**2. ENVIRONMENTAL POLLUTION**

**ANSWER THE FOLLOWING**

**Q-1) How many types of water are there? What are the causes of water pollution? What are the signs of polluted water?**

**Ans-** Types of Water

* Distilled water- Pure form of water without any element.
* Mineral water- Water is mixed with some minerals, which is a more healthier form of water.
* Tap water- This type of water is mixed slightly with impurities. It is potable, but not pure.
* Polluted/Contaminated water-

Causes of Water Pollution

* Sewage water mixing with other water bodies, oil wells and underground coal mines near to water bodies.
* Social and religious practices.
* Detergents and chemical fertilizers, pesticides.
* Industrial effluents.
* Urbanization.
* Deforestation.
* Poor management of cleanliness.
* Poor sanitization.
* Dust mixing with water.

Signs of Polluted Water

* Bad taste.
* Bad odour.
* Change in colour.
* Oil/grease on the water surface.
* Number of fishes are less in that water body.
* Weeds are grown inside the water.

**Q-2) What are the effects of water pollution? What should be done to decrease/remove water pollution?**

**Ans- Effects:**

**• Oxygen demanding waste (Biodegradable organic waste)**

**• Organic matter which reaches the water bodies is decomposed by**

**• microorganisms present in water. For this oxygen dissolved in water is used.**

**Control of water pollution:**

**• Biochemical Oxygen demand (BOD) is used as reassure to find out the of Biodegradable matter in the water.**

**• It is defined as amount of oxygen required by the bacteria to decompose the biodegradable organic matter under aerobc condition.**

**• The saturated value of DO in water is in the order of 8 to 10 mg/L**

**Treatments:**

1. **Primary Treatment:**

**• The sewage should be properly treated before disposing it in any water bodies.**

**• Sewage should be given following treatment before discharging into water bodies**

**remove floating impurities, girt. inorganic particles. settable solids etc. it mainly involves physical for removal of impurities.**

1. **Secondary treatment:**

* **Mostly aimed to remove organic impurities using mainly biological methods.**

1. **Tertiary treatment:**

**• Mostly using strong oxidizing agents to remove impurities. Example chlorine gas.**

**• It is used to remove the impurities remaining after primary and secondary treatment.**

**• The industrial effluent should be properly treated before discharging it into water bodies.**

* **By enforcing stringent standards for disposal Of sewage and industrial waste into water bodies.**
* **By prohibiting direct washing of clothes and animals in water bodies used for drinking water supply.**

**Q-3) Define: Air pollution. State its causes and effects.**

**Ans-** "Air pollution is defined as the presence of unwanted and undesirable foreign particles and gases (in sufficient quantity and duration) in the air which may have adverse effects on human being. animals, plants, vegetation's and important structure. Sources of air pollution can be mainly classified into

(a) Natural

(b) Man- made

Natural Sources

Pollen grains

Volcanic eruption

Forest fire

Salt spray from oceans

Dust storms

Marshy land

Bacteria and other microorganisms

Photochemical reaction

Manmade sources

Industrial units

Thermal power plants

Automobile exhaust

Fossil fuel burning

Agricultural activities

Mining

Air crafts

Nuclear explosion

Domestic burning Of woods

Classification based on origin Of air pollutants Primary pollutants:

These are emitted directly from the sources and are found in the atmospheres. For Example, S02, N02, HC. ash, smoke. dust, mist, etc.

2. Secondary pollutants:

These are formed in the atmosphere by chemical interactions between primary pollutants and atmospheric constituents.

