E-CONTENT OF ENVIRONMENTA STUDIES FOR THE STUDENTS OF MECHANICAL ENGINEERING

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CHAPTER -1

Introduction

Basics of Ecology

Ecology is the study of interactions between living things and the environment.

An ecosystem is the combination of living things, such as plants, animals and microscopic organisms, plus environmental factors such as temperature, rain and sun light and ecology studies all of these aspects of an ecosystem.

Ecosystem- concept

An **ecosystem** is a community of living organisms in conjunction with the nonliving components of their environment, interacting as a system.

Sustainable development

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs

Renewable resources

Air, water, wind, solar energy etc are all renewable resources. Renewable resources can be easily renewed by nature.

1. Solar energy: Sun is a big source of energy. The energy that we get from the *Sun* is called solar energy.

2. Hydro-Energy: Water flowing into the river or water stored in a dam is sources of hydro energy.

3. Wind energy: Winds are constantly being created in nature. The windmill is a source of electrical energy.

4. Biogas: It is used as fuel in gas stove especially in rural areas.

5. Wood: Wood is an ancient and traditional source of energy. It is mainly a mixture of many carbohydrate compounds. Wood is used to cook food.

6. Hydrogen: It is a good source of energy because it does not create pollution and produce maximum energy on burning.

7. Alcohol: Alcohol has many commercial and medical purposes. It can use for producing energy. It can be obtained while making sugar from sugarcane.

8. Air: All living things need air to breathe**.** Therefore, air is an important natural resource.

9. Water: All living things water in order to survive.

10. Soil: It is an important resource as this is the layer where plants grow. We all need food in order to survive. We get most of our food from crops grown in the soil.

Non Renewable resources

The other classification of resources is non-renewable resources. Non-renewable resources are those natural resources that are available in limited quantity. These resources cannot be renewed or replenished in short duration. Therefore they are also known as *exhaustible resources*. Examples- coal, natural gas, petroleum etc.

1. Fossil fuel Fossil fuels like coal and petroleum are non-renewable resources. They are found deep inside the earth and are made by natural processes over many centuries.

- **Coal**: It is also known as black diamond. Coal is used as a fuel, to generate electricity, and in factories and steam engines.
- **Natural gas**: Natural gas is used as a fuel called *Compressed Natural Gas or CNG*.
- **Petroleum**: Petroleum is also known as mineral oil or crude oil.

2. Nuclear energy

In the classification of resources, nuclear energy is classified as non-renewable. The fuel used for nuclear energy is generally uranium, which is in a limited supply.

CHAPTER -2

AIR POLLUTION

Air pollution is a mixture of solid particles and gases in the air. Car emissions, chemicals from factories, dust, pollen and mold spores may be suspended as particles. Ozone, a gas, is a major part of air pollution in cities. When ozone forms air pollution, it's also called smog.

SOURCES OF AIR POLLUTION

There are four main types of air pollution sources:

- ***mobile sources*** – such as cars, buses, planes, trucks, and trains
- ***stationary sources*** – such as power plants, oil refineries, industrial facilities, and factories
- ***area sources*** – such as agricultural areas, cities, and wood burning fireplaces
- ***natural sources*** – such as wind-blown dust, wildfires, and volcano

EFFECTS OF AIR POLLUTION

1. **ON HUMAN HEALTH:** Watery eyes, coughing and difficulty breathing are acute and common reactions.

2. **ON ECONOMY:** Air pollution already affects human health, agriculture and leads to a range of other impacts.

3. **ON PLANTS AND ANIMALS:** Air pollution has a lot of influence on vegetation by **attacking its growth sources,** such as airborne molecules, soil minerals or directly its organisms.

4. **SMOG**: It reduces the amount of sun rays arriving to plants, **denying or slowing plant growth**.

5. **Ozone layer depletion:** It increases the amount of UVB arriving to plants

6. **Lead:** It can **inhibit photosynthesis**, what implies **growth and survival issues** for the surrounding vegetation

7. **Nitrogen**: It is essential for plants nutrition, but **high levels of nitrogen dioxide or nitrogen monoxide pollution damage their lives**.

