Environmental protection

Global warming and Climate change

Rapid urbanization and industrilisation have posed a great threat to the global environment. The gases (Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_20), Chlorofluorocarbons (CFCs), Ozone (O_3) and Water vapour (H_2O)) are **radiatively active gases** (also called **greenhouse gases**) and they can absorb long wave infrared radiation. The increased amount of greenhouse gases in the atmosphere are affecting the global climate and this phenomenon is called **global change**.

A glass house used for raising delicate plants is called **greenhouse**. A greenhouse has higher temperature inside than outside though the interior receives less radiations, it is called **greenhouse effect**.

The capacity of the atmosphere to keep the earth warm depends upon the concentration of greenhouse gases. The excessive increase in concentrations of these gases in the atmosphere would retain more and more of the infrared radiation, resulting in inhanced **greenhouse effect**. The consequent increase in the global mean temperature is referred to as **global warming**.

The **Inter governmental Panel on Climatic Change (IPCC)** periodically makes an assessment of the atmospheric abundance of greenhouse gases and its possible impact on climate and related issues.

Effects on weather and climate

- The average temperature of the earth may increase by 1.4^0 C to 5.8^0 C by the year 2100 from year 1990.
- It is expected that the rise in temperature will be more marked in the regions of middle and higher latitudes.
- The frequency of extreme drought and floods will increase.
- The human disease will increase, particularly in tropical and sub tropical countries due to increase of disease vectors, water borne pathogens etc.

Rise in sea level

- The global warming also contributes to rise in sea level due to thermal expansion of ocean and melting of glaciers and Greenland ice sheets.
- A rise of even half a meter in sea level would affect human population.
- Many of the world's important cities and coastal areas will likely to be hit by storms and floods.

Effect on range of species distribution

- Many species may disappear, as they are unable to migrate temperature change.
- Rapid rise in temperature may cause large scale death of many trees, as they are sensitive to temperature stress.

Food production

- Global warming will reduce crop production due to increase of plant diseases and pests.

Acid rain

When fossil fuels such as coal, oil and natural gas are burned, chemicals like sulphur dioxide and nitrogen oxides are produced. These chemicals react with water in the air to form sulphuric acid and nitric acid. These acid pollutants spread upwards into the atmosphere and are carried by air currents to finally return to the ground in the form of **acid rain**, fog or snow.

The corrosive nature of acid rain causes many forms of environmental damage

Effects of Acid rain

- Acid rain dissolves and washes away nutrients in the soil, which are needed by plants.
- It affects trees more directly by creating holes in the leaves, causing brown dead spots which affect the plant's photosynthesis.
- Acid rain flows as ground water to reach rivers, lakes and wet lands to make water acidic. This affects plant and animal life in aquatic ecosystems.
- It also effects on wildlife by disrupt the food chain endangering the ecosystem.
- Damage buildings, automobiles and other structures made of stone and metal (example: Taj Mahal).
- Acid with other chemicals in the air produces urban smog which causes respiratory problems.

Ozone layer depletion

Stratospheric ozone plays a vital role by protecting the living organisms from the harmful effects of ultraviolet radiations.

Causes of ozone depletion

- Ozone hole refers to the thinning of stratospheric ozone layer during the spring time.
- A number of pollutants enter into the stratosphere and deplete the ozone layer. These include CFCs, CH4 and N2O.
- Among these CFCs are the most damaging agents of ozone layer.
- CH4 and N2O also destroy ozone through a complicated series of reactions.

Effect of ozone depletion

- In humans, the increased UV radiation increases the cataract.
- For mankind causes skin cancer.
- Decline the functioning of the immune system.
- UV radiation damages nucleic acids in the living organisms.
- UV radiation stop photosynthesis in plants and phytoplankton, which in turn affect the food chain.

Environmental laws and protection acts

Constitutional provisions

India is the first country in the world to have provisions for the protection and conservation of environment in its constitution. The provisions for environmental protection in the constitution were made after the **'UN conference on Human Environment' held in Stockholm on 5th June, 1972**. (Therefore 5th June is celebrated as World Environment Day all over the world).

The Constitution of India has a number of provisions demarcating the responsibility of the central and state government towards 'Environmental Protection'.

i) Article 48-A: It declares that **"the state shall try to protect and improve the environment and safeguard the forests and wildlife of the country"**.

ii) Article 51-A(g): It declares that **"it shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wild life and to have sympathy for living creatures"**.

iii) Article 47, 48 and 51A: According to these articles, It is the duty of state to protect and improve the environment and duty of state to protect and improve the environment and public health and provide pollution free water, air and environment for the public.

