Section-B

Sources Of Pollution:-

There are two main sources of pollution:
(a) Natural sources, and
(b) Man made or Anthropogenic sources

1) Natural sources:
(a) Volcanic eruptions release gases and volcanic ash.
(b) Forest fire produce smoke and trace gases.
(c) Dust storms increase the wind blown dust into the environment
(d) Bacteria, spores, cysts and pollens are all natural pollutants.
(e) Decay of organic matter in marshy places release marsh gas which is light colorless inflammable hydrocarbon.

2) Man made or Anthropogenic sources:
They cover a wide spectrum of types as man has aggravated the problem of pollution by innumerable activities like
(a) Industrialisation
(b) Invention of automobiles

(c) Over population
(d) Deforestation: Destruction of natural habitat
(e) Nuclear explosions
(f) Over-exploitation of natural resources
(g) Construction of buildings, roads & dams
(h) explosives used in wars
(i) Uses of fertilisers and pesticides
(j) quarrying and mining

Air Pollution:-

There are many definitions of air pollution:

(a) It may be defined as any atmospheric condition in which certain substances are present in such concentrations that they can produce undesirable effects on man and environment.

(b) It is the excessive concentration of foreign matter in the atmosphere which adversely affects the well being of individuals or causes damage to property.

Causes:-

There are two main causes or sources of air pollution:

(a) Natural (b) Man-made

(a) Natural causes or Sources :-

Natural sources cause large scale of air pollution which is beyond the control of man.

(a) Natural contaminants usually present in the air are pollen, bacteria etc.

(b) Carbon monoxide from the breakdown of methane.

(c) Volcanic eruptions release many gases and volcanic ash which cause air pollution.

(d) forest fires release smoke and harmful trace gases.

(e) Electric storms and solar flares pollute the air by the harmful chemicals they produce.

(f) Salt spray from oceans

(g) Dust storms

Man-made :-
1) Rapid industrialisation
2) Automobile revolution
3) Deforestation
4) Transportation

☒ Classification of Pollution Sources:
The man-made sources of air pollution and broadly categorised into three:

(a) Point or Stationary Sources:- These are best exemplified by industries as they add pollutants to the air at particular points from their tall chimneys. Pollutants from such-point-sources affect only restricted areas.

(b) Line or Mobile Sources:- The line or mobile sources of air pollution are the automobiles as these add pollutants along narrow belts and over long distances.

(c) Area Sources:- Towns and cities add smoke and gases over wide areas and so qualify as areas sources of air pollution.

Classification Of Air Pollutants:-

1) According to Origin:

(a) Primary Pollutants: Those pollutants that are emitted directly from the sources and are found in the atmosphere in the form in which they were emitted are called primary pollutants.

(b) Secondary Pollutants: Those pollutants that are formed in the atmosphere by chemical interactions between primary pollutants and atmospheric constituents are called secondary pollutants. These are usually formed by a photochemical reaction or by hydrolysis or oxidation reactions in the atmosphere.

Eg:- Ozone, Sulphur trioxide, Ketones etc.

2) According to State Matter:

(a) Gaseous air Pollutants

(b) Particulate air Pollutants:

Aerosols, dust, smoke, fumes, mist, fog, flyash, soot.

Effects of Air Pollution:-

On Human Health:

(a) Irritation of the respiratory tract
(b) Irritation of eye, nose and throat
(c) Lead particulates cause lead poisioning resulting in convulsions, delirium, coma and even death
(d) Cadium Cadmium particulates cause cardiovascular diseases, kidney and liver damage and even death
(e) Nicked particulates result in respiratory damage
(f) Mercury result in nerve, brain and kidney damage
(g) Radio-active fallout has somatic and genetic effects on future generation

On Animals:- When the animals feed upon the particulate coated plants, they get affected with Arsenic poisioning. Lead poisioning results in bronchitis and lack of appetite in pet animals.

