like sulphur dioxide
(b) particulate matter of the size 5 micrometer or above
(c) gases like ozone and methane
(d) particulate matter of the size 2.5 micrometer or less

11 Suspended particulate matter which remains in air for weeks is
(a) $\leq 10\,\mu m$ (b) $\geq 10\,\mu m$ (c) $\geq 20\,\mu m$ (d) $\geq 25\,\mu m$

12 Which of the following health problems originate due to the inhalation of fine particulate matter?
(a) Irritation
(b) Inflammation of respiratory tract
(c) Damage of lungs and premature deaths
(d) All of the above

13 Which device is fitted in automobiles for reducing the emission of poisonous gases like NO and CO?
(a) Catalytic converters
(b) Electrostatic precipitator
(c) Scrubber
(d) Bag filter

14 Catalytic converters possesses which one of the following metals as catalyst?
(a) Platinum (b) Palladium
(c) Rhodium (d) All of these

15 In catalytic converters, hydrocarbons which are unburnt and carbon monoxide and nitric oxide are changed into
(a) CO_2 and N_2; respectively
(b) CO_2 and H_2O; CO_2 and N_2, respectively
(c) O_2 and CO_2; N_2, respectively
(d) H_2O; CO_2 and N_2, respectively

16 Identify the correctly matched pair.
(a) Particulate matter – Breathing and respiratory symptoms
(b) Removal of particulate matter – Electrostatic precipitator
(c) SO_2 – Catalytic converter
(d) Both (a) and (b)

17 Motor vehicles equipped with catalytic converter should use unleaded petrol because lead
(a) in petrol inactivates the catalyst
(b) increases the burning of petrol
(c) decreases the efficiency of vehicles
(d) is a heavy metal

18 Noise which is more than ……cause noise pollution.
(a) 70 dB
(b) 80 dB
(c) 120 dB
(d) 180 dB

19 Which of the following problem(s) is/are created by a brief exposure to extremely high sound level, 150 dB or more generated by take off of a jet plane or rocket?
(a) Deafness
(b) Damage eardrums
(c) Both (a) and (b)
(d) None of the above

20 Given below are the set of health problems.
I. Lack of sleep
II. High blood pressure
III. Stress
IV. Complete or partial hearing
V. Anxiety
Which of the health problems given above are caused by noise pollution?
(a) I, II and III
(b) II, III and IV
(c) II, III, IV and V
(d) I, II, III, IV and V

21 Steps taken by the Government of India to control air pollution includes
(a) compulsory mixing of 20% ethyl alcohol with petrol and 20% biodiesel with diesel
(b) compulsory PUC (Pollution Under Control) certification of petrol driven vehicles, which tests for carbon monoxide and hydrocarbons
(c) permission to use only pure diesel with a maximum of 500 ppm sulphur as fuel for vehicles
(d) use of non-polluting Compressed Natural Gas (CNG) only as fuel by all buses

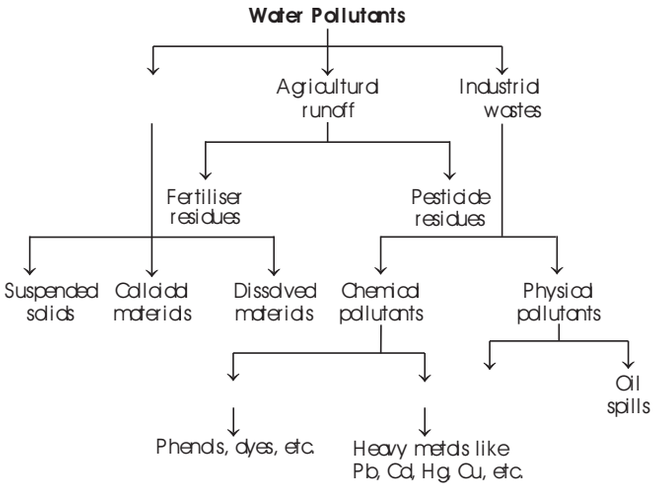
22 Euro III norms were stipulated to control
(a) carbon content
(b) sulphur content
(c) nitrogen content
(d) phosphorus content

23 The air prevention and control of pollution act came into force in
(a) 1985 (b) 1990
(c) 1975 (d) 1981

TOPIC 2 ~ *Water Pollution and its Control Measures*

24 Water pollution due to faecal matter is indicated by
(a) *Escherichia coli*
(b) *Rhizobium*
(c) *Bacillus*
(d) *Streptococcus*

25 The below chart shows the sources of water pollution.



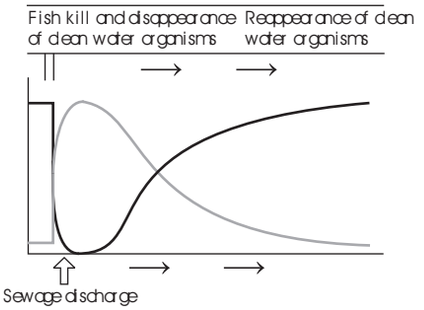
Read the chart carefully and identify *A*, *B*, *C* and *D*.
(a) A–Domestic sewage, B–Thermal (hot) waste water, C–Organic compound, D–Inorganic compounds
(b) A–Chemical sewage, B–Industrial waste water, C–Inorganic compound, D–Organic compounds
(c) A–Industrial sewage, B–Domestic waste water, C–Phenol group, D–Heavy metallic group
(d) A–Sewage, B–Chemical industry waste water, C–Organic compounds, D–Inorganic compounds

26 The amount of biodegradable organic matter in sewage water can be estimated by measuring
(a) biological oxygen demand
(b) biochemical oxygen demand
(c) the growth of microorganism in water
(d) the growth of bacteria in water

27 Water having Dissolved Oxygen (DO) below …… is considered polluted.
(a) 8 mg/L (b) 80 mg/L
(c) 70 mg/L (d) 95 mg/L

28 Biochemical Oxygen Demand (BOD) may not be a good index for pollution in water bodies receiving effluents from ***NEET 2016***
(a) domestic sewage
(b) dairy industry
(c) petroleum industry
(d) sugar industry

29 Given below is a flow chart showing the effect of sewage discharge on some important characteristics of a river. Read carefully and identify *A, B, C* and *D*.



(a) A–BOD, B–Dissolved oxygen, C–Concentration, D–Direction of flow
(b) A–Dissolved oxygen, B–BOD, C–Direction of flow, D–Concentration
(c) A–Dissolved oxygen, B–BOD, C–Concentration, D–Direction of flow
(d) A–BOD, B–Dissolved oxygen, C–Direction of flow, D–Concentration

30 High value of BOD (Biochemical Oxygen Demand) indicates that ***CBSE-AIPMT 2015***
(a) water is pure
(b) water is highly polluted
(c) water is less polluted
(d) consumption of organic matter in the water is higher by the microbes

31 A river with an inflow of domestic sewage rich in organic waste may result in ***NEET 2016***
(a) increased population of aquatic food web organisms
(b) an increased production of fish due to biodegradable nutrients
(c) death of fish due to lack of oxygen
(d) drying of the river very soon due to algal bloom

32 Arrange the following options in ascending order of their BOD value.
I Sample of highly polluted pond water.
II Sample from unpolluted pond water.
III Distilled water.
(a) III, I and II (b) II, III and I
(c) III, II and I (d) I, III and II

33 Which of the following options is/are incorrect about algal bloom?
(a) Formed by blue-green algae
(b) Causes deterioration of water quality and fish mortality
(c) Causes depletion of O_2 in water
(d) Growth of *Eichhornia* causes discolouration of water

34 The term 'Terror of Bengal' is used for
(a) *Eichhornia crassipes*
(b) decreased biological oxygen demand
(c) biomagnification
(d) algal bloom

35 Hyacinth is termed as the terror of Bengal, how it causes death of fishes?
(a) Covers the surface of the water that inhibits sunlight to pass through
(b) Drains oxygen from the water that causes oxygen deficiency
(c) Absorbs nutrients from the water that causes malnutrition
(d) Releases carbon dioxide in a huge amount which is lethal to fishes

36 Increase in concentration of the toxicant at successive trophic levels is known as
CBSE-AIPMT 2015, AIIMS 2018
(a) biomagnification (b) biodeterioration
(c) biotransformation (d) biogeochemical cycling

37 DDT residues are rapidly passed through food chain causing biomagnification because DDT is
(a) liposoluble
(b) moderately toxic
(c) non-toxic to aquatic animals
(d) water soluble

38 If a pond food chain gets polluted by DDT, the tissue concentration of DDT would be the highest in
(a) aquatic weed (b) herbivorous fish
(c) carnivorous fish (d) None of these

39 The highest DDT concentration in aquatic food chain shall occur in ***NEET 2016***
(a) phytoplankton (b) seagull (c) crab (d) eel

40 In an area where DDT had been used extensively, the population of birds declined significantly because
(a) birds stopped laying eggs ***CBSE-AIPMT 2012***
(b) earthworms in the area got eradicated
(c) cobras were feeding exclusively on birds
(d) many of the birds laid eggs that did not hatch

41 Eutrophication is caused due to
JIPMER 2019
(a) accumulation of minerals
(b) effect of UV - C
(c) accumulation of metals
(d) accumulation of zooplankton

42 Which of the following options pertain to eutrophication?
(a) Occurs due to addition of artificial or natural nutrients
(b) Results in algal bloom
(c) More precisely called hypertrophication
(d) All of the above