Environmental laws

Major legislations directly dealing with the protection of environment in India are

1. The wild life protection Act, 1972.
2. The water (Prevention and control of pollution) Act, 1974.
3. The forest conservation Act, 1980.
4. The air (Prevention and control of pollution) Act, 1981.
5. The Environment (Protection) Act, 1986.
6. The Public Liability Insurance Act, 1991.
7. The National Environment Tribunal Act, 1995.

The wild life protection Act, 1972 provides for rational and modern wildlife management, while the forest protection Act, 1980 has been enacted to check indiscriminate deforestation and diversion of forest land for non-forest purposes. The water and air Acts are the major instruments for the control of water and air pollution and these have provided for the establishment of the Central and State Pollution Control Boards.

Salient features of Environmental Protection Act, Air & Water Acts

Environmental (Protection) Act, 1986

This act came into force on Nov 19, 1986, the birth anniversary of late Prime Minister Indira Gandhi. She took interest in environmental issues of the country. This act aimed to protect and improve the quality of environment by Central Government with coordination of the State Government.

There are four main chapters and different clauses under various chapters which lay down the standards, policies and act of environmental degradations and policies for improvement of environment and prevention of human beings from environmental hazards.

- **Chapter I:** Describes the definitions of various entities that are related to environment.
- **Chapter II**: Describes the role of central government to take measures for environment protection and its improvement along with the economic development. It includes the appointment of officers, power to give directions, rules to regulate environmental pollution, laying down procedures and standards for industrial waste, emissions, hazardous waste etc.
- **Chapter III**: Deals with the prevention, control and abatement of environmental pollution. As per the guidelines, a person running an industry or operation cannot emit or discharge environmental pollutants in excess of the permissible limit. Central government or its officers may take samples of air, water, soil or other substance from any factory for the purpose of analysis and upon failure to satisfy the norms, shall liable to be proceeded against and punished accordingly. Penalty - Imprisonment of five years with a fine upto one lakh rupees or it extend to Rs 5000 every day.
- **Chapter IV**: Lists miscellaneous articles which are not pertaining to environment but are guidelines for functioning and conduct of officers and government representatives and these guidelines must be laid before parliament for its validity.

The Air (Prevention and Control of Pollution) Act,1981

As a control of the UN conference on Human environment held on June 1972, steps were taken to prevent all natural amenities and with this in view, this act has been enacted in 1981. The main objectives of this act are:

i) To prevent and control air pollution
ii) To establish Central and State boards for the prevention and control of air pollution, and
iii) To provide and confer powers and functions to the Central and State boards to restore wholesomeness of air.

It consists of 7 chapters and 54 sections.

- **Chapter I:** This chapter defines the following terms such as air pollutant, air pollution, approved fuel ,automobile, chimney emission, control equipment etc.,
- **Chapter II:** It deals with the information regarding CPCB and SPCB, their constitutions, terms and conditions of service of members, delegation of powers to various officials.
- **Chapter III:** This chapter emphasizes the function of central board and state board such as to collect, compile and publish the data regarding air pollution and to guide the concerned industry for the effective prevention and control of air pollution.
- **Chapter IV:** This deals with prevention and control of air pollution. The boards are authorized to declare the air pollution control areas, instruct regarding the emission standards from automobiles and restrict the activities of certain industries. According to this chapter the industrial people are not permitted to allow excess pollutants with respect to standards and in such cases the board has the power to enter, inspect and collect sample, find out the reports in

the state laboratories. On the basis of the report appeal can be made and the persons may be punished.

- **Chapter V:** This chapter deals with the fund, accounts and auditing of the central and state boards.
- **Chapter VI:** If the industry or person fails to follow the standards, they will be punished. **Punishment:** Imprisonment for not less than one year and 6 months, it may extend to 6 years and with fine.
- **Chapter VII:** It deals with the power to amend the schedules, the necessity of state board to maintain a register containing relevant particulars and about the power of central and state government to make rules regarding the air pollution control.

The Water (Prevention and Control of Pollution) Act, 1974

The Water Act was enacted under article 252(1) of the constitution as a social welfare measure.

i) To prevent and control water pollution
ii) To establish Central and State boards for the prevention and control of water pollution, and
iii) To provide and confer powers and functions to the Central and State boards to restore wholesomeness of water.