CONTROL METHODS

Some of the effective methods to Control Air Pollution are as follows:

(a) Source Correction Methods:

Industries make a major contribution towards causing air pollution. Formation of pollutants can be prevented and their emission can be minimised at the source itself.

(b) Pollution Control Equipment:

(1) Gravitational Settling Chamber:

For removal of particles exceeding 50 µm in size from polluted gas streams, gravitational settling chambers are put to use.

(2) Cyclone Separators (Reverse flow Cyclone):

Centrifugal force is utilized by cyclone separators, to separate the particulate matter from the polluted gas.

(3) Electrostatic Precipitators:

The electrostatic precipitator (Fig. 5.4) works on the principle of electrostatic precipitation i.e. electrically charged particulates present in the polluted gas are separated from the gas stream under the influence of the electrical field.

(4) Wet Collectors (Scrubbers):

In wet collectors or scrubbers, the particulate contaminants are removed from the polluted gas stream by incorporating the particulates into liquid droplets.

(c) Diffusion of Pollutants in Air:

Dilution of the contaminants in the atmosphere is another approach to the control of air pollution. Dilution of pollutants in air depends on atmospheric temperature, speed and direction of the wind.

(d) Vegetation:

Plants contribute towards controlling air-pollution by utilizing carbon dioxide and releasing oxygen in the process of photosynthesis. This purifies the air (removal of gaseous pollutant—CO_2) for the respiration of men and animals.

(e) Zoning:

This method of controlling air pollution can be adopted at the planning stages of the city. Zoning advocates setting aside of separate areas for industries so that they are far removed from the residential areas.

Chapter-3

WATER POLLUTION

Water pollution is the contamination of water bodies. Water pollution results when contaminants are introduced into the natural environment.

IMPURITIES IN WATER

Water impurities include dissolved and suspended solids. Calcium bicarbonate is a soluble salt. Suspended solids are substances that are not completely soluble in water and are present as particles. These particles usually impart a visible turbidity to the water. Dissolved and suspended solids are present in most surface waters.

TYPES OF IMPURITIES IN WATER

BIOLOGICAL IMPURITIES IN WATER

Biological impurities in water are caused by the presence of living organisms. These include algae, protozoa, pathogens, bacteria, viruses, microbes, and parasites along with their cysts (eggs) in contaminated water.

COLLOIDAL IMPURITIES IN WATER

Colloidal impurities in water include organic waste products and amino acids.

CAUSES OF WATER POLLUTION

1. Industrial waste

Industries produce a huge amount of waste which contains toxic chemicals and pollutants which can cause air pollution and damage to us and our environment. They contain pollutants such as lead, mercury, sulfur, asbestos, nitrates, and many other harmful chemicals.

2. Sewage and wastewater

The sewage and wastewater that is produced by each household is chemically treated and released into the sea with fresh water. The sewage water carries harmful bacteria and chemicals that can cause serious health problems.

3. Mining activities

Mining is the process of crushing the rock and extracting coal and other minerals from underground. Mining activities emit a large amount of metal waste and sulphides from the rocks which is harmful to the water.

4. Marine dumping

The garbage produced by each household in the form of paper, aluminum, rubber, glass, plastic, food is collected and deposited into the sea in some countries. These items take from 2 weeks to 200 years to decompose. When such items enter the sea, they not only cause water pollution but also harm animals in the sea.

5. Accidental oil leakage

Oil spill poses a huge concern as a large amount of oil enters into the sea and does not dissolve with water; thereby opens problem for local marine wildlife such as fish, birds and sea otters.

6. The burning of fossil fuels

Fossil fuels like coal and oil when burnt produce a substantial amount of ash in the atmosphere

7. Chemical fertilizers and pesticides

Chemical fertilizers and pesticides are used by farmers to protect crops from insects and bacteria.

8. Leakage from sewer lines

A small leakage from the sewer lines can contaminate the underground water and make it unfit for the people to drink.

9. Global warming

An increase in earth’s temperature due to the greenhouse effect results in global warming.