43 Advantage(s) of thermal waste water can be the
(a) elimination of organisms sensitive to high temperature
(b) enhancement in the growth of plants and fishes in extremely cold areas
(c) Both (a) and (c)
(d) None of the above

44 Choose the incorrect pair.
(a) Eutrophication – Natural ageing of lake
(b) Phosphorus – Decreases the growth of aquatic organisms
(c) *Eichhornia crassipes* – Grow abundantly in eutrophic water bodies
(d) Nitrates – Overstimulate the growth of algae

45 Cleaning of waste water in Arcata Marsh involves
(a) only conventional method of sewage treatment
(b) removal of dissolved heavy metals through biological process
(c) filtration, chlorination like chemical processes
(d) enhance the need for chemical fertilisers

46 Ecological sanitation is a sustainable system for handling human excreta, using dry composting toilets. Such 'EcoSan' toilets are working in
(a) Asom and West Bengal
(b) Andhra Pradesh and Maharashtra
(c) Kerala and Sri Lanka
(d) Karnataka and Andhra Pradesh

TOPIC 3 ~ *Solid Wastes, Agrochemicals and Radioactive Wastes*

47 Sanitary landfills were adopted as the substitute for open-burning dumps, but it is not really much of a solution to manage solid waste in metro cities. Why?
(a) The sites are getting filled due to increased garbage generation
(b) There is a danger of seepage of chemicals, polluting the underground water
(c) Both (a) and (b)
(d) None of the above

48 E-waste are buried in ...*A*... or ...*B*... .
Complete the given statement by choosing appropriate option for *A* and *B*.
(a) A–land fills, B–incinerated
(b) A–open area, B–recycle
(c) A–dumping zone, B–recycle
(d) A–open area, B–incinerated

49 Which of the following is an innovative remedy for plastic waste? ***NEET (Odisha) 2019***

(a) Burning in the absence of oxygen
(b) Burrying 500 m deep below soil surface
(c) Polyblend
(d) Electrostatic precipitator

50 Polyblend, a fine powder of recycled modified plastic, has proved to be a good material for ***NEET 2019***

(a) use as a fertiliser (b) construction of roads
(c) making tubes and pipes (d) making plastic sacks

51 A feature of integrated organic farming is that

(a) in this process, waste products from one process are recycled and used as nutrients for other processes
(b) industrial wastes are utilised for manufacturing products like polyblend
(c) chemical fertilisers are used to increase yield
(d) Both (a) and (c)

52 High level radioactive waste can be managed in which of the following ways?

(a) Open dumping (b) Composting
(c) Incineration (d) Dumping in sealed containers

53 Which of these following methods is the most suitable for disposal of nuclear waste? ***NEET 2019***

(a) Bury the waste under Antarctic ice-cover
(b) Dump the waste within rocks under deep ocean
(c) Bury the waste within rocks deep below the earth's surface
(d) Shoot the waste into space

54 What steps should be taken for the disposal of nuclear waste?

(a) Nuclear waste should be pre-treated
(b) It should be stored in shielded containers
(c) It should be buried about 500 m deep with in rock
(d) All of the above

55 Why do you think burying radioactive waste deep is not agreeable to many people?

(a) Because it takes several decades to decay
(b) Because it still have radioactive properties and can pose threat
(c) Both (a) and (b)
(d) None of the above

TOPIC 4 ~ *Greenhouse Effect, Global Warming and Ozone Depletion*

56 A naturally occurring phenomenon that is responsible for heating of earth's surface and atmosphere due to the presence of certain gases in the atmosphere is

(a) greenhouse effect
(b) solar effect
(c) ozone layer effect
(d) None ot the above

57 Which of the following pairs of gases is mainly responsible for greenhouse effect? ***NEET 2019***

(a) Oxygen and nitrogen
(b) Nitrogen and sulphur dioxide
(c) Carbon dioxide and methane
(d) Ozone and ammonia

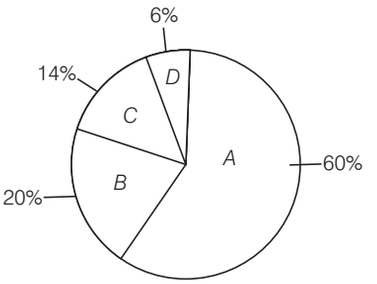
58 What is the result of greenhouse effect?

(a) Melting of polar ice-caps
(b) CO_2 fertilisation effect
(c) Rising of sea level and global warming
(d) All of the above

59 Carbon dioxide is called greenhouse gas because it is

(a) used in greenhouse to increase plant growth
(b) transparent to heat but traps sunlight
(c) transparent to sunlight but traps heat
(d) transparent to both sunlight and heat

60 Study carefully the following pie diagram representing the relative contribution of various greenhouse gases to total global warming. Identify the gases *A*, *B*, *C* and *D*.



(a) A – N_2O, B – CFCs, C – CO_2, D – Methane
(b) A – CO_2, B – Methane, C – CFCs, D – N_2O
(c) A – CFCs, B – CO_2, C – Methane, D – N_2O
(d) A–Methane; B–N_2O, C–CFCs, D–CO_2

61 Rise in temperature leads to deleterious changes in environment resulting in odd climatic changes called

(a) global warming
(b) El Nino effect
(c) La Nino effect
(d) greenhouse effect

62 Global warming can be controlled by ***NEET 2013***
(a) reducing deforestation, cutting down use of fossil fuel
(b) reducing reforestation, increasing the use of fossil fuel
(c) increasing deforestation, slowing down the growth of human population
(d) increasing deforestation, reducing efficiency of energy usage

63 The zone of atmosphere in which ozone layer is present is called ***CBSE-AIPMT 2014***
(a) ionosphere (b) mesosphere
(c) stratosphere (d) troposphere

64 The thickness of ozone in a column of air from the ground to the top of the atmosphere is measured in terms of
(a) Decibel units (b) Pascal units
(c) Svedberg units (d) Dobson units

65 Ozone gas is continuously formed by the action of ...*A*... on ...*B*... in the ...*C*.... .
Fill in the blanks by selecting appropriate option.
(a) A–UV-A, B–oxygen, C–troposphere
(b) A–Cl^-, B–molecular oxygen, C–stratosphere
(c) A–CFCs, B–UV-B rays, C–troposphere
(d) A–UV rays, B–molecular oxygen, C–stratosphere

66 A balance should exist between production and degradation of ozone. By which factor this balance is being disrupted and causes reduction of ozone content of atmosphere? Choose the correct option.
(a) Greenhouse gases (b) Chlorofluorocarbons
(c) Nitrous oxide (d) Aromatic compounds

67 In stratosphere, which one of the following elements acts as a catalyst in degradation of ozone and release of molecular oxygen? ***NEET 2018***
(a) Fe (b) Cl (c) Carbon (d) Oxygen

68 Fill up the blanks.
I …*A*… used as refrigerants which reacts with UV in …*B*… to release …*C*… atoms.
II Chlorine atoms act as …*D*… to degrade ozone and release molecular …*E*… .
III Bad ozone is formed in …*F*… and is harmful to plant and animals.
IV Good ozone is formed in …*G*… and absorbs harmful …*H*… from the sun.
Complete the given set of statements by filling appropriate options in the blanks *A-H*.
(a) A–NO_2, B–Troposphere, C–Floride, D–Catalyst, E–CO_2, F–Stratosphere, G–Atmosphere, H–Infrared radiation
(b) A–CFCs, B–Stratosphere, C–Chlorine, D–Catalyst, E–Oxygen, F–Troposphere, G–Stratosphere, H–UV radiations
(c) A–CO_2, B–Ionosphere, C–Calcium, D–Catalyst, E–Chlorine, F–Ionosphere, G–Troposphere, H–Infrared radiation
(d) A–CH_4, B–Stratosphere, C–Sodium, D–Catalyst, E–Oxygen, F–Atmosphere, G–Ionosphere, H–UV radiation

69 Identify the incorrect match.
(a) UV-B — Damages DNA and causes mutation
(b) UV-A — Passes through the ozone and reaches the earth's surface
(c) Ozone hole —A large area of thinned ozone layer
(d) None of the above

70 Which of the following is not one of prime health risks associated with greater UV-radiation through the atmosphere due to depletion of stratospheric zone? ***CBSE-AIPMT 2015***
(a) Increased skin cancer
(b) Reduced immune system
(c) Damage to eyes
(d) Increased liver cancer

71 Which of the following protocols did aim for reducing emission of chlorofluorocarbons into the atmosphere? ***NEET 2019***
(a) Kyoto protocol (b) Gothenburg protocol
(c) Geneva protocol (d) Montreal protocol

72 World Ozone Day is celebrated on ***NEET 2018***
(a) 16th September (b) 21st April
(c) 5th June (d) 22nd April

TOPIC 5 ~ *Improper Resource Utilisation and Deforestation*

73 The fertile top soil is removed by human activities like
(a) over-cultivation
(b) unrestricted grazing
(c) deforestation and poor irrigation practices
(d) All of the above

74 Desertification has become a major problem due to
(a) decreased natural resources (b) increased urbanisation
(c) increased population (d) All of these

75 One of the main reasons of soil erosion in India is
(a) farming (b) deforestation
(c) drought conditions (d) temperature

76 If an agricultural field is liberally irrigated for a prolonged period of time, it is likely to face problem of ***NEET (Odisha) 2019***
(a) metal toxicity
(b) alkalinity
(c) acidity
(d) salinity

77 Fill up the blanks.

I ...*A*...in soil results from irrigation without proper drainage of water. This affects the plants and draws salts to the soil surface. The salt is either deposited as a layer on land surface or collects at ...*B*... of plants.