For Example, Ozone, Sulphur trioxide, PAN aldehydes, ketones

**Q-4) Explain various types of air pollutants, its causes and effects.**

**Ans-**  1. CO(Carbon monoxide):

Sources:

* Volcanic eruption natural gas emissions  electrical discharge during cloud forming  marsh gas production etc.
* Transportation sources contribute about 64% Of CO in air.
* Forest fire and agricultural burning contribute about 17 % of in air.
* Industrial processes such as electric furnace and blast furnaces in iron and steel industries  Petroleum refining
* Paper industry
* Gas manufacture  Coal mining

Effects:

* It reduces the oxygen carrying capacity of the blood by selectively
* combining with haemoglobin forming carboxy haemoglobin . This causes
* giddiness, laziness, and exhaustion.
* It reduces vision and causes cardiovascular disorders.
* CO is a very dangerous asphyxiant and its high levels are fatal to human life.

2. Carbon dioxide (C02): The content of carbon dioxide in the air has increased by approximately 15% during the last century in spite of the fact that photosynthesizing green plants balance the C02- 02ratio to a large extent.

Sources:

* Fossil fuel burning
* Agricultural practices (e.g. Deforestation)
* Forestry.

Effects:

* it is major effect is on the climate of earth (Green House effect).
* C02 is less dangerous than CO and cause nausea and headache.

1. Oxides of Nitrogen (NOX): Nitric oxide and nitrogen oxide are very important pollutant. NO is colourless, odourless gas but is N02 reddish brown and have suffocating odour.

Sources:

* + Fuel combustion in automobiles and industries.
  + Lightening
  + Forest fire
  + Bacterial decomposition of organic matter Effects:
  + Nitric oxide combines with haemoglobin and reduces the oxygen carrying capacity of blood.
  + N02 is more toxic then NO and may affect lungs and cause bronchitis.
  + N02 is react with atmospheric moisture to form nitric acid causes acid rain and affects vegetables and metals.

1. Oxides of Sulphur (SOX) : SOX include S02 and S03. S02 is colourless gas having pungent and suffocating odour.

Sources:

* of the SOX pollution (67%) due to volcanic activities and other natural sources.
* Burning Of solid and fossil fuels
* Transportation
* Industries like paper mfg. plants, refineries, Sulphur acid  Open burning of refuse and municipal incinerator Effects:
* It causes cardiac diseases. asthma. bronchitis, eye irritation, throat troubles etc.
* Long term exposures to high levels of Sulphur dioxide gas causes respiratory illness and heart diseases.
* Oxides of Sulphur attacks building materials especially marbles and lime stone. (e.g. Taj Mahal at Agra)
* S02 react with moisture in atmosphere to form Sulphur acid which causes acid rain affects vegetables and metals.
* Oxides of Sulphur may affect clothes. leather, paper and plants.

1. Hydrocarbon (HC): The gaseous and volatile hydrocarbons are mainly responsible for air pollution. Common HC includes methane, ethane, acetylene etc.

Sources:

* + Coal fields
  + Natural fires
  + Incomplete combustion from car engines
  + Industrial sources (refineries)
  + Forest fires

 Agricultural burning  Coal waste fires Effects:

* + Some aromatic HC may cause cancer.
  + Unburned HC with oxides of nitrogen in the presence of sunlight from Photochemical Oxidants (like ozone, PAN) which are harmful.

1. Particulate Air pollutants: These are small, solid particles and liquid droplets present in the atmosphere in fairly large numbers and sometimes pose serious air pollution problems. The size of particulate ranges from 0.02 p to 500 p.
   1. Aerosols: These include all air borne suspensions of solid or liquid particles smaller than 1 mm.
   2. Dust: It consist of small solid particles (size 1 to 200 pm) and are generated by material crushing, grinding or blasting,
   3. Smoke: It consist of fine solid particles (size 0.1 to 1 pm) resulting from the incomplete combustion of organic particles like coal, wood, tobacco or other chemical processes.
   4. Fumes: These are fine solid particles (size 0.1 to 1 pm) formed by the condensation of vapours of solids materials.
   5. Mist: It consist of liquid droplets formed by the condensation of vapours in the atmosphere or are released from industrial operation.