On Materials:-
(a) Corrosion (b) Abrasion
(c) Deposition and removal of materials
(d) Chemical attack

✱ Control of Air Pollution:- By
(a) Source correction Method
(b) Pollution Control equipment
(c) Diffusion of pollutant in air
(d) Vegetation (e) Zoning

(a) Source Correction Method:-
(I) Substitution of raw materials
(II) Process Modification: The existing process may be changed by using modified technique to control emission at source.
(III) Modification of Existing Equipment
(IV) Maintenance of Equipment

(b) Pollution Control Equipment:-
(I) Control devices for particulate Contaminats
(a) Gravitational Settling
(b) Cyclone separators

(c) Fabric filters
(d) Electrostatic precipitators
(e) Wet collectors (Scrubbers):
(i) Spray tower (ii) Venturi Scrubber
(iii) Cyclonic scrubber

(II) Control device for gaseous contaminate:
(a) Wet absorption method
(b) Dry absorption method

Water Pollution:-

It can be defined as the presence in water, of some foreign substances or impurities in such quantity so as to constitute a health hazard by lowering the water quality and making it unfit for use.

Causes / Sources of Water Pollution:

(a) Point Sources:
Those sources which can be identified at a single location are known as point sources.
The water pollution caused by point sources

can be minimized if all domestic sewage, industrial effluents, cattlefield and livestock wastewaters etc. are all centrally collected, treated upto requisite acceptable levels and reused for different beneficial purposes

(b) Diffused Sources:
Those sources whose location cannot be easily identified are called diffused sources.
In this case, the pollutants scattered on the ground ultimately reach the water sources and cause water pollution.
The water pollution caused by diffused sources like agriculture can be controlled by changing the cropping patterns, tillage practice and advanced farm management practices which don't contaminate the water bodies.

Effects Of Water Pollution :-

Health Hazards Of Water Pollution :
(a) Phosphorous and Nitrates with water promote the growth of oxygen consuming

algae which reduce the DO level of water, killing fish and other aquatic organisms.

(b) Industrial effluents in the addition of poisonous chemicals which kill aquatic organisms and may reach human body through contaminated food (i.e. fish etc.)

(c) Domestic, commercial and industrial effluents contaminate the water with organic pollutants.

(d) Thermal pollution of water reduces the DO level of the aquatic system making it incapable of supporting life.

Control (Pg. 204, S.K. Dhameja)

* Marine / River Pollution :-

Causes / Sources :

(a) Oil (b) Waste disposal. (Explain yourself)

Effects Of Marine Pollution :

Pollution of the sea has been going on unnoticed for a long time by discharge of domestic sewage and agricultural and industrial wastes into the rivers which flow into the sea, washing of cargo

tanks in the open sea and ocean dumping of ship generated garbage and ship operated sewage.
The leakage of oil could endanger the marine and coastal environment.
1) There have been heavy kills of fish and other organism.
2) Disturbes aquatic life and environment
3) Supply water in the tank will be dirty and harmful for health.
4) Spread bad smell in the surroundings

Control:-
(a) Control of oil pollution: The method are:
(i) burning of oil
(ii) leaving the deposits insitu and making them innocuous by coating them with various material
(iii) emulsifying the oil and leaving its disposal dispersal by the tides & waves.
(iv) by hosing it down with water

(b) Control Of Waste Disposal

Airborne Air Born Diseases :-
An air born disease is any disease that is caused by pathogens and transmitted through the air. The relevant pathogens may be viruses, bacteria, or fungi, and they may be spread through coughing, sneezing, raising of dust, spraying of liquids or similar activities likely to generate aerosol particles or droplets.
Airborne pathogens or allergens often cause inflammation in the nose, throat, sinuses and the lungs. This is caused by the inhalation of these pathogens that affect a person's respiratory system or even rest of the body.
Many common infections can spread by airborne transmission at least in some cases including Anthrax, chickenpox, Influenza, Measles, Smallpox and Tuberculosis.

Causes:-

An airborne disease can be caused by exposure to a source: an infected patient or animal, by being transferred from the infected person or animal's mouth, nose, cut, or needle puncture.