II *A* water logged soil has poor ...*C*... .

III Removal of forest areas to fulfil the need of growing human population is called ...*D*... .

IV ...*E*... of India has recommended 33% forest cover for the plains and 67% for the hills.

Here *A*-*E* refers to

(a) A–Soil erosion, B–stems, C–structure, D–reforestation, E–The National Forest Policy (1987)

(b) A–Water logging, B–roots, C–aeration, D–deforestation, E–The National Forest Policy (1988)

(c) A–Soil succession, B–leaves, C–nutrients, D–afforestation, E–The National Forest Policy (1989)

(d) A–Desertification, B–fruits, C–minerals, D–deforestation, E–The National Forest Policy (1986)

78 Slash and burn agriculture in North-Eastern states of India is also called

(a) ley farming (b) commercial agriculture

(c) Jhum cultivation (d) All of these

79 Jhum cultivation refers to

(a) cultivation of neem tress

(b) cultivation of medicinal plants

(c) tribal method of shifting cultivation

(d) cultivation of timber plants

80 Read the following statements and select the correct option for filling the blanks.

I ..... occurs due to improper drainage of water.

II Cultivation practice that leads to deforestation particularly in North- Eastern region is ..... .

III The management of forests for the benefit of entire ecosystem is .....

(a) Water-logging, Jhum cultivation, Silviculture

(b) Soil erosion, Slash and burn culture, Joint forest movement

(c) Water-logging, Silviculture, Slash and burn culture

(d) Eutrophication, Silviculture, Jhum cultivation

81 Identify the incorrect effect of deforestation.

(a) Soil erosion

(b) Altering the weather pattern by decreasing rainfall

(c) Accelerated nutrient recycling

(d) Destruction of natural habitats of wildlife

82 Restoring a forest cover over an area where one existed earlier, but was removed at some point of time in the past is called

(a) reforestation

(b) afforestation

(c) deforestation

(d) None of these

83 Indian government recently instituted 'Amrita Devi Bishnoi Award'. This is awarded to individuals and communities from rural areas involved in

(a) wildlife protection and conservation

(b) forest mangement

(c) environment protection

(d) tree plantation

84 Joint Forest Management concept was introduced in India during ***NEET 2016***

(a) 1970s (b) 1980s

(c) 1990s (d) 1960s

85 The concept of Joint Forest Management (JFM) involves

(a) work in close association with the local communities for protecting and managing forests on mutual benefits

(b) conservation of forest and agricultural land by the NGOs

(c) conservation of forest and agricultural land by the state government

(d) conservation of forest and agricultural land by the local communities only

86 Increased soil fertility, decreased soil erosion and desertification, restore biodiversity, etc. All these can be achieved by

(a) joint forest management

(b) reforestation

(c) silviculture

(d) All of the above

NEET

SPECIAL TYPES QUESTIONS

I. Assertion and Reason

■ **Direction** (Q. No. 87-94) *In each of the following questions, a statement of Assertion (A) is given followed by corresponding statement of Reason (R). Of the statements, mark the correct answer as*

(a) If both A and R are true and R is the correct explanation of A

(b) If both A and R are true, but R is not the correct explanation of A

(c) If A is true, but R is false

(d) If A is false, but R is true

87 **Assertion** (A) Catalytic converters greatly reduce pollution caused by automobiles.

Reason (R) A Suspended Particulate Matter (SPM) is a pollutant released by diesel vehicles.

88 **Assertion** (A) UV-radiation causes photo-dissociation of ozone into O_2 and O, thus causing damage to the stratospheric ozone layer.

Reason (R) UV-radiations reaching earth causes skin cancer.

89 **Assertion** (A) Ozone formed in the stratosphere by photochemical reactions as a result of human activities is harmful for all living organisms.

Reason (R) Ozone layer present in the troposphere is bad ozone.

90 **Assertion** (A) Currently, the global atmosphere is warming up.

Reason (R) The depletion of stratospheric ozone layer has resulted an increase in the amount of ultraviolet radiations reaching to the earth.

91 **Assertion** (A) Methane component of greenhouse gases contributing to global warming is about 20%.

Reason (R) Introduction of multi-point fuel injection engines in automobiles has increased methane content in the exhausts.

92 **Assertion** (A) BOD is an indicator of pollution in water.

Reason (R) High BOD is observed in highly polluted water. ***NEET 2018***

93 **Assertion** (A) Green muffler or belt vegetation aims to reduce noise pollution but also reduce air pollution.

Reason (R) Green muffler scheme refers to the plantation of trees and shrubs along road sides.

94 **Assertion** (A) According to the Central Pollution control Board (CPCB) particulate size of 2.5 μm or less in diameter are responsible for causing great harm to human health.

Reason (R) The particulates can be inhaled deep into the lungs and can cause breathing and respiratory changes.

II. Statement Based Questions

95 Which of the statements given about pollution is incorrect?

(a) Pollution is an undesirable change in physical, chemical or biological characteristics of air, land water or soil

(b) The Air prevention and control of pollution act was amended in 1987 to include noise as an air pollutant

(c) In order to control environmental pollution, the Government of India has passed the Environment Protection Act, 1976 to protect and improve the quality of our environment

(d) All of the above

96 Which of the statements regarding the sources of air pollution is correct?

(a) Smoke from forest fires, volcanic eruptions do not cause air pollution

(b) Decomposition of garbage does not result in the release of unwanted gases into the atmosphere

(c) Burning of fossil fuels in automobiles and industries releases particulate are noise pollutants

(d) Use of leaded petrol in automobiles emit various pollutants

97 Which of the statements given about Electrostatic Precipitator (ESP) is/are correct?

(a) is an electrical device to remove particulate matter present in the exhaust of thermal power plant

(b) Over than 99% particulate matter can be removed by this method

(c) ESP has electrode wires and a stage of collecting plates

(d) All of the above

98 Which one of the following is an incorrect statement?

(a) Agents that bring about an undesirable change in characteristics of air, land, water or soil are called as pollutants

(b) Automobiles are major cause of atmospheric pollution

(c) Lead free petrol and diesel can reduce the atmospheric pollution *via* automobiles

(d) Environment Protection Act (air, water and soil) was implemented in 1988

99 Which of the statements given are correct about scrubber?
(a) It is used to remove gases like nitrogen dioxide from industrial exhaust
(b) In a scrubber, the exhaust is passed through a spray of water or lime
(c) Water dissolves gases and lime reacts with nitrogen dioxide to form a precipitate of calcium nitrate and nitrite
(d) All of the above

100 Which one of the statement(s) given is/are correct about catalytic converters?
(a) These are fit into automobiles for reducing emission of poisonous gases like NO_2 and CO
(b) They have in expensive metals like lead, mercury and rhodium as catalysts
(c) As the exhaust emission passes through catalytic converter, nitric oxide is changed to nitrogen gas, carbon monoxide is oxidised to carbon dioxide and unburnt hydrocarbons get completely burnt into O_2 and CO_2
(d) Motor vehicles fit with catalytic converter should use leaded petrol because lead in the petrol activates the catalyst

101 Which one of the following statement (s) is/are correct?
(a) CNG burns most efficiently without leaving any unburnt remnant behind
(b) CNG is cheaper than petrol or diesel
(c) CNG cannot be siphoned off by thieves and adulterated like petrol or diesel
(d) All of the above

102 Which one of the following statement(s) is/are incorrect?
(a) Noise causes psychological disorder in humans
(b) Noise causes physiological disorder in humans
(c) Noise measurable unit is dB, but some times it is measured in Dobson unit
(d) Sound level of 150 dB may damage eardrums

103 Which statement is true about the Euro III norms?
(a) It stipulates to control sulphur at 350 ppm in diesel and 150 ppm in petrol
(b) It stipulates to reduce sulphur level to 20 ppm in petrol and diesel
(c) It stipulates to reduce sulphur level to 200 ppm in diesel and petrol
(d) It stipulates to reduce sulphur level to 200 ppm in diesel and 100 ppm in petrol

104 Which of the following statement (s) is/are not correct regarding biomagnification?
(a) Heavy metals and persistent pesticides pass into food chain and increases in amount per unit weight of organisms with the rise in trophic level due to their accumulation in fat
(b) Accumulation of zinc can cause thinning of eggshell in birds
(c) DDT accumulation is a major cause of killing of fish-eating birds
(d) Biomagnification occurs in all aquatic food chain

105 Which of the statement(s) given about eutrophication is/are correct?
(a) Eutrophication is the unnatural ageing of a water body by nutrient enrichment
(b) The accelerated ageing of lakes due to sewage and agricultural and industrial wastes is called cultural or accelerated eutrophication
(c) The plant nutrients responsible for eutrophication are nitrates and sulphates
(d) Phosphates and nitrates dacclerate the growth of algae which reduce oxygen utilisation and may oxygenate the water, enough to allow the fishes and other aquatic animals to thrive

106 Which of the following statements is not valid for aerosols? ***NEET 2017***
(a) They are harmful to human health
(b) They alter rainfall and monsoon patterns
(c) They cause increased agricultural productivity
(d) They have negative impact on agricultural land