10. Radioactive waste

Nuclear energy is produced using nuclear fission or fusion. The element that is used in the production of nuclear energy is Uranium which is a highly toxic chemical.

11. Urban development

As more cities and towns are developed, they have resulted in increasing use of fertilizers to produce more food, soil erosion due to deforestation, increase in construction activities, inadequate sewer collection, and treatment, landfills as more garbage is produced, increase in chemicals from industries to produce more materials.

12. Leakage from the landfills

When it rains, the landfills may leak and the leaking landfills can pollute the underground water with a large variety of contaminants.

13. Animal waste

The waste produced by animals is washed away into the rivers when it rains and causes various water-borne diseases like cholera, diarrhea, jaundice, dysentery and typhoid.

14. Underground storage leakage

Accidentals leakage may cause damage to the environment and result in soil erosion.

SOURCES OF WATER POLLUTION

Direct sources

It includes effluent outfalls from factories, refineries, waste treatment plants etc. that emit fluids of varying quality directly into urban water supplies.

Indirect sources

It includes contaminants that enter the water supply from soils/groundwater systems and from the atmosphere via rain water.

The Effects of Water Pollution on Human Health

1. Diarrhea

In young children, this condition can cause a high fever, persistent vomiting, bloody stools, and possibly unresponsiveness.

2. Salmonella

Salmonella is a type of bacteria that can cause an infection when ingested through contaminated food or water.

3. Cholera

Cholera is a bacterial disease that is generally spread in polluted water.

4. Dysentery

Dysentery is the inflammation of the intestines and is often accompanied by bloody diarrhea.

5. E. Coli

Escherichia coli (E. coli) is a common type of bacteria that is found in the intestines of healthy humans.

6. Hepatitis A

Hepatitis A is a highly contagious liver infection that can be transferred through the consumption of contaminated food or water.

7. Hepatitis E

Hepatitis E is another type of liver disease caused by the hepatitis E virus. It is often associated with contaminated water in countries that have poor sanitation practices.

8. Parasitic Infections

Harmful parasites found in contaminated water can be ingested, causing serious infections in the body.

9. Botulism

Botulism is a type of rare poisoning caused by a toxin known as Clostridium botulinum.

10. Typhoid Fever

Typhoid fever is a serious condition typically spread by contaminated food or water.

Prevention of water pollution

- Use Less Plastic
- Reuse Items
- Recyclable Options
- Do Not Dispose Oils in the Sink
- Cleaning Chemicals
- Do not Throw Away Medicines
- Household Items
- Garbage Disposal
- Dishwashing or Laundry
- Limit the Use of Detergents and Bleaches
- Use Environmentally Friendly Detergents
- Gardening
- Avoid Pesticides
- Conserve Soil

WATER TREATMENT PROCESSES

Water is essential for health, hygiene and the productivity of our community.

Coagulation / Flocculation

During coagulation, liquid aluminum sulfate and polymer is added to untreated water. When mixed with the water, this causes the tiny particles of dirt in the water to stick together or coagulate.

Sedimentation

As the water and the floc particles progress through the treatment process, they move into sedimentation basins where the water moves slowly, causing the heavy floc particles to settle to the bottom.

Filtration

Filtration collects the suspended impurities in water and enhances the effectiveness of disinfection. The filters are routinely cleaned by backwashing.

Disinfection

Water is disinfected before it enters the distribution system to ensure that any disease-causing bacteria, viruses, and parasites are destroyed.

Sludge Drying

Solids that are collected and settled out of the water by sedimentation and filtration are removed to drying lagoons.

Fluoridation

Water fluoridation is the treatment of community water supplies for the purpose of adjusting the concentration of the free fluoride ion to the optimum level sufficient to reduce dental caries.

pH Correction

Lime is added to the filtered water to adjust the pH and stabilise the naturally soft water in order to minimize corrosion in the distribution system, and within customers' plumbing.