**Q-5) State the mitigation and control measures of pollution.**

**Ans-**  Mitigation and control measures

* Pollution prevention, minimization, and mitigation measures have been incorporated by Mississippi Power and NACC as part of the conceptual designs of the proposed project facilities.
* For example, regulated air pollutant emissions would be reduced through the use of advanced technologies and emission controls.
* In addition, the IGCC power plant would be designed to capture approximately 67 percent of the C02 that would have otherwise been emitted.
* Power plant facilities would be located to avoid impacts to wetlands to the extent practicable.
* Similarly, the mining would occur on the least environmentally damaging practicable site, and linear facility corridors were selected considering avoiding environmentally sensitive areas.
* Unavoidable impacts to wetlands would be minimized and would be mitigated. Additional measures would be incorporated at subsequent stages of design and engineering.

For example, exact placements of pipeline trenches and transmission line structures would be adjusted where practicable to avoid impacts to wetlands or Other sensitive areas (such as cultural resources).

* The minimization and mitigation of potential adverse impacts from project activities would be achieved through implementation of BMPs and compliance with requirements contained in facility permits and other applicable federal. state, or municipal regulations and ordinances.
* Outlines specific pollution prevention and mitigation measures, including those required under federal, state, or local regulations and permitting requirements that would be implemented for each resource area.
* Permits yet to be obtained by Mississippi Power and NACC would also impose a variety of measures to prevent or minimize pollution and mitigate environmental impacts through the imposition of specific permit conditions. DOE may also consider additional mitigation as a condition of the ROD.
* The proposed IGCC power plant would reduce S02, NOx, mercury, and particulate emissions by removing constituents from the syngas.
* The removal of nearly 100 percent Of the fuel-bound nitrogen from the syngas prior to combustion in the gas turbine would result in appreciably lower NOX emissions compared to existing, conventional coal-fired power plants.
* The project is expected to remove than 99 percent Of the sulphur and more than 92 percent Of the mercury.
* More than 99.9 percent Of particulate emissions would be removed using high temperature, high-pressure filtration (rigid. barrier-type filter
* Approximately 60 percent less C02 would be permitted per unit Of power generated compared to typical emissions rates at existing, conventional coal-fired power plants.
* However. there would still be some emissions Of C02, and these emissions would contribute to a net increase in global atmospheric concentrations Of C02.
* This mitigation Of C02 emissions would be achieved through beneficial use for EOR and geologic storage.
* The design would incorporate systems to capture approximately 67 percent Of the C02, which would be delivered via pipeline for use in existing EOR operations in Mississippi.
* DOE has been studying the use Of EOR for sequestration and believes it is "a promising technology to safely store C02 underground" (DOE, 2008).
* Use of reclaimed municipal effluent and reuse of other water reclaimed from within the power plant for cooling water makeup would greatly reduce the potential withdrawal and consumption of ground water from the Massive Sand aquifer, thereby reducing impacts on ground water resources.
* The proposed generation facilities would discharge no process liquid effluent from the site.
* Ash generated by the gasifiers would be made available for beneficial use, managed onsite, or trucked to a permitted landfill. Commercial-grade anhydrous ammonia and H2S04 would be recovered as byproducts and marketed.

**Q-6) Write a brief note on : Noise Pollution with causes, effects and measures.**

**Ans-**  **Noise Pollution**

* Noise is unpleasant and unwanted sound.
* Sound is what we hear.
* The difference between sound ad nose depends upon the listener and the circumstances.
* Sound power in watts converted to decibel scale is called the sound power level, Sound pressure:
* It is the amount Of air pressure fluctuation created by the source Of the sound.
* Sound pressure is expressed as Pascal. A healthy young person can hear sound pressure is low pressures as low as 0.00002Pa.

Sound Pressure Level (SPL):

* Sound pressure converted to the decibel scale is called sound pressure level.
* Decibel (dB) is used in environmental noise pollution as a

of sound power level, sound intensity level and sound pressure level.



Stationary sources: Industries, printing presses, Domestic Gadgets like mixers, Exhaust fan, Desert coolers, Vacuum Cleaners. Radio etc

Mobile Sources: Poor urban planning. industrialization, social events, transportations, construction, Household chores, Agriculture Activates, Religious Dscourse. Elections.