107 Identify the correct statement from below.
(a) A mere 0.1% impurities make domestic sewage unfit for human use
(b) BOD of clean water is < 5 ppm and highly polluted water is 17 ppm
(c) Both (a) and (b)
(d) None of the above

108 Study the following statements regarding EcoSan toilets and select the incorrect ones.
(a) They are working in Sri Lanka and Kerala
(b) Composting method for recycling of human excreta
(c) Recycled materials forms natural fertilisers
(d) Enhance the need for chemical fertilisers

109 Which of the following statements defines Integrated Organic Farming appropiately?
(a) It is cyclical and zero-waste procedure
(b) Allows maximum utilisation of resources
(c) Increases the efficiency of production
(d) All of the above

110 Choose the correct statement for agrochemicals.
(a) Toxic to non-target organisms
(b) Toxic to important components of soil ecosystem
(c) Their usage enhance crop production
(d) All of the above

111 Which statement correctly represents the harmful effects of depletion of earth's ozone layer?
(a) The average temperature of earth's surface will increase gradually
(b) The oxygen content of the atmosphere will decrease
(c) Increased amount of ultraviolet radiation will reach earth's surface
(d) Sea levels will rise as the polar ice caps will gradually melt

112 Which one of the following is an incorrect statement?
CBSE-AIPMT 2012

(a) Most of the forests have been lost in tropical areas
(b) Ozone in upper part of atmosphere is harmful to animals
(c) Greenhouse effect is a natural phenomenon
(d) Eutrophication is a natural phenomenon in freshwater bodies

113 Which of the following statements about ozone is correct?
NEET (Odisha) 2019

(a) Tropospheric ozone protects us from UV- radiations
(b) Stratospheric ozone is 'bad'
(c) Tropospheric ozone is 'good'
(d) Stratospheric ozone protects us from UV- radiations

114 Consider the following statements.

I. Algal blooms are formed by free-floating algae.
II. Algal bloom causes fish mortality and deterioration of water quality.
III. Some bloom-forming algae are extremely toxic to human beings and animals.

Which of the statements given above are correct?
(a) I and II (b) I and III (c) II and III (d) I, II and III

115 Consider the following statements about polyblend.

I. In 1989, Ahmed Khan developed bitumen, a fine powder of recycled modified plastic.
II. Polyblend has been mixed with bitumen to lay roads in Bengaluru.
III. Polyblend and bitumen, when used to lay roads, enhanced bitumen's water repellant properties and helped to increase the life of road.

Which of the statements given above are correct?
(a) I and II (b) I and III
(c) II and III (d) I, II and III

116 Which of the given statements pertain correctly to solid wastes?

I. Classification of waste into the categories like biodegradable, recyclable and non-biodegradable.
II. Reusable products can be recycled.
III. Dispose biodegradable waste into the pits in ground.
IV. Reduce production of non-biodegradable waste as these are difficult to dispose.
V. Incineration is not advised.

(a) I and II (b) I, II, III and IV
(c) I, II and III (d) I, II, III, IV and V

117 Consider the following statements about harmful effects of radioactive pollution.

I. Radiations from nuclear wastes causes mutation at a very high rate.
II. At high doses, nuclear radiations are lethal.
III. At low doses, radiations cause various disorders like cancer.

Which of the statements given above are correct?
(a) I and II (b) I and III
(c) II and III (d) I, II and III

118 Which of the following statements are correct with regard to contribution of various factors to greenhouse effect?

I. Relative contribution of various gases like CO_2, CH_4, CFCs, N_2O, etc.
II. Biological magnification and eutrophication.
III. Deforestation to incorporate Urban needs.
IV. Various activities like burning of fossil fuels.
V. Odd climatic changes such as El-Nino effect.
VI. Use of refrigerants like chlorofluorocarbons.

(a) II, IV, V and VI (b) I, III and IV
(c) IV, V and VI (d) II, III and I

119 Read the following statements carefully and select the correct option.

I. UV- rays are essential for the production as well as degradation of ozone gas.
II. Ozone present in ionosphere acts as a shield absorbing UV-radiations coming from the sun.
III. One fourth of the incoming solar radiation is reflected by the atmospheric gases and clouds and only half of the incoming solar radiation falls on the earth's surface, heating it. Of this only a small proportion is reflected back.

(a) I and II (b) I and III
(c) II and III (d) I, II and III

120 Which of the following statements are correctly showing the harmful effects of global warming?

I. The temperature of the earth has increased by 0.6°C in last three decades, which will lead to the change in precipitation patterns.
II. This rise in temperature will lead to the increased melting of polar ice caps which will cause the rise in sea level and many coastal areas will be submerged.
III. Increased temperature will lead to the decreased weed growth, eruption of diseases and pests. Thus, crop productivity will increase.

(a) I and II (b) I and III
(c) II and III (d) I, II and III

121 Which of the following statements correctly describe the consequence of deforestation?

I. An increase in O_2 concentration in atmosphere.
II. Loss of biodiversity due to habitat destruction.
III. Desertification, which leads to the formation of large barren patches of land.
IV. Disturbed hydrological cycle.

(a) I, II and III (b) II, III and IV
(c) I, III and IV (d) I, II, III and IV

122 Which of the following statement(s) represents the advantages of ecological sanitation?

I. It is a practical, hygienic and efficient method of waste disposal.
II. It is cost effective method.
III. Human excreta cannot be recycled into natural fertilisers to replace chemical fertilisers.

(a) I and II (b) I and III
(c) II and III (d) I, II and III

123 Jhum cultivation.

I. Also called as slash and burn agriculture, is the farming practice in North-Eastern states of India.
II. Farmers cut down the trees of forest and burn the plant remains.
III. The ash is used as a fertiliser and the land is then used for farming or cattle grazing.
IV. After cultivation, the land is left for several years, so as to allow its recovery.

Which of the statements given above are correct about Jhum cultivation?

(a) I, II and III
(b) II, III and IV
(c) I, III and IV
(d) I, II, III and IV

124 Consider the following statements.

I. Reforestation is the process of restoring a forest that once existed but was removed at some point of time in the past.
II. Reforestation may occur naturally in a deforested area.
III. A tree plantation movement or Van Mahotsava is being carried out in India since 1982.

Which of the statements given above are correct?

(a) I and III (b) I and II
(c) II and III (d) I, II and III

125 Consider the following statements.

I. Soil with a vegetation cover is easily eroded by both wind and water.
II. Excessive irrigation results in water logging of soil.
III. Increased salt concentration damages agriculture.

Which of the statements given above are correct?

(a) I and II (b) I and III
(c) II and III (d) I, II and III

126 Which of the statements given about desertification are correct?

I. Conversion of former moist and fertile land into arid desert area.
II. It is a product of soil erosion.
III. Desertified area can be put to any use.

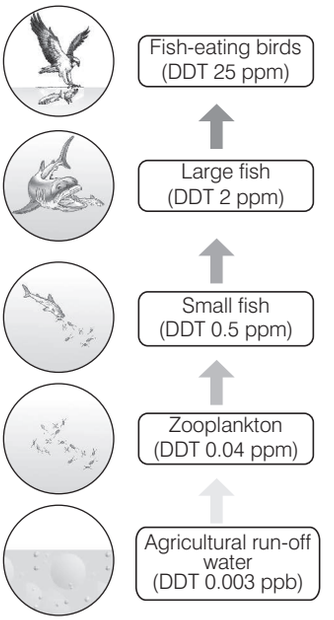
(a) I and II (b) I and III
(c) II and III (d) I, II and III

127 Which of the statements given are correct about Chipko movement?

I. It was initially meant for protecting crops but now meant for preservation of environment including habitat and wildlife.
II. Chipko movement was started in Garhwal, Himalayas in 1974 by Shri Sundar Lal Bahuguna to prevent cutting down of trees.
III. Local women hugged trees to prevent them from being cut down by contractors.

(a) I and II
(b) I and III
(c) II and III
(d) I, II and III

128 Choose the correct statement regarding the process of biomagnification of DDT in an aquatic food chain as described by the figure given below.

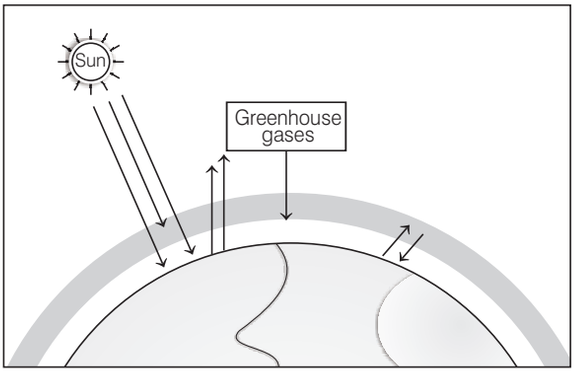


I. Biomagnification refers to increase in concentration of the toxicant at successive trophic levels.
II. High concentrations of DDT disturb calcium metabolism in birds, which cause thinning of eggshell and their premature breaking.
III. River water may have a very low concentration of DDT, but the carnivorous fish in that river may contain high concentration of DDT, which is still suitable for consumption by human beings.

Which of the statements given above are correct?

(a) I and II
(b) I and III
(c) II and III
(d) I, II and III

129 Given diagram represents the greenhouse effect.



I. Greenhouse gases absorb infrared radiation from the earth. The absorbed radiations again come to earth's surface and heat it up.

II. CO_2, CH_4, CFCs and N_2O are the gases responsible for greenhouse effect.

III. Increase in the level of greenhouse gases results in considerable heating of earth, leading to El nino effect.

Which of the statements given above are correct?