This act consists of 8 chapters and 64 sections

- **Chapter I:** This chapter explains the terms such as board, central, state board, member, outlet sewer sewage effluent, trade effluent, stream and pollution.
- **Chapter II:** It elaborates about the constitution of central board, state board, committees, terms and conditions of service of members, meeting of the board. It also explains about delegation of powers to chairman, member secretary, officers and other employees of the board.
- **Chapter III:** It deals with the constitution, composition and the special provision of joint board. For eg. A Joint board for the river Cauvery includes officials from Karnataka, Tamilnadu and Pondicherry along with the Central board officials.
- **Chapter IV:** This chapter deals with the functions of central board, state board and their powers to give directions to concerned authorities.
- **Chapter V:** It explains the power of state government to collect samples of effluent, analyze in government laboratory and publish the results. On the basis of the result they may restrict the outlets and discharges into stream or well.
- **Chapter VI:** It deals with the maintenance of funds of central and state board, budgets, annual report submission, account and auditing.
- **Chapter VII:** This elaborates about the penalty in case of offences committed by companies. **Punishment:** Imprisonment for not less than one year and six months but which may extend to 6 years with fine. Incase of failure, an additional fine of Rs.5000/ will be imposed for every day. In such case the names of the offenders may be even published.
- **Chapter VIII:** It explains about the central and state water laboratories, analysts, reports of the analysts, protection, action in good faith and about the power of central and state government to formulate the rules. Important sections under this act are
- **Under Section 19:** The entire National Capital Territory of Delhi has been declared as water pollution prevention control area.
- **Under Section 21:** Officials of DPCC can take samples of the water effluent from any industry stream or well or sewage sample for the purpose of analysis.
- **Under Section 23:** Officials of the state boards can enter any premises for the purpose of examining any plant, record, register etc. or any of the functions of the Board entrusted to him.
- **Under Section 24:** No person shall discharge any poisonous, noxious or any polluting matter into any stream, or well or sewer or on land.

What are the Functions of Central and State Pollution Control Boards

Functions of the Central Pollution Control Board:

1. The main functions of the central board shall be to promote the cleanliness and improve the quality of the air/water in streams and wells and to prevent control for decrease air pollution/water pollution in the country.
2. Advice the central government, on any matter concerning the improvement of the quality of air and prevention control or abatement of air pollution/water pollution.
3. Plan and cause to be execute a nation wide programme through mass media for the provision, control or abatement of air/water pollution.
4. Provide technical assistance and guidance to the state boards carry out and sponsor investigations and research relating to problems of air pollution/water pollution and its control and abatement.
5. Plan, organize the training of persons engaged or to be engaged in programmes for prevention, control and abatement of air pollution on such terms and conditions as the central board may specify.

Functions of the State Pollution Control Board:

1. To advice the central government in any matter concerning the prevention, control or abatement of air/water pollution.
2. To advice the state government, on any matter to plan and cause to be executed a nationwide programme for the prevention, control or abatement of air/water pollution.
3. To collect information relating air/water pollution and to encourage, conduct, participate in investigations and research relating to problems of water pollutions.
4. To plan a comprehensive programme through mass media for prevention control or abatement of air/water pollution.
5. To inspect sewage or trade effluents, works and plants for the treatment of sewage or trade effluent.
6. To lay down, modify or annual effluent standards for the sewage and trade effluents and for the quality or receiving water s resulting from the discharge of effluents and to classify water resulting from the discharge for effluents and classify waters of the state.
7. To evolve economical and reliable methods of effluents of sewage and trade effluents.
8. To evolve methods of utilization of sewage and suitable trade effluents in agriculture.
9. To evolve efficient methods of disposal of sewage and trade effluents on land.
10. To lay down standards of treatment of sewage and trade effluents to be discharged into any particular stream.
11. For prevention, control, abatement of discharged of wastes into stream or wells.

Multiple choice questions:

1. When the SO_2 & NO_2 increases in the atmosphere, its leads to
a. Acid rain
b. Ozone depletion
c. Volcanic eruption
d. Precipitaiton

2. The process of trapping of heat in the troposphere is called
a. Hydrological cycle
b. Green house effect
c. Ozone layer depletion
d. Acid rain

3. Water Act in India was passed in the year
a. 1974
b. 1981
c. 1984
d. 1986

4. The major compound responsible for the ozone layer destruction is
a. Sulphuric acid
b. Nitric acid
c. Chlorofluoro carbon
d. All

5. Increase in the air temperature is known as
a. Air pollution
b. Global warming
c. Thermal pollution
d. Stratosphere

6. The Water (Prevention and Control of pollution) Act was in the year
a. 1974
b. 1981
c. 1984
d. 1986

7. The Air (Prevention and Control of pollution) Act was in the year
a. 1974
b. 1981
c. 1984
d. 1986

8. The major cause for the global population increase in the 19^{th} century was due to
a. Decrease in birth rate
b. Industrial revolution
c. Decrease in death rate
d. Green revolution