1. Heart problems : As high noise levels constricts the blood arteries, the high intensity sound causes dramatic rise in the blood pressure, disrupting the blood flow. The heart rate also increases. Due to increased blood pressure, the heart problems such as Ischemic heart disease are caused.

2. Auditory/Hearing problems: Problems like Tinnitus. It becomes noise for human ear when it crosses 70 db. Noise levels above 80 db can cause damaging effects to the ear. Noise above 100 db can cause permanent hearing loss.

3•  : Noise interrupts sleep which results in reduced energy levels resulting in extreme fatigue. Efficiency decreased.

1. Release of stress hormones: Adrenaline and Cortisol are released which results in increased stress and Stifles the immune system. Interferes in verbal Communication
2. It discourages the annual visits of birds to the lakes surrounded by industrial units causing noise pollution.

6. Noise can affect the semicircular canals of ear. Causing dizziness and nausea Variation in Blood pressure in skull affecting brain and nervous system.

Control Of Noise Pollution:

Three components of noise pollution must be taken into consideration •

Source Of Noise

Medium Of Noise

Objects affected by noise

The most important means Of Controlling is at individual. Society and Government Level. Noise Pollution abatement involves following measure :-

l. Engineering measures:

A) Noise Reduction B) Noise Control

A) NOISE REDUCTION:- Several devices can be used to reduce the intensity of noise. Enclosure of machinery with sound absorbing materials can reduce the intensity of Noise produced. Various materials used to reduce noise are

1. Glass 5/8 mm (reduces up to 50db)
2. Cinder blocks 10mm thick (reduces 25db)
3. Cinder blocks 10mm thick: Plastered m one side of wall (reduces 42db)
4. Cinder blocks 10mm thick: Plastered on both sides of wall (reduces 75db)

These materials are effective but costly and may not be adopted by owners of commercial buildings / Industry.

Plantation of Shrubs and Trees: • can be done around the noise generating sources. Noise is blocked by these shrubs and trees. (Green Muffler scheme). These can reduce intensity of noise by 10-15 Sound proof homes.

* The most important way of controlling noise pollution is by:

at:

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| --- | --- | --- | --- | --- | --- | --- |
| 1. |  | CONTROL AT |  |  |  | POINTS:- |

1. Providing silencers to cars/machines
2. Banning of pressure horns.
3. Avoiding unnecessary blowing of horn.
4. Improving machinery designs.
5. Improving road system. streamlining traffic flow and removing bottlenecks.
6. Educating the users of loudspeakers, radio, television, music systems etc to keep at low frequency.
7. Shut the door while using household machines.



i. Workers of factories and individuals can ear muffs, ear plugs etc. ii. proper layout Of buildings (sound proof). iii. The noise can be effectively reduced by using sound absorbing materials in community halls. cinema halls. temples, mosques etc.

White noise machines also known as Sound machines: These are the machine that are placed between noise source and receivers. These machines produce natural soothing sounds such as flowing water, winds, chirping birds, soft music etc. THROUGH LAW.- Legislation can ensure that sound production is minimized.

**Q-7) Explain : Soil pollution and it's causes.**

**Ans-**

Soil Pollution•.

Soil pollution refers to the contamination of soil with anomalous concentrations of toxic substances.

It is a serious environmental concern since it harbours many health hazards. For example, exposure to soil containing high concentrations of benzene increases the risk of contracting leukemia.

It is important to understand that all soils contain compounds that are harmful/toxic to human beings and other living organisms. However, the concentration of such substances in unpolluted soil is low enough that they do not pose any threat to the ecosystem.

When the concentration of one or n-ore such toxic substances is high enough to cause damage to living organisms, the soil is said to be Contaminated .