(a) I and II (b) II and III
(c) I and III (d) I, II and III

130 Go through the following statements.

I. The dangers of particulate matter that are very small are not removed by electrostatic precipitators.

II. Smokestacks of thermal power plants, smalters and other industries release particulate and gaseous air pollutants together with harmless gases like N_2, O_2, etc.

III. In the 1990s, Delhi ranked first among the 41 most polluted cities of the world.

IV. Air pollution problems in Delhi became so serious that a Public Interest Litigation (PIL) was filed in the Supreme Court of India.

Which of the above statements are correct.

(a) I, II and IV (b) I, II and III
(c) II and III (d) I, II, III and IV

131 Which one of the following statement(s) is/are incorrect?

I. Without greenhouse effect, the average temperature at surface of earth would have been a chilly –18°C rather than the present average of 15°C.

II. Ramesh Chandra Dagar, a farmer of Sonipat (Haryana) has created the Haryana kisan welfare club, with a current membership of 5000 farmers.

III. Over half of the *e*-wastes generated in the developed world are exported to developing countries mainly to China, India and Pakistan.

IV. The use of incinerators is crucial to disposal of hospital waste, which includes disinfectants, harmful chemicals, pathogenic microbes, etc.

(a) I and II (b) I, II and III
(c) I, II, III and IV (d) None of these

132 Read the following statements given here below and select the right answer.

I. Solid wastes refer to everything that goes out in trash.

II. A citizen group called Friends of the Arcata Marsh (FOAM) are responsible for the upkeep and safeguarding of the integrated waste water treatment project.

III. Municipal solid wastes are wastes from homes, offices, schools, hospitals, etc., that are collected and disposed by the municipality.

IV. According to an estimate, a substantial rise in CO_2 and SO_2 level has been found in Delhi between 1997 and 2005.

(a) I, II, III and IV (b) I, II and III
(c) II, III and IV (d) I, II and IV

III. Matching Type Questions

133 Match the following columns.

	Column I (Pollutants)		**Column II** (Examples)
A.	Particulate pollutants	1.	Hydrogen sulphide
B.	Gaseous pollutants	2.	Metallic particles
C.	Primary pollutants	3.	O_3
D.	Secondary pollutants	4.	DDT

Codes

	A	B	C	D		A	B	C	D
(a)	2	1	4	3	(b)	4	3	2	1
(c)	3	2	4	1	(d)	2	3	1	4

134 Match the following columns.

	Column I		**Column II**
A.	Bhopal Gas Tragedy	1.	Ramesh Chandra Dagar
B.	Integrated organic farming	2.	Reduction in emission of greenhouse gases (2005)
C.	National forest policy	3.	December 23, 1984
D.	World Environment Day	4.	1988
E.	Kyoto protocol	5.	5th June

Codes

	A	B	C	D	E
(a)	1	2	3	4	5
(b)	2	3	4	1	5
(c)	3	1	4	5	2
(d)	5	1	2	3	4

135 Match the following columns.

	Column I		Column II
A.	Suspended solids	1.	Nitrates, ammonia, phosphate, sodium and calcium
B.	Colloidal materials	2.	Faecal matter, bacteria, paper and cloth fibres
C.	Dissolved materials	3.	Sand, silt and clay

Codes

	A	B	C		A	B	C
(a)	1	2	3	(b)	2	3	1
(c)	3	1	2	(d)	3	2	1

136 Match the following columns.

	Column I (Food chain)		Column II (Biomagnifications of DDT)
A.	Fish eating birds	1.	2 ppm
B.	Large fish	2.	0.5 ppm
C.	Small fish	3.	0.04 ppm
D.	Zooplankton	4.	25 ppm

Codes

	A	B	C	D		A	B	C	D
(a)	3	2	4	1	(b)	4	1	2	3
(c)	2	3	4	1	(d)	3	4	1	2

137 Match the following columns.

	Column I (Air pollution control measures)		Column II (Used for)
A.	Catalytic converter	1.	Particulate matter
B.	Electrostatic precipitator	2.	Carbon monoxide and nitrogen oxides
C.	Scrubber	3.	Sulphur dioxide

Codes

	A	B	C		A	B	C
(a)	1	2	3	(b)	2	1	3
(c)	1	3	2	(d)	3	2	1

138 Match the following columns.

	Column I		Column II
A.	Polyblend	1.	Mercury
B.	EcoSan	2.	Bitumen
C.	Biomagnification	3.	Kerala

Codes

	A	B	C		A	B	C
(a)	1	2	3	(b)	2	3	1
(c)	3	2	1	(d)	2	1	3

139 Match the following columns.

	Column I (Greenhouse gases)		Column II (Relative contributions)
A.	CO_2	1.	14 %
B.	CH_4	2.	6 %
C.	N_2O	3.	60 %
D.	CFC + HFC	4.	20 %

Codes

	A	B	C	D		A	B	C	D
(a)	3	4	2	1	(b)	4	3	2	1
(c)	2	3	4	1	(d)	1	4	2	3

140 Match the following columns.

	Column I (Acts to reduce deforestation)		Column II (Years)
A.	Bishnoi Community	1.	1988
B.	Chipko Movement	2.	1980
C.	Joint Forest Management	3.	1974
D.	The National Forest Policy	4.	1731

Codes

	A	B	C	D		A	B	C	D
(a)	1	4	3	2	(b)	4	3	2	1
(c)	3	2	1	4	(d)	4	1	2	3

141 Match the following columns.

	Column I		Column II
A.	Catalytic converter	1.	Thermal power plant
B.	Electrostatic precipitator	2.	Platinum, palladium and rhodium
C.	Earmuffs	3.	High noise level
D.	Landfills	4.	Solid wastes

Codes

	A	B	C	D		A	B	C	D
(a)	1	4	3	2	(b)	4	3	2	1
(c)	3	2	1	4	(d)	2	1	3	4

142 Match the following columns. ***NEET 2018***

	Column I		Column II
A.	Eutrophication	1.	UV-B radiaiton
B.	Sanitary landfill	2.	Deforestation
C.	Snow blindness	3.	Nutrient enrichment
D.	Jhum cultivation	4.	Waste disposal

Codes

	A	B	C	D		A	B	C	D
(a)	3	4	1	2	(b)	1	3	4	2
(c)	2	1	3	4	(d)	1	2	4	3

NCERT & NCERT Exemplar

MULTIPLE CHOICE QUESTIONS

NCERT

143 The constituents of domestic sewage are
(a) suspended solids (b) colloidal materials
(c) undissolved materials (d) Both (a) and (b)

144 The solid wastes can best be managed
(a) by open burning dumps
(b) by municipality agencies
(c) by sanitary landfills
(d) All of the above

145 Choose one of the best method to reduce the effect of global warming amongst the following.
(a) Reducing anthropogenic activities and reducing rate of human population growth
(b) Reforestation
(c) Desertification
(d) Use of biodiesel

146 The probable cause of ozone hole over Antarctica is
(a) emission of CFC
(b) release of CH_4
(c) high concentration of CO_2
(d) None of the above

147 Which of the following causes mutations and genetic disorders in organisms?
(a) Radioactive wastes
(b) Defunct ships and e-wastes
(c) Municipal solid wastes
(d) None of the above

NCERT Exemplar

148 Non-biodegradable pollutants are created by
(a) nature (b) excessive use of resources
(c) humans (d) natural disasters

149 According to the Central Pollution Control Board (CPCB), the diameter of particles that are responsible for causing great harm to human health is
(a) 2.5 micrometers (b) 5.0 micrometers
(c) 10.0 micrometers (d) 7.5 micrometers

150 Compressed Natural Gas (CNG) is
(a) propane (b) methane (c) ethane (d) butane

151 World's most problematic aquatic weed is
(a) *Azolla* (b) *Wolffia*
(c) *Eichhornia* (d) *Trapa*

152 Which of the following exhibits biomagnification?
(a) SO_2 (b) Mercury
(c) DDT (d) Both (b) and (c)

153 The expanded form of DDT is
(a) Dichloro Diphenyl Trichloroethane
(b) Dichloro Diethyl Trichloroethane
(c) Dichloro Dipyrydyl Trichloroethane
(d) Dichloro Diphenyl Tetrachloroacetate

154 Choose the incorrect statement.
(a) The Montreal protocol is associated with the control of emission of ozone depleting substances
(b) Methane and carbon dioxide are greenhouse gases
(c) Dobson units are used to measure oxygen content of air
(d) Use of incinerators is crucial to disposal of hospital wastes

155 The green scum seen in the freshwater bodies is
(a) blue-green algae (b) red algae
(c) green algae (d) Both (a) and (c)

156 The loudness of a sound that a person can withstand without discomfort is about
(a) 150 dB (b) 215 dB (c) 30 dB (d) 80 dB

157 The major source of noise pollution, worldwide is due to
(a) office equipment
(b) transport system
(c) sugar, textile and paper industries
(d) oil refineries and thermal power plants

158 Catalytic converters are fit into automobiles to reduce emission of harmful gases. Catalytic converters change unburnt hydrocarbons into
(a) carbon dioxide and water
(b) carbon monoxide
(c) methane
(d) carbon dioxide and methane

159 Nuisance growth of aquatic plants and bloom forming algae in natural water is generally due to high concentrations of
(a) carbon (b) sulphur (c) calcium (d) phosphorus