9. Which of the following is not a green house gas
a. O_2
b. CO_2
c. CH_4
d. CFC's

10. The environmental protection act was enacted in the year
a. 1974
b. 1981
c. 1984
d. 1986

11. The main impact of urbanization on plant and animal is
a. Increase in species
b. Loss of species
c. Mutation of species
d. both (b) and (c)

12. Which of the following is not a solution for global warming?
a. Reducing fossil fuel consumption
b. Planting more trees
c. De-forestation
d. None of the above

13. The meaning of global warming is
a. Increase in the temperature of climate
b. A planet hotter than earth
c. Solar radiation
d. Cooling effect

14. Primary cause of acid rain around the world is due to
a. Carbon dioxide
b. Sulphur dioxide
c. Carbon monoide
d. Ozone

15. The green house gas is
a. N_20
b. CH_4
c. CO_2
d. All of the above

16. Acid rain effects on
a. Materials
b. Plants
c. Solid
d. All of the above

17. Ozone layer is present in

a. Troposphere
b. Mesosphere
c. Stratosphere
d. Thermosphere

18. The major compound responsible for the ozone layer destruction is
a. CFC
b. Oxygen
c. Methane
d. Carbon dioxide

19. The effect of Acid rain
a. Reduces soil fertility
b. Increases atmospheric temperature
c. Causing respiratory problems
d. None of the above

20. The cause of ozone depletion is found to be due to the wide spread use of
a. Chlorofluro carbon
b. Sulphuric acid
c. Mercury
d. Methyl Iso Cyanate

21. Ozone hole was first discovered over
a. Arctic
b. Antarctic
c. Tropical region
d. Africa

22. The pH of Acid rain water is
a. Less than 5.2
b. less than 5.6
c. less than 6.2
d. less than 5.8

23. Ozone layer thickness is measured in
a. Centimeters
b. Millimeter
c. Dobson unit
d. Decibels

24. The steady decline of ozone in the stratosphere is called
a. Ozone destruction
b. Ozone hole
c. Ozone thinning
d. None of the above

25. Major sources of acid forming compounds are
a. Automobile, coal and oil fired power stations

b. Hydroelectric power stations
c. Solar devices
d. None of the above

26. Which of the following is the remedial measures for Acid rain
a. Reducing the release of oxides of nitrogen and sulphur into the atmosphere
b. Use of coal, free from sulphur
c. Use of electrostatic precipitator and catalytic converters
d. All of the above

27. The process of movement of nutrients from the soil by the Acid rain is called
a. Transpiration
b. Leaching
c. Thermosphere
d. Infilitration

28. Greenhouse effect is related to
a. Green trees on house
b. Global warming
c. Grasslands
d. Greenery in country

29. Which of the following gases contributes maximum to the Greenhouse effect on earth?
a. Carbon dioxide
b. Methane
c. Chlorofluorocarbon
d. Freon

30. Chlorofluorocarbon releases a chemical harmful to ozone is
a. Chlorine
b. Fluorine
c. Nitrogen peroxide
d. Sulphur dioxide

31. Population explosion will cause
a. Biodiversity
b. Stress on ecosystem
c. More employment
d. None of these

32. Which of the following is the ill effect of urbanization?
a. Decrease in agricultural land
b. Loss of greenery
c. Loss of water bodies
d. All of the above

33. Global warming may bring about the following change in the climate of the earth
a. Increase in the rain fall
b. Desertification and melting of glaciers

c. Drought
d. All of the above

34. Which green house gas is known as colourless, non-flammable, sweetish odour & laughing gas?
a. Methane
b. CO_2
c. Nitrous Oxide
d. Sulfur hexa fluoride

35. The first of the major environmental protection act to be promulgated in India was
a. Water act
b. Air act
c. Environmental act
d. Noise pollution rules

36. Global warming could affect
a. Climate
b. Increase in Sea level
c. Melting of glaciers
d. All of the above

37. The major source of SO_2 is
a. Smelter
b. Power station
c. Both (a) and (b)
d. Refineries

38. The ozone layer is located up to _____ Km above the earth surface
a. 10
b. 50
c. 80
d. 100

39. The main pollutants causing acid rain are
a. Copper and antimony
b. Sodium and platinum
c. Nitrogen and sulphur compounds
d. Carbon and silver

40. The growth of plants is
a. Reduced by Acid rain
b. Increased by Acid rain
c. Drastically increased by Acid rain
d. Not affected from Acid rain