SEWAGE TREATMENT

Wastewater (liquid waste) from flushing the toilet, bathing, washing sinks and general cleaning goes down the drain and into a pipe, which joins a larger sewer pipe under the road. The larger pipe also joins a major pipe that leads to the treatment center.

STAGE ONE: SCREENING

Screening is the first stage of the wastewater treatment process. Screening removes large objects like, diapers, nappies, sanitary items, cotton buds, face wipes and even broken bottles, bottle tops, plastics and rags.

STAGE TWO: PRIMARY TREATMENT

This involves the separation of organic solid matter (or human waste) from the wastewater. This is done by putting the wastewater into large settlement tanks for the solids to sink to the bottom of the tank. The settled solids are called ‘sludge’.

STAGE THREE: SECONDARY TREATMENT

The water, at this stage, is put into large rectangular tanks. These are called aeration lanes. Air is pumped into the water to encourage bacteria to break down the tiny bits of sludge that escaped the sludge scrapping process.

STAGE FOUR: FINAL TREATMENT

The water at this stage is almost free from harmful substances and chemicals. The water is allowed to flow over a wall where it is filtered through a bed of sand to remove any additional particles.
The filtered water is then released into the river.

Water quality standards

The World Health Organization (WHO) Guideline for Drinking-water Quality (GDWQ) includes the following recommended limits on naturally occurring constituents that may have direct adverse health impact:

- Arsenic 10µg/l
- Barium 10µg/l
- Boron 2400µg/l
- Chromium 50µg/l
- Fluoride 1500µg/l

- Selenium 40µg/l
- Uranium 30µg/l

Organic species:

- Benzene 10µg/l
- Carbon tetrachloride 4µg/l
- 1,2-Dichlorobenzene 1000µg/l
- 1,4-Dichlorobenzene 300µg/l
- 1,2-Dichloroethane 30µg/l
- 1,2-Dichloroethene 50µg/l
- Dichloromethane 20µg/l
- Di(2-ethylhexyl)phthalate 8 µg/l
- 1,4-Dioxane 50µg/l

CHAPTER -4

SOIL POLLUTION

Soil pollution is defined as the presence of toxic chemicals (pollutants or contaminants) in soil, in high enough concentrations to pose a risk to human health and/or the ecosystem.

SOURCES OF SOIL POLLUTION

Some of the most important sources of land or soil pollution are:

1. Domestic and Municipal Wastes:

One of the main causes of land and soil pollution is the growing quantity of domestic and municipal wastes. It includes food scraps, old newspapers, and a variety of plastic items, bottles, discarded papers, wood, lawn trimmings, glass, canes, and old appliances.

2. Industrial and Mining Wastes:

The disposal of industrial solid wastes is the major source of soil pollution by toxic chemicals. The industrial wastes are mainly discharged from coal and mineral mining industries, metal processing industries and engineering industries.

3. Agricultural Wastes:

Agricultural practices also pollute the soil. According to an estimate, agricultural activities produce more than 1.8 billion tones of waste, each year.

4. Radioactive Materials:

The radioactive wastes produced by nuclear testing laboratories and industries reach the soil and accumulate there.

5. Biological Agents:

The excreta of humans, animals and birds are also a source of soil pollution by biological agents.

TYPES OF SOLID WASTE

Solid waste is the unwanted or useless solid materials generated from human activities in residential, industrial or commercial areas. It may be categorized in three ways.

- **Household Waste** (HHW) is post-consumer waste which qualifies as hazardous waste when discarded. It includes household chemicals such as consumer products sold for home care, personal care, automotive care, pest control and other purposes.
- **Hospital waste** contaminated by chemicals used in hospitals is considered hazardous. These chemicals include formaldehyde and phenols, which are used as disinfectants, and mercury, which is used in thermometers or equipment that measure blood pressure.
- **Agricultural waste** is defined as unwanted waste produced as a result of agricultural activities (i.e., manure, oil, silage plastics, fertilizer, pesticides and herbicides; wastes from farms, poultry houses and slaughterhouses; veterinary medicines, or horticultural plastics).