160 In the textbook you came across 'three mile island and chernobyl disasters associated with accidental leakage of radioactive wastes.' In India, we had Bhopal gas tragedy. It is associated with which of the following?
(a) CO_2 (b) Methyl isocyanate
(c) CFCs (d) Methyl cyanate

161 Which one of the following diseases is not due to contamination of water?
(a) Hepatitis-B (b) Jaundice
(c) Cholera (d) Typhoid

162 The material generally used for sound proofing of rooms like a recording studio and auditorium, is
(a) cotton
(b) coir
(c) wood
(d) styrofoam

163 Which of the following materials takes the longest time for biodegradation?
(a) Cotton (b) Paper
(c) Bone (d) Jute

164 Among the following which one causes more indoor chemical pollution?
(a) Burning coal
(b) Burning cooking gas
(c) Burning mosquito coil
(d) Room spray

165 Why is it necessary to remove sulphur from petroleum products?
(a) To reduce the emission of sulphur dioxide in exhaust fumes
(b) To increase efficiency of automobiles engines
(c) To use sulphur removed from petroleum for commercial purposes
(d) To increase the lifespan of engine silencers

166 Which one of the following impurities is easiest to remove from waste water?
(a) Bacteria
(b) Colloids
(c) Dissolved solids
(d) Suspended solids

167 Match the following columns and choose the correct option.

	Column I		Column II
A.	Environment Protection Act	1.	1974
B.	Air Prevention and Control of Pollution Act	2.	1987
C.	Water Act	3.	1986
D.	Amendment of Air Act to include noise as an air pollutant	4.	1981

Codes

	A	B	C	D		A	B	C	D
(a)	3	4	1	2	(b)	1	3	2	4
(c)	4	1	2	3	(d)	3	4	2	1

168 Algal blooms impart a distinct colour to water due to
(a) their pigments
(b) excretion of coloured substances
(c) formation of coloured chemicals in water facilitated by physiological degradation of algae
(d) absorption of light by algal cell wall

169 Match the items in Column I and Column II and choose the correct option.

	Column I		Column II
A.	UV rays	1.	Biomagnification
B.	Biodegradable organic matter	2.	Eutrophication
C.	DDT	3.	Snow blindness
D.	Phosphates	4.	BOD

Codes

	A	B	C	D		A	B	C	D
(a)	2	1	4	3	(b)	3	2	4	1
(c)	3	4	1	2	(d)	3	1	4	2

Answers

› *Mastering NCERT with MCQs*

1 (d) 2 (b) 3 (c) 4 (d) 5 (c) 6 (c) 7 (c) 8 (c) 9 (b) 10 (a) 11 (a) 12 (d) 13 (a) 14 (d) 15 (b)
16 (d) 17 (a) 18 (b) 19 (c) 20 (d) 21 (d) 22 (b) 23 (d) 24 (a) 25 (a) 26 (b) 27 (a) 28 (c) 29 (b) 30 (b)
31 (c) 32 (c) 33 (d) 34 (a) 35 (b) 36 (a) 37 (a) 38 (c) 39 (b) 40 (a) 41 (a) 42 (d) 43 (b) 44 (b) 45 (b)
46 (c) 47 (c) 48 (a) 49 (c) 50 (b) 51 (a) 52 (d) 53 (c) 54 (d) 55 (c) 56 (a) 57 (c) 58 (d) 59 (c) 60 (b)
61 (b) 62 (a) 63 (c) 64 (d) 65 (d) 66 (b) 67 (b) 68 (b) 69 (d) 70 (d) 71 (d) 72 (a) 73 (d) 74 (d) 75 (b)
76 (d) 77 (b) 78 (c) 79 (c) 80 (a) 81 (c) 82 (a) 83 (a) 84 (b) 85 (a) 86 (d)

› *NEET Special Types Questions*

87 (b) 88 (d) 89 (d) 90 (b) 91 (c) 92 (a) 93 (b) 94 (a) 95 (c) 96 (d) 97 (d) 98 (d) 99 (b) 100 (a) 101 (d)
102 (c) 103 (a) 104 (b) 105 (b) 106 (c) 107 (c) 108 (d) 109 (d) 110 (d) 111 (c) 112 (b) 113 (d) 114 (d) 115 (c) 116 (b)
117 (d) 118 (b) 119 (b) 120 (a) 121 (b) 122 (a) 123 (d) 124 (b) 125 (c) 126 (a) 127 (c) 128 (a) 129 (a) 130 (a) 131 (d)
132 (b) 133 (a) 134 (c) 135 (d) 136 (b) 137 (b) 138 (b) 139 (a) 140 (b) 141 (d) 142 (a)

› *NCERT & NCERT Exemplar Questions*

143 (d) 144 (d) 145 (a) 146 (a) 147 (a) 148 (c) 149 (a) 150 (b) 151 (c) 152 (d) 153 (a) 154 (c) 155 (d) 156 (d) 157 (b)
158 (a) 159 (d) 160 (b) 161 (a) 162 (d) 163 (c) 164 (a) 165 (a) 166 (d) 167 (a) 168 (a) 169 (c)

Answers & Explanations

1 (*d*) Ozone (O_3) is a secondary pollutant as it is formed by reaction amongst primary pollutants. On the other hand, SO_2 is a primary pollutant. These pollutants persist in the environment in the form they are passed into it. CO is qualitative pollutant. It is considered as pollutant only when its concentration reaches beyond a threshold value in the environment.
CO_2 is a quantitative as well as a primary pollutant.

5 (*c*) Electrostatic precipitator is used to remove particulate matter present in the exhaust of thermal power plant. These are very efficient devices, which remove 99% of particulates of 5-20 μm size, present in the industrial and thermal plant exhausts.

10 (*a*) A scrubber in the exhaust of a chemical industrial plant removes gases like sulphur dioxide. The dirty air is cleaned by capturing the harmful gases in water/lime spray.

11 (*a*) Suspended particulate matter is less than 10 μm in size. Particulate matter consists of soot, flyash, fur, hair, spores, pollen, etc. These are differentiated into settleable (larger than 10 μm remaining in air for less than one day) and suspended (less than 10 μm remaining in air for more than one day to several weeks). SPM (Suspended Particulate Matter) consists of aerosol (less than 1 μm), dust (more than 1 μm) and mist (liquid, more than 1 μm).

14 (*d*) Catalytic converters having expensive metals like platinum, palladium and rhodium as the catalysts, are fitted in automobiles for reducing the emission of poisonous gases like NO and CO. As it converts carbon monoxide (CO) and nitric oxide (NO) to less harmful gases, i.e. carbon dioxide and nitrogen gas.

16 (*d*) Both (a) and (b) are correctly matched pairs. Option (c) represents the incorrect pair and can be corrected as SO_2, i.e. sulphur dioxide gas is removed with the help of scrubber.

19 (*c*) A brief exposure to extremely high sound level, 150 dB or more generated by a jet plane or rocket takes of, may damage eardrums thus, permanently impairing hearing ability (deafness).

22 (*b*) Euro-III norms were stipulated to control sulphur content at 350 ppm in diesel and 150 ppm in petrol.

23 (*d*) Air (Prevention and control of pollution) Act came into force in 1981, but was amended in 1987 to include noise as an air pollutant.

26 (*b*) The amount of biodegradable organic matter in sewage water can be estimated by measuring biochemical oxygen demand. Biochemical Oxygen Demand (BOD) is the amount of oxygen used for biochemical oxidation by microorganisms in a unit volume of water. Polluted water has high BOD. Thus, when sewage gets mixed with river water, its BOD will increase.

28 (*c*) Biochemical Oxygen Demand (BOD) is not a good index for checking the pollution levels of waterbodies receiving effluents from petroleum industry. This is because petroleum industries release non-biodegradable waste, which cannot be degraded by microbes.

30 (*b*) High value of BOD in a water source indicates the presence of high level of pollutants. Highly polluted water bodies has increased demand of oxygen and as a result there is a sharp decline in dissolve oxygen. Thus, the level of BOD increases.

31 (*c*) A river with an inflow of domestic sewage which is rich in organic waste will reduce the Dissolved Oxygen (DO) content. The biodegradation of organic waste will increase biological oxygen demand of the river thus, consumes a lot of O_2 . Therefore, depleting the O_2 content and may result in death of fish due to the lack of oxygen.

32 (*c*) Biochemical oxygen demand is the amount of oxygen (in milligrams) required for five days in one litre of water at 20ºC for the microorganisms to metabolise organic waste. BOD increases with increase of pollution.

Thus, arrangement of the statements in the increasing order of their BOD level is III→ II → I.

33 (*d*) Option (d) is incorrect for algal bloom and can be corrected as

Growth of planktonic algae not *Eichhornia* causes water discolouration. Rest all are correct.

34 (*a*) Water hyacinth (*Eichhornia crassipes*) also called 'Terror of Bengal' is one such plant that sometimes chokes ponds, lakes and rivers. These grow abundantly in eutrophic water bodies, and lead to an imbalance in the dynamics of the ecosystem of water bodies.

35 (*b*) Water hyacinth (*Eichhornia*) causes death of fishes as it reduces the O_2 level in water.

It is termed as the terror of Bengal because it drains dissolved oxygen of the water, i.e. increases BOD (Biochemical Oxygen Demand). It grows abundantly in eutrophic water body and imbalances water ecosystem, leading to the death of fishes.