41. In order to reduce Acid rain it is advisable to use
a. Coal with high sulphur content
b. Coal with lower sulphur content
c. Coal with high carbon content

d. Coal with low carbon content

42. Acid rain problem can be reduced by
a. Replacing natural gas by coal
b. Replacing coal by natural gas
c. Replacing coal by coke
d. Replacing coal oil

43. Acid rain can be controlled by
a. Reducing SO_2 and NO_2 emissions
b. Reducing oxygen emission
c. Increasing number of lakes
d. Increasing the forest cover

44. Which of the following statements about ozone is true?
a. Ozone is a major constituent of photochemical smog
b. Ozone protects us from the harmful UV radiation of sun
c. Ozone is highly reactive
d. All of the above

45. Ozone layers absorbs
a. UV rays
b. Infra red rays
c. Cosmic rays
d. CO

46. CFCs have been used as
a. Solvent
b. Refrigerants
c. Blowing agents for polymer forms
d. All of these

47. World Ozone day is being celebrated on
a. September 5th
b. October 15th
c. September 16th
d. September 11th

48. To achieve the goal of clean environment, important strategies required are
a. Effective laws
b. Active participation of the public
c. Active participation of NGO's
d. Both (a) and (b)

49. The first united national conference on Human Environment was held at
a. Stockholm
b. Newyork
c. Montreal
d. Basal

50. The constitution of India makes provisions for Environmental protection in the chapters on
a. Fundamental rights
b. Directive principle of state policy
c. Fundamental duties
d. All

51. Environmental pollution is a
a. States problem
b. Global problem
c. Countries problem
d. Regional problem

52. There are provisions for protection of our environment under
a. Indian penal code
b. Police Act
c. Municipal Act
d. All of the above

53. Central pollution control board was established under the provision of
a. The Environmental Protection Act 1986
b. The water Act 1974
c. The water cess Ruler 1978
d. The Air Act 1981

54. The Environmental Protection Act, 1986 deals with
a. Air
b. Water
c. Land
d. All of the above

55. The principal functions of the CPCB are
a. To promote cleanliness of streams and wells
b. To improve quality of air
c. To monitor State Pollution Control Boards
d. Both (a) and (b)

56. Karnataka state pollution control board was established in the year
a. 1974
b. 1982
c. 1986
d. 1976

57. Environmental Education is targeted to
a. General Public
b. Professional and social groups
c. Technicians and Scientists
d. All of the above

58. The study of environmental system and their interaction is fall under
a. Environmental science
b. Environmental engineering
c. Environmental management
d. Both (a) and (c)

59. In which year the Hon. Supreme Court of India, directed to made environmental education as a compulsory subject at all level of education
a. 2003
b. 1997
c. 2002
d. 1986

60. Environmental (Protection) Act was enacted in the year
a. 1986
b. 1992
c. 1984
d. 1974

61. The Air (Prevention & Control of Pollution) Act was enacted in the year
a. 1996
b. 1974
c. 1981
d. 2000

62. The Water (Prevention & Control of Pollution) Act was enacted in the year
a. 1986
b. 1974
c. 1981
d. 2004

63. Earth Day is observed on
a. 1st December
b. 5th June
c. 22nd April
d. 1st January

64. Which of the following is the authority to monitor industrial effluents
a. Center for Science & Environment
b. State Pollution Control Board
c. Indian Environmental Association
d. None

Answer the following questions:

1. Define greenhouse effect. Explain greenhouse effect with a neat sketch.

2. What is Greenhouse effect? Describe how greenhouse effect is affecting humans.

3. Discuss the Global warming/green house effect being a global environmental issue has significant effect on climate.
4. Global warming and climate change being a global environmental issue. Brief explanation the connection between the two.
5. Discuss the causes and effects of global warming.
6. Demonstrate the ways in which the earth gets warmed and its effect on the climate change.
7. Briefly explain the global warming and climate change.
8. List and explain causes and effects of ozone layer depletion.
9. Explain ozone layer depletion. Give causes and effect of this phenomenon.
10. What are the causes, effects and solutions of Acid rain.
11. Define Acid rain. What are its effects and solutions?
12. What is the greenhouse effect, and how does it affect the climate.
13. Mention the salient features of environmental protection act.
14. Give an account on the following acts through legislation
    i) Air act ii) Water act
15. Discuss the salient features of Air Act and Water Act.
16. Discuss the salient features of environmental protection act.
17. Discuss functions of State Pollution Control Board.
18. What are functions of central and state pollution control boards.
19. Write any 4 important functions of state pollution control board.
20. Write any four important functions of central pollution control board.
21. Write any 3 important functions of Central pollution control board.
22. Bring out the difference between functions of central and state pollution control board.