BIO-MEDICAL WASTES

Bio-medical waste means any waste, which is generated during the diagnosis, treatment of human beings or animals or in research activities pertaining thereto or in the production or testing of biological.

E-WASTE

E-waste is a popular, informal name for electronic products nearing the end of their "useful life." Computers, televisions, VCRs, stereos, copiers, and fax machines are common electronic products.

EFFECTS OF SOLID WASTE POLLUTION

- Toxic substances may leach or percolate to contaminate the ground water.
- Municipal solid wastes heap up on the roads due to improper disposal system.
- Electronics contain mercury, lead, cadmium, chromium and other metals that compromise environmental health.

- One effect of solid waste disposal is bad smell.

SOLID WASTE MANAGEMENT

Solid waste management is a term that is used to refer to the process of collecting and treating solid wastes. It also offers solutions for recycling items that do not belong to garbage or trash. Solid waste management is an important aspect of urban area management. Improper disposal of municipal solid waste can create unsanitary conditions, which can lead to environmental pollution and the outbreak of vector-borne disease.

The task of solid waste management presents complex technical challenges. They also pose various economic, administrative, and social problems which need urgent attention.

The major sources of solid waste are households; agricultural fields; industries and mining, hotels and catering; roads and railways; hospitals and educational institutions; cultural centers and places of recreation and tourism etc. Plastic waste is also a solid waste.

Functional Elements of the Waste Management System

There are six functional components of the waste management system, as outlined below:

1. **Waste generation**: This encompasses any activities involved in identifying materials that are no longer usable and are either gathered for systematic disposal or thrown away.
2. **Onsite handling, storage, and processing**: This relates to activities at the point of waste generation, which facilitate easier collection. For example, waste bins are placed at sites that generate sufficient waste.
3. **Waste collection:** A crucial phase of waste management, this includes activities such as placing waste collection bins, collecting waste from those bins, and accumulating trash in the location where the collection vehicles are emptied. Although the collection phase involves transportation, this is typically not the main stage of waste transportation.

4. **Waste transfer and transport**: These are the activities involved in moving waste from the local waste collection locations to the regional waste disposal site in large waste transport vehicles.
5. **Waste processing and recovery**: This refers to the facilities, equipment, and techniques employed to recover reusable or recyclable materials from the waste stream and to improve the effectiveness of other functional elements of waste management.
6. **Disposal**: The final stage of waste management. It involves the activities aimed at the systematic disposal of waste materials in locations such as landfills or waste-to-energy facilities.

Methods of Solid Waste Management

There are different methods of solid waste management. The following are some of the recognized methods:

Sanitary Landfill

This is the most popular solid waste disposal method used today. Garbage is basically spread out in thin layers, compressed and covered with soil or plastic foam. Modern landfills are designed in such a way that the bottom of the landfill is covered with an impervious liner which is usually made of several layers of thick plastic and sand. This liner protects the ground water from being contaminated because of leaching or percolation. When the landfill is full, it is covered with layers of sand, clay, top soil and gravel to prevent seepage of water.

Incineration

This method involves burning of solid wastes at high temperatures until the wastes are turned into ashes. Incinerators are made in such a way that they do not give off extreme amounts of heat when burning solid wastes. This method of solid waste management can be done by individuals, municipalities and even institutions. The good thing about this method is the fact that it reduces the volume of waste up to 20 or 30% of the original volume.

Recovery and Recycling

Recycling or recovery of resources is the process of taking useful but discarded items for next use. Traditionally, these items are processed and cleaned before they are recycled. The process aims at reducing energy loss, consumption of new material and reduction of landfills.

Composting

Due to lack of adequate space for landfills, biodegradable yard waste is allowed to decompose in a medium designed for the purpose.Only biodegradable waste materials are used in composting. Good quality environmentally friendly manure is formed from the compost and can be used for agricultural purposes.

Pyrolysis

This is method of solid waste management whereby solid wastes are chemically decomposed by heat without presence of oxygen. This usually occurs under pressure and at temperatures of up to 430 degrees Celsius. The solid wastes are changed into gasses, solid residue and small quantities of liquid.