The root cause of soil pollution is often one of the following:

* Agriculture (excessive improper use of pesticides)
* Excessive industrial activity
* Poor management or inefficient disposal of waste

The challenges faced in soil remediation (decontamination Of soil) are closely related to the extent of soil pollution. The greater the contamination, the greater the requirement for resources for remediation.

Sources:

* 1. Heavy Metals

The presence of heavy metals (such as lead and mercury, in abnormally high concentrations) in soils can cause it to become highly toxic to human beings. Some metals that can be classified as soil pollutants are tabulated below.

* 1. Industrial Waste

The discharge of industrial waste in soils can result in soil pollution. Common soil pollutants that can be sourced from industrial waste are listed below:

Chlorinated industrial solvents

Dioxins are produced from the manufacture of pesticides and the incineration of waste.

Plasticizers/dispersants

Poly Chlorinated Biphenyls (PCBs)

The petroleum industry creates many petroleum hydrocarbon waste products. Some of these wastes, such as benzene and methylbenzene, are known to be carcinogenic in nature.

* 1. Pesticides

Pesticides are substances (or mixtures of substances) that are used to kill or inhibit the growth of pests. Common types of pesticides used in agriculture include Herbicides — used to kill/control weeds and other unwanted plants. Insecticides — used to kill insects.

**Q-8) Describe effects and control measures for soul pollution.**

**Ans-** Effects on Human Beinqs

Soil contaminants can exist in all three phases Therefore. these contaminants can find their way into the human body via several channels such as direct contact with the skin or through the inhalation of contaminated soil dust. The short-term effects of hurnan exposure to polluted soil  Headaches, nausea, and vomiting.

* Coughing, pain in the chest, and wheezing.
* Irritation of the skin and the eyes.
* Fatigue and weakness.

A variety of long-term ailments have been linked to soil pollution. Sorne such diseases are listed below.

* Exposure to high levels of lead can result in permanent damage to the nervous system. Children are particularly vulnerable to lead.
* Depression of the CNS (Central Nervous System).
* Damage to vital organs such as the kidney and the liver.  Higher risk of developing cancer.

It can be noted that many soil pollutants such as petroleum hydrocarbons and industrial solvents have been linked to congenital orders in humans. Thus, soil pollution can have several negative effects on human health.

# Effects on Plants and Animals

Since soil pollution is often accompanied by a decrease in the availability of nutrients, plant life ceases to thrive in such soils. Soils contaminated with inorganic aluminium can prove toxic to plants. Also, this type Of pollution Often increases the salinity Of the soil. making it inhospitable for the growth Of plant life.

Plants that are grown in polluted soil may accumulate high concentrations of soil pollutants through a process known as bioaccumulation. When these plants are consumed by herbivores. all the accumulated pollutants are passed up the food chain. This can result in the loss/extinction of many desirable animal species. Also. these pollutants can eventually make their way to the top of the food chain and manifest as diseases in human beings.

# Effects on the Ecosystem

* Since the volatile contaminants in the soil can be carried away into the atmosphere by winds or can seep into underground water reserves, soil pollution can be a direct contributor to air and water pollution.
* It can also contribute to acid rain (by releasing huge quantity Of ammonia into the atmosphere).
* Acidic soils are inhospitable to several microorganisms that improve soil texture and help in the decomposition of Organic matter. Thus, the negative effects Of soil pollution also impact soil quality and texture.
* Crop yield is greatly affected by this form of pollution. In China, over 12 million tons of grain (worth approximately 2.6 billion USO) is found to be unfit for human consumption

due to contamination with heavy metals.

Control Measures:

Several technologies have been developed to tackle soil remediation. Some important strategies followed for the decontamination of polluted soil are listed below.

* Excavation and subsequent transportation of polluted soils to remote, uninhabited locations.
* Extraction Of pollutants via thermal remediation— the temperature is raised in order to force the contaminants into the vapour phase, after which they can be collected through vapour extraction.
* Bioremediation or phytoremediation involves the use of microorganisms and plants for the decontamination Of SGI.

Micro embolization involves the use of FMO for the accumulation of heavy metal contaminants.