36 (*a*) Biomagnification refers to increase in concentration of toxicants at successive trophic levels. This happens when a toxic substance gets accumulated in an organism and it cannot be metabolised or excreted. It is thus passed on to the next higher trophic level.

38 (*c*) If a pond gets polluted, then out of the given options, concentration of DDT would be the highest in a carnivorous fish. This is because, concentration of toxicants increase at successive trophic levels as these get accumulated when organisms cannot metabolise or excrete them.

Since, out of the given options, a carnivorous fish occupies the highest trophic level in an aquatic food chain, concentration of DDT would be the highest in it.

39 (*b*) DDT is a toxic substance, which gets concentrated subsequently in a food chain of an aquatic ecosystem in the following manner

$$\underset{(0.04\,ppm)}{\text{Phytoplanktons}} \rightarrow \underset{(0.5\,ppm)}{\text{eel}} \rightarrow \underset{(2\,ppm)}{\text{Crab}} \rightarrow \underset{(25\,ppm)}{\text{Seagull}}$$

Thus, the animal or organism acquiring the highest position in a food chain would have the highest DDT concentration (here seagull).

41 (*a*) Eutrophication is caused due to the accumulation of minerals in water bodies. It is the process of natural ageing of lakes by the biological enrichment of its water. In a young lake, the water is clear, supporting little life. With time due to the introduction of nutrients such as nitrogen and phosphorus, growth of microorganisms is encouraged which deteriorates the water quality and depleting the dissolved O_2 in water.

44 (*b*) Option (b) represents the incorrect pair and can be corrected as

Phosphorus encourages the growth of aquatic organisms. Rest other options are correctly matched.

49 (*c*) Polyblend is an innovative remedy for plastic waste. Polyblend is a fine powder of recycled modified plastic which when mixed with bitumen, can be used to lay roads. This mixture helps to increase the road life by a factor of three.

52 (*d*) High level radioactive waste can be managed by dumping it in sealed containers at about 500 m deep below the earth's surface.

53 (*c*) Nuclear waste is usually disposed by burying it within rocks deep below the earth's surface. Nuclear waste disposal is extremely hazardous. Before burrying the waste, it is sealed in large containers, so as to reduce its radiation effects.

57 (*c*) Greenhouse effect is mainly contributed by carbon dioxide (60%) and methane (20%) along with nitrous oxide, nitrogen dioxide and chlorofluorocarbons. Greenhouse effect results in the rise in temperature of earth because greenhouse gases has the ability to trap the heat of solar radiations.

59 (*c*) The excess amount of CO_2 forms a thick 'blanket'in the atmosphere, which is transparent to sunlight, but absorbs infrared radiations trapping heat near the earth's surface. In this way, due to the CO_2 blanket, the earth's atmosphere works very much like a greenhouse, which causes warming up of the interiors. So, carbon dioxide is called a greenhouse gas.

61 (*b*) The temperature of the earth has increased by 0.6º C in the last three decades, which will lead to changes in precipitation patterns. This rise in temperature leads to deleterious changes in environment resulting in odd climatic changes called El Nino effect.

62 (*a*) Global warming can be controlled by reducing deforestation and cutting down use of fossil fuel, which results into reduction of accumulation of the greenhouse gases.

The other ways of reducing global warming are slowing down the growth of human population, improving efficiency of energy usage, etc.

63 (*c*) The ozone layer is mainly found in the upper part of the atmosphere called the stratosphere, i.e. approximately 20-30 km above the earth. Ozone layer acts as a shield by absorbing UV-rays from the sun.

67 (*b*) In stratosphere, Cl acts as a catalyst in the degradation of ozone and release of molecular oxygen. It is released by action of UV rays on chlorofluorocarbons. Chlorine reacts with ozone in a series of chain reactions, converting it into molecular oxygen and nascent oxygen (O). One active chlorine can destroy 5000 molecules of ozone in one month.

70 (*d*) Depletion of stratospheric zone enables the UV-radiations to reach the earth's surface. The exposure to these radiations has increased the occurrence of skin cancer, snow blindness (damage to eyes), herpes and deficient functioning of immune system, etc.

Liver cancer is not a consequence of UV exposure, it is a pathogen induced, health or life style induced disease.

71 (*d*) Montreal protocol act is aimed with reducing the emission of chlorofluorocarbons into atmosphere because it has the deleterious effects on stratospheric ozone. This protocol was signed in Montreal, Canada in 1987.

76 (*d*) Salinity of soil is a problem faced by farmers if they liberally irrigate agricultural field for a prolonged period of time.

Irrigation salinity is the accumulation of salts in the topsoil under irrigation. It is caused by over irrigation of agricultural land, in efficient water use, poor drainage and the irrigation of unsuitable and leaky soils.

79 (*c*) In tribal North-Eastern states of India, farmers perform Jhum cultivation in which trees of the forest are cut down and burned. The ash produced is used as a fertiliser and the land is then used for farming or cattle grazing. After cultivation, the area is left for several years so as to allow its recovery and repeat this process in another area. Thus, this shifting cultivation method also contributes in deforestation.

82 (*a*) Reforestation is the natural or intentional restocking of forests and woodlands that existed earlier but were depleted at some point of time in the past, usually through deforestation.

85 (*a*) In 1980s, the Government of India has introduced the concept of 'Joint Forest Management (JFM)' to work closely with the local communities for protecting and managing forests on mutual benefits.

87 (*b*) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.

Catalytic converter fitted in the vehicle can convert harmful gases to less harmful gases and reduce their potential hazards. Thereby greatly reducing the pollution caused by automobiles. SPM is a pollutant generated from natural sources such as volcanoes or dust storms and also by human activities such as diesel vehicles, industrial plants, etc.

88 (*d*) Assertion is false, but Reason is true and Assertion can be corrected as

UV-radiations do not cause photodissociation of ozone into O_2 and O, instead, it takes part in the formation of ozone in following two steps

$$O_2 \xrightarrow{\text{UV-radiations}} [O] + [O]$$

$$O_2 + [O] \xrightarrow{\text{UV-radiations}} \underset{\text{(Ozone)}}{O_3}$$

89 (*d*) Assertion is false, but Reason is true and Assertion can be corrected as

Good ozone is formed in stratosphere and absorbs harmful UV-radiations from the sun. Bad ozone is formed in troposphere and is harmful to plants and animals.

90 (*b*) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.

The increase in the global mean temperature is referred to as global warming. The main reason for global warming is the greenhouse effect. Ozone layer of stratosphere is continuously depleting due to the increase in ozone depleting substances such as CFCs, CH_4, etc., in atmosphere. The thinning of the ozone layer results in an increase in the amount of UV-radiations reaching the earth surface.

91 (*c*) Assertion is true, but Reason is false. Reason can be corrected as

Introduction of efficient engines in automobiles such as multi-point fuel injection engine have reduced the unburnt hydrocarbon (methane) content in the exhausts.

92 (*a*) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

Biochemical Oxygen Demand (BOD) is the amount of O_2 (in milligrams), required to decompose organic matter present in one litre of water which is heavily polluted. Increase in BOD value causes sharp decline in dissolved oxygen in water and hence it indicates that the water is polluted.

93 (*b*) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.

Green muffler or green belt vegetation is rows of trees and shrubs grown and maintained to serve as noise absorbers. It also reduces air pollution becasue the trees and shrubs absorb polluted gases and cause setting of suspended particulate matter.

94 (*a*) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

According to the Central Pollution Control Board, particulate matter of size 2.5 µm or less in diameter can cause great harm to human health.

This is because these particulates can be inhaled deep into the lungs and cause breathing or respiratory changes.

95 (*c*) Statement in option (c) is incorrect and can be corrected as

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

Rest of the statements are correct.

96 (*d*) Statement in option (d) is correct.

Rest of the statements are incorrect and can be corrected as

- Smoke from forest fires, volcanic eruptions cause air pollution.
- Decomposition of garbage results in the release of unwanted gases into the atmosphere.
- Burning of fossil fuels and industries releases particulate are air pollutants.

98 (*d*) Statement in the option (d) is incorrect and can be corrected as

Environment (protection) Act to protect and improves the quality of our environment (air, water and soil) was implemented in 1986.

Rest of the statements are correct.

99 (*b*) Statement in option (b) is correct.

Rest of the statements are incorrect and can be corrected as

- A scrubber can remove gases like sulphur dioxide from industrial exhausts.
- Water dissolves gases lime reacts with sulphur dioxide to produce a precipitate of calcium sulphate or calcium sulphide.

100 (*a*) Statement in option (a) is correct.

Rest of the statements are incorrect and can be corrected as

- Catalytic converters have expensive metals like platinum, palladium and rhodium which act as catalysts.
- As the exhaust emission passes through the catalytic converter, nitric oxide is changed to nitrogen gas, carbon monoxide is oxidised to carbon dioxide and unburnt hydrocarbons get completely burnt into CO_2 and H_2O.
- Motor vehicles fit with catalytic converters should use unleaded petrol because the lead in petrol inactivates the catalyst.

102 (*c*) Statement given in option (c) is incorrect and can be corrected as

Noise is measured in dB unit whereas, thickness of the ozone is measured in terms of Dobson unit (DU).

Rest of the statements are correct.

104 (*b*) Statement in option (b) is incorrect and can be corrected as

Higher amounts of the pesticide (DDT) disturbs calcium metabolism in birds and causes thinning of eggshells. Rest of the statements are correct.

105 (*b*) Statement in option (b) is correct.