CHAPTER-5

NOISE POLLUTION

Noise pollution is generally defined as regular exposure to elevated sound levels that may lead to adverse effects in humans or other living organisms.

SOURCES OF NOISE POLLUTION

- Street traffic sounds from cars, buses, pedestrians, ambulances etc.
- construction sounds like drilling or other heavy machinery in operation
- airports, with constant elevated sounds from air traffic, i.e. planes taking off or landing
- workplace sounds, often common in open-space offices
- constant loud music in or near commercial venues
- industrial sounds like fans, generators, compressor, mills
- train stations traffic
- household sounds, from the television set to music playing on the stereo or computer, vacuum cleaners, fans and coolers, washing machines, dishwashers, lawnmowers etc.
- Events involving fireworks, firecrackers, loudspeakers etc.

UNITS OF NOISE

Sound intensity is measured in units called **decibels** (dB).

EFFECTS OF NOISE POLLUTION

1. Hearing Problems

Our ears can take in a certain range of sounds without getting damaged.Constant exposure to loud levels of noise can easily result in the damage of our eardrums and loss of hearing.

2. Health Issues

Excessive noise pollution in working areas such as offices, construction sites, bars and even in our homes can influence psychological health.

3. Sleeping Disorders

Loud noise can certainly hamper sleeping pattern and may lead to irritation and uncomfortable situations.

4. Cardiovascular Issues

High-intensity noise causes high blood pressure and increases heartbeat rate as it disrupts the normal blood flow.

5. Trouble Communicating

High decibel noise can put trouble and may not allow two people to communicate freely.

6. Effect on Wildlife

Wildlife faces far more problems than humans because of noise pollution since they are more dependent on sound.

AMBIENT AIR QUALITY STANDARDS IN RESPECT OF NOISE

Area Code	Category of Area/Zone	Limits in dB(A)	
		Day	Night
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence Zone	50	40

CONTROL MEASURES

1. Ear-Plugs, Ear-muffs
2. Use of sound barriers
3. Modified machineries
4. Green Cover

CHAPTER-6

Introduction to Water (Prevention and Control of Pollution) Act 1974

This is an Act to provide for the prevention and control of water pollution and the maintaining or restoring of wholesomeness of water through various management guidelines and restrictions. The act was introduced and incorporated into the Constitution of India in 1974.

Functions of the Central Board

- Advise the Central Government on any matter concerning the prevention and control of water pollution.
- Co-ordinate the activities of the State Boards and resolve dispute among them.
- Provide technical assistance and guidance to the State Boards, carry out and sponsor investigations and research relating to problems of water pollution and prevention, control or abatement of water pollution.
- Plan and organize the training of persons engaged or to be engaged in programs for the prevention, control or abatement of water pollution.
- Collect, compile and publish technical and statistical data relating to water pollution and the measures devised for its effective prevention and control.

Functions of the State Board

- Plan a comprehensive programme for the prevention, control or abatement of pollution of streams and wells in the State.
- Advise the State Government on any matter concerning the prevention, control or abatement of water pollution.
- Encourage, conduct and participate in investigations and research relating to problems of water pollution and prevention, control or abatement of water pollution.
- Collaborate with the Central Board in organizing the training of persons engaged or to be engaged in programmes relating to prevention, control or abatement of water pollution.

- Inspect sewage or trade effluents, works, and plants for the treatment of sewage and trade effluents and to review plans, specifications or other data relating to plants set up for the treatment of water.
- Evolve methods of utilization of sewage and suitable trade effluents in agriculture.
- Evolve economical and reliable methods of treatment of sewage and trade effluents, having regard to the peculiar conditions of soils, climate and water resources of different regions.

Introduction to Air (Prevention and Control of Pollution) Act, 1981

The act was introduced and incorporated into the Constitution of India in 1981 laying down guidelines for the preservation of the quality of air and control of air pollution.