Prevention:

Some ways to prevent airborne diseases include washing hands, using appropriate hand disinfection, getting regular immunizations against diseases believed to be locally present, wearing a respirator and limiting time spent in the presence of any patient likely to be a source of infection.

Waterborne diseases:-

They are caused by pathogenic microorganisms that most commonly are transmitted in contaminated fresh water. Infection commonly results during bathing, washing, drinking, in the preparation of food, or the consumption of food thus infected.

The term "waterborne diseases" is reserved

largely for infections that predominantly are transmitted through contact with or consumption of infected water. Waterborne diseases can have a significant impact on the economy, locally as well as internationally. People who are infected by this are usually confronted with related costs and not seldom with a huge financial burden.

Various forms of waterborne diseases probably are the most prominent examples and affect mainly children in developing countries.

☒ Sensitive Analysis :-

It is the study of how the uncertainty in the output of a mathematical model or system can be appointed to different sources of uncertainty in its inputs. It can be useful for a range of purpose including: Testing the robustness of the result of a model or system in the presence of uncertainty.

Increased understanding of the relationships between input and outpu

variables in a system or model.
Uncertainty reduction: identifying model inputs that cause significant uncertainty in the output and should therefore be the focus of attention if the robustness is to be increased.
Good modelling practice requires that the modeler provides an evaluation of the confidence in the model. This requires, first, a quantification of the uncertainty in any model results, and second, an evaluation of how much each input is contributing to the output uncertainty. Sensitivity analysis addresses the second of these issues, performing the role of ordering by importance the strength and relevance of the inputs in determining the variation in the output.
In models involving many input variables sensitivity analysis is an essential ingredient of model building and quality assurance.

Risk Assessment:-

Modern occupational safety and health legislation usually demands that a risk assessment be carried out prior to making an intervention. It should be kept in mind that risk management requires risk to be managed to a level which is as low as is reasonably practical. This assessment should:

1) Identify the hazard
2) Identify all affected by the hazard and how evaluate the risk.
3) ~~Identify all affected by the hazard~~
3) Identify and prioritize appropriate control measures.

The calculation of risk is based on the ~~likehood~~ likelihood or probability of the harm being realized and the severity of the consequences.

The assessment should be recorded and reviewed periodically and whenever there is a significant change to work practices. The assessment should include practical recommendations to control the risk.

Occupational health :-

It is an area concerned with the safety, health and welfare of people engaged in work or employment. It's goal include to foster a safe and healthy work environment.

Occupational health deals with the all aspects of health and safety in the workplace and has a strong focus on primary prevention of hazards. It is a multidisciplinary field of health care. Concerned with enabling an individual to undertake their occupations in the way that causes least harm to their health.

The main focus in occupational health is on three different objectives:

(i) the maintenance and promotion of workers health and working capacity.

(ii) the improvement of working environment and work to become conducive to safety and health.

(iii) development of work organizations and working cultures in a direction which supports health and safety.

Environmental Management Techniques :-

1) Minimising odour emissions: (Explain)

2) Minimising Particulate matter emissions:
Minimising emissions of particulate matter management practices must minimise the quantity of pollutants leaving the site as airborne particulate matter, reduce the stormwater sediment load and protect the local amenity.

3) Minimising emissions of airborne pathogens:
Methods are :-
(a) Do not allow organics that are being processed, or products to lose too much moisture.
(b) Have adequate environmental management technique at the facility to manage particulate matter.
(c) Avoid uncontrolled emissions of biogas in aerobic processes

4) Minimising amenity impacts (including odour and particulate matter):
Keep stockpiles of raw organics and product low to avoid potential negative

environment impacts.

5) Managing storage times for feedstock:
The storage times of organic feedstock should be controlled to avoid emissions of offensive odours.

6) Covering Of Organics:
The biodegradable organics should be covered in order to reduce odour emissions.

7) Management of leachate drains and storage ponds

8) Cleaning of vehicles

9) Management of biogas

10) Preventing water pollution

11) Screening of organics received