Rest of the statements are incorrect and can be corrected as

- Eutrophication is the natural ageing of a water body by nutrient enrichment.
- The plant nutrients responsible for eutrophication are nitrates and phosphates.
- Phosphates and nitrates accelerate the growth of algae which utilise the oxygen in water and deoxygenate it is enough to kill the fishes and other aquatic animals.

106 (*c*) Statement in option (c) is not valid for aerosols. Aerosol refers to the suspended particulate matter of less than 1 µm size. These are suspended in the atmosphere and have a measurable effect on climate change as these can modify the amount of energy reflected by clouds. As a result, these can change the atmospheric circulation patterns and affect agricultural productivity negatively. These also affect human health by causing breathing problems.

Rest of the statements are valid for aerosol.

108 (*d*) Statement in option (d) is incorrect regarding EcoSan toilets and can be corrected as

EcoSan toilets reduce the need for chemical fertiliser as human excreta can be recycled into a resource (as natural fertiliser) in this method.

Rest of the statements are correct.

111 (*c*) Statement in option (c) correctly represents the harmful effects of depletion of earth's ozone layer.

On the other hand, statements in options (a), (b) and (d) represent the harmful effects of global warming.

112 (*b*) Statement in option (b) is incorrect and can be corrected as

Ozone in lower part of atmosphere (troposphere) is harmful to animals. This ozone is also called as 'bad' ozone.

Rest of the statements are correct.

113 (*d*) Statement in option (d) is correct.

Good ozone is found in the upper part of the atmosphere, i.e. stratosphere. Bad ozone is formed in the lower atmosphere, i.e. troposphere. Stratospheric ozone protects us from UV-radiations.

115 (*c*) The statements II and III are correct. The statement I is incorrect and can be corrected as

In 1998, Ahmed Khan, aged 57 years old, developed polyblend a fine powder of recycled modified plastic.

116 (*b*) Statements I, II, III and IV pertain correctly to solid wastes. Statement V is incorrect and can be corrected as

Incineration is one of the methods of disposal advised for solid waste disposal.

118 (*b*) Statements I, III and IV are correct for contribution of various factors towards greenhouse effect.

Statements II, V and VI do not contain correct information and can be corrected as

- Biological magnification and eutrophication contribute to water pollution.
- Odd climatic changes such as El nino effect is the result of greenhouse effect and global warming.
- Use of refrigerants like chlorofluorocarbons leads to the ozone depletion.

119 (*b*) Statements I and III are correct. Statement II is incorrect and can be corrected as

Ozone present in stratosphere acts as a shield absorbing UV- radiations coming from the sun.

120 (*a*) Statements I and II are correctly showing the harmful effects of global warming.

Statement III is incorrect and can be corrected as

Increased temperature will lead to the increased weed growth, eruption of diseases and pests. Thus, crop productivity will decrease.

121 (*b*) Statements II, III and IV correctly describe the consequences of deforestation. Statement I is incorrect and can be corrected as

Deforestation can result in an increased carbon dioxide (CO_2) concentration in the atmosphere because trees that could hold a lot of carbon in their biomass are lost with deforestation.

122 (*a*) Statements I and II are correct for advantages of ecological sanitation. Statement III is incorrect and can be corrected as

Human excreta can be recycled into natural fertilisers to replace the chemical fertilisers.

124 (*b*) Statements I and II are correct. Statement III is incorrect and can be corrected as

A tree plantation movement or Van Mahotsava is being carried out in India since 1950.

125 (*c*) Statements II and III are correct. Statement I is incorrect and can be corrected as

Soil without a vegetation cover is easily eroded by both wind and water.

126 (*a*) Statements I and II are correct for desertification. Statement III is incorrect and can be corrected as

Desertified area cannot be put to any further use.

127 (*c*) Statements II and III are correct. Statement I is incorrect and can be corrected as

Chipko movement was initially meant for protecting trees, but now meant for preservation of environment including habitat and wildlife.

128 (*a*) Statements I and II are correct, while III is incorrect and can be corrected as

River water may have a very low concentration of DDT, but the carnivorous fish in that river may contain high concentration of DDT, which is not suitable for consumption by human beings.

129 (*a*) Statements I and II are correct for greenhouse effect. Statement III is incorrect and can be corrected as

Increase in the level of greenhouse gases results in the considerable heating of the earth leading to global warming.

130 (*a*) Statements I, II and IV are correct. Statement III is incorrect and can be corrected as

In the 1990s, Delhi ranked fourth among the 41 most polluted cities of the world.

132 (*b*) Statements I, II and III are correct. Statement IV is incorrect and can be corrected as

According to an estimate, a substantial fall in CO_2 and SO_2 levels have been found in Delhi between 1997 and 2005.

145 (*a*) Reducing anthropogenic (human) activities and reducing rate of human population growth is one of the best method to reduce the effect of global warming amongst the given option.

This can be explained as due to increase in population size, the demand for various resources (both natural and man-made) increases. Global warming occurs inorder to fulfil this demand. Also certain authropogenic activities also contribute in global warming like excess deforestation, use of automobiles, etc.

146 (*a*) Chlorofluorocarbons (CFCs) react with Ozone (O_3) in the stratosphere and create a hole in the ozone layer. Thus, emission of CFC is the main cause of the ozone hole formed over Antarctica.

147 (*a*) Radioactive wastes emit dangerous high energy waves (radiations), which affect the DNA of an organism. This causes mutations and genetic disorders in living beings.

148 (*c*) Non-biodegradable pollutants are created by human activities like industrialisation. These have a slow or zero rate of degradation by general biological processes. These include plastics, tin container, heavy metals, radioactive substances, etc.

149 (*a*) According to CPCB, particulate matter of 2.5 µm or less in diameter is responsible for causing great harm to human health. The particular matter of 2.5 or less in size if inhaled deep into the respiratory tract (up to lungs) can cause respiratory problems and may even lead to death.

150 (*b*) Compressed Natural Gas (CNG) consists of around 90% methane, by compressing it to less than 1% of volume, it occupies at standard atmospheric pressure. Other options are

Propane and butane together form LPG or Liquified Petroleum Gas, while ethane is used in chemical industry to produce ethene.

151 (*c*) *Eichhornia* (water hyacinth) was introduced in certain water bodies of India to check water pollution, as this weed absorbs mercury, cadmium, lead and nickel from sewage water.

It is considered as the world's most problematic weed as it is an invasive species. If not controlled, water hyacinth covers the enitre pond or lake and impacts water flow, blocks sunlight, acts as prime habitat for mosquito (vector) and starves the water for oxygen.

152 (*d*) Biomagnification, also called as bioaccumulation. It is the accumulation of non-biodegradable toxic materials like Hg (mercury), DDT, etc., in different trophic levels.

154 (*c*) Statement in option (c) is incorrect and can be corrected as

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. On the other hand, oxygen sensors are used to measure the exhaust gas concentration of oxygen.

Rest of the statements are correct.

155 (*d*) The green scum seen in the freshwater bodies mainly consists of green algae and blue-green algae, while the red algae is mostly marine.

156 (*d*) The loudness of a sound that a person can withstand without discomfort is about 80 dB. Prolonged exposure to sound level about 80 dB can be painful and gradually leads to the permanent loss of hearing ability or deafness.

158 (*a*) Catalytic converters contain costly metals like rhodium, platinum and palladium which act as catalysts and when exhaust gas passed through the fit catalytic converter, the unburnt hydrocarbons (cause of cancer) are oxidised into carbon dioxide and water.

159 (*d*) Nuisance growth of aquatic plants and the bloom forming algae in natural water bodies is generally due to high concentration of phosphorus. It favours the growth of aquatic weed plants like *Eichhornia* (water hyacinth) and certain blue-green algae.

160 (*b*) MIC (Methyl Isocyanate) was leaked from the insecticide (SAVIN) unit of the Union Carbide at Bhopal and this leakage lead to the Bhopal Gas Tragedy.

This chemical tragedy occurred on December 2, 1984 at Bhopal, the capital of Madhya Pradesh, in which around 2000-3000 people died on the same night.

161 (*a*) Hepatitis-B is not caused by contamination of water, but by the exposure to infectious agents (i.e. virus).

162 (*d*) The material generally used for sound proofing of rooms like recording studio, cinema hall, auditorium, which absorb sound and enable proofing is styrofoam.

163 (*c*) Out of the given options, bone takes the longest time for biodegradation as it is made up of protein fraction, mineral fraction and organic compounds.

164 (*a*) Burning coal is the cause of major indoor chemical pollution. It releases carbon content in the atmosphere, which combines with oxygen to form carbon dioxide, a threat to environment or may result in the formation of carbon monoxide, which is a threat to human health.

Burning of coal also releases inhalable particles of nitrogen oxides, sulphur dioxides, metal and silicates.

166 (*d*) Three types of impurities are found in waste water, suspended particles (solids), colloidal impurities and dissolved material (inorganic and organic) like calcium, ammonia, toxic material, phosphate, sodium, calcium and nitrate. Out of them suspended solids like sand, silt and clay impurities are easily removed, in sewage treatment plants.

168 (*a*) Algal bloom impart a distinct colour to water due to their pigments. Pigment composition of several groups of algae.

Green algae	–	Chlorophyll-*b*
Brown algae	–	Chlorophyll-$c_1 + c_2$, fucoxanthin
Yellow algae	–	Chlorophyll-$c_1 + c_2$, fucoxanthin
Red algae	–	Phycoerythrin, phycocyanin