Functions of the Central Board

- Advise the Central Government on any matter concerning the improvement of the quality of air and the prevention, control or abatement of air pollution;
- Plan and cause to be executed a nation-wide programme for the prevention, control or abatement of air pollution;
- Co-ordinate the activities of the State and resolve disputes among them;
- Provide technical assistance and guidance to the State Boards, carry out and sponsor investigations and research relating to problems of air pollution and prevention, control or abatement of air pollution.
- Plan and organize the training of persons engaged or to be engaged in programmes for the prevention, control or abatement of air pollution on such terms and conditions as the Central Board may specify;
- Organize through mass media a comprehensive programme regarding the prevention, control or abatement of air pollution;
- Collect, compile and publish technical and statistical data relating to air pollution and the measures devised for its effective prevention, control or abatement and prepare manuals, codes or guides relating to prevention, control or abatement of air pollution.
- Lay down standards for the quality of air.
- Collect and disseminate information in respect of matters relating to air pollution.

Functions of the State Board

- Plan a comprehensive programme for the prevention, control or abatement of air pollution and to secure the execution thereof-,
- Advise the State Government on any matter concerning the prevention, control or abatement of air pollution;
- Collect and disseminate information relating to air pollution;
- Collaborate with the Central Board in organizing the training of persons engaged or to be engaged in programmes relating to prevention, control or abatement of air pollution and to organize mass-education programme relating thereto.
- Inspect, at all reasonable times, any control equipment, industrial plant or manufacturing process and to give, by order, such directions to such persons as it may consider necessary to take steps for the prevention, control or abatement of air pollution;
- Inspect air pollution control areas at such intervals as it may think necessary, assess the quality of air therein and take steps for the prevention, control or abatement of air pollution in such areas;
- Lay down, in consultation with the Central Board and having regard to the standards for the quality of air laid down by the Central Board, standards for emission of air pollutants into the atmosphere from industrial plants and automobiles or for the discharge of any air pollutant into the atmosphere from any other source whatsoever not being a ship or an aircraft.
- Advise the State Government with respect to the suitability of any premises or location for carrying on any industry which is likely to cause air pollution.
- Perform such other functions as may be prescribed or as may, from time to time, be entrusted to it by the Central Board or the State Government.

Environment Protection Act 1986

- co-ordination of actions by the State Governments, officers and other authorities
- planning and execution of a nation-wide programme for the prevention, control and abatement of environmental pollution;
- laying down standards for the quality of environment in its various aspects;
- laying down standards for emission or discharge of environmental pollutants from various sources;

- restriction of areas in which any industries, operations or processes shall not be carried out or shall be carried out subject to certain safeguards;
- laying down procedures and safeguards for the prevention of accidents which may cause environmental pollution and remedial measures for such accidents;
- laying down procedures and safeguards for the handling of hazardous substances;
- examination of such manufacturing processes, materials and substances as are likely to cause environmental pollution;

FUNCTIONS OF CENTRAL POLLUTION CONTROL BOARD

- Advise the Central Government
- Co-Ordination with State Board
- Technical Assistance/Guidance to State Boards
- Training Programme
- Organizing Comprehensive Programme
- Functions as State Board
- Publication of Statistical/Technical Data
- Laying Down Standard for A Stream/Well
- Execution of Programme at National Level

FUNCTIONS OF STATE POLLUTION CONTROL BOARDS

- Planning Comprehensive Programme
- Advisory functions
- Dissemination of Information
- Investigation and research
- Organizing training programme
- Inspection of sewage/trade effluents plants
- Lay down Standards for Causing Discharge of Water
- Economical Methods of Treatment of Sewage
- Methods Regarding Utilization of Sewage

- Methods of Disposal of Sewage
- Laying Down Standards for Treatment of Sewage
- Advisory Functions

NATIONAL GREEN TRIBUNAL ACT, 2010

It is an Act of the Parliament of India which enables creation of a special tribunal to handle the expeditious disposal of the cases pertaining to environmental issues. It draws inspiration from the India's constitutional provision of (Constitution of India/Part III) Article 21 Protection of life and personal liberty, which assures the citizens of India the right to a healthy environment.

- It is a specialized body set up under the National Green Tribunal Act (2010) for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources.
- With the establishment of the NGT, India became the third country in the world to set up a specialized environmental tribunal, only after Australia and New Zealand, and the first developing country to do so.
- NGT is mandated to make disposal of applications or appeals finally within 6 months of filing of the same.

ENVIRONMENTAL IMPACT ASSESSMENT

- Environmental Impact Assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.

- UNEP defines Environmental Impact Assessment (EIA) as a tool used to identify the environmental, social and economic impacts of a project prior to decision-making. It aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision-makers.

- Environment Impact Assessment in India is statutorily backed by **the Environment Protection Act, 1986** which contains various provisions on EIA methodology and process.

CHAPTER-7

GLOBAL WARMING

Global warming is the long-term heating of Earth's climate system observed since the pre-industrial period (between 1850 and 1900) due to human activities, primarily fossil fuel burning, which increases heat-trapping greenhouse gas levels in Earth's atmosphere. Since the pre-industrial period, human activities are estimated to have increased Earth's global average temperature by about 1 degree Celsius (1.8 degrees Fahrenheit), a number that is currently increasing by 0.2 degrees Celsius (0.36 degrees Fahrenheit) per decade.

Global warming occurs when carbon dioxide (CO2) and other air pollutants and greenhouse gases collect in the atmosphere and absorb sunlight and solar radiation that have bounced off the earth's surface.

GREEN HOUSE EFFECT

The **greenhouse effect** is the process by which radiation from a planet's atmosphere warms the planet's surface to a temperature above what it would be without this atmosphere.
The greenhouse effect is a natural process that warms the Earth's surface. When the Sun's energy reaches the Earth's atmosphere, some of it is reflected back to space and the rest is absorbed and re-radiated by greenhouse gases.

Greenhouse gases include water vapour, carbon dioxide, methane, nitrous oxide, ozone and some artificial chemicals such as chlorofluorocarbons (CFCs).

The absorbed energy warms the atmosphere and the surface of the Earth. This process maintains the Earth's temperature at around 33 degrees Celsius warmer than it would otherwise be, allowing life on Earth to exist.

DEPLETION OF THE OZONE LAYER

Ozone depletion is the term commonly used to describe the thinning of the ozone layer in the stratosphere. Ozone depletion occurs when the natural balance between

the production and destruction of ozone in the stratosphere is tipped in favor of destruction. Human activity is the major factor in tipping that natural balance, mostly from releasing artificial chemicals, known as ozone-depleting substances (ODS), to the atmosphere. These are stable substances that do not break down in the lower atmosphere and contain either/both chlorine and/or bromine.

ACID RAIN

Acid rain, or acid deposition, is a broad term that includes any form of precipitation with acidic components, such as sulfuric or nitric acid that fall to the ground from the atmosphere in wet or dry forms. This can include rain, snow, fog, hail or even dust that is acidic.

ECO- FRIENDLY MATERIAL

There are some great choices for eco-friendly flooring; cork flooring, bamboo, and recycled wood flooring are all excellent options. Cork flooring is a great alternative to wood; it is environmentally friendly; it only uses the bark from the tree and does not kill the tree as a result from harvest.

RECYCLING OF MATERIALS

Recycling is the process of converting waste materials into new materials and objects. It is an alternative to "conventional" waste disposal that can save material and help lower greenhouse gas emissions. Recycling can prevent the waste of potentially useful materials and reduce the consumption of fresh raw materials, thereby reducing: energy usage, air pollution (from incineration), and water pollution (from land filling).Recycling is a key component of modern waste reduction and is the third component of the "Reduce, Reuse, and Recycle" waste hierarchy.

CONCEPT OF GREEN BUILDING

Green building refers to both a structure and the application of processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from planning to design, construction, operation, maintenance, renovation, and demolition. It requires close cooperation of the contractor, the architects, the engineers, and the client at all project stages.

Green building is the practice of creating structures and using processes that are eco-friendly and resource-efficient throughout a building's life-cycle starting from design, construction, operation, maintenance, renovation and deconstruction. Green building is also known as a sustainable or high performance building.