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PG AND RESEARCH DEPARTMENT OF COMMERCE

ENVIRONMENTAL STUDIES

UNIT-I
ENVIRONMENT

What is Environment? (2 Marks)

The term 'Environment' etymologically means 'surroundings' was first introduced by a biologist Jacob Van Uerkul. It is derived from an old French word 'Environer' (meaning encircle). In real word everything that affects an organism during its lifetime is collectively known as its environment.

- **Environment** means all of the outside forces, events and things that act on a thing. A person's environment is made up of everything that surrounds him or her, including houses, buildings, people, animals, land, temperature, water, light, and other living and non-living things.
- Living things do not simply exist in their environment. They constantly interact with it. Organisms change in response to conditions in their environment. The environment consists of the interactions among plants, animals, soil, water, temperature, light, and other living and non-living things.
- "Environmental studies" is an interdisciplinary study of 'how nature works and how things in nature are interconnected' are receiving lot of attention through out the world to sustain life and the nature has got very close relationship with ecology, ecosystem, economics, sociology, chemistry and biological aspects of nature.
- World Environment day (June-5) was established by the United nations General Assembly in 1972 to mark the opening of the Stockholm Conference on the Human Environment. Another one resolution was adopted by the General Assembly the same day, leads to the creation of UNEP- United Nation Environment Program.

Define environment? (2 Marks)

- "Environment" refers to the sum total of all social, economical, biological, physical or chemical factors which constitute the surroundings of man, who is both creator and moulder of his environment."
- "Environment is a holistic view of the world as it functions at any time, with a multitude of special elemental and socio-economic systems distinguished by quality and attributes of space and behavior of biotic and a -biotic forms'.
- "Environment is the representative of physical components of the earth where in man is the important factor in influencing his environment.
- "Environment is the complex of social or cultural condition that affects an individual or community"

SCOPE OF THE ENVIRONMENTAL STUDIES

Write short notes on scope of the environmental studies. (5 Marks)

The multiple and multilevel scope of environmental studies are pointed below,

- Environmental studies create awareness among the people to know about various resources of the region, pattern of utilization and availability for the future use.
- It provides knowledge of ecological system causes, effects and its relationship.
- It provides information about living things and its importance.
- The study enables one to understand the causes and consequences due to natural and man induced disasters (flood, earth quake, landslides, cyclone, etc.)
- It enables one to evaluate alternative responses to environmental issues before deciding alternative course of action.
- The study enables environmentally literates citizen (by knowing the environmental acts, rights, rules, etc) to make appropriate judgment and decision for the protection and improvement of the earth.
- The study exposes the problems of over population, health, hygienic, etc and the role of education in eliminating/ minimizing the evils from the society.
- The study tries to identify and develop appropriate and indigenous eco-friendly skills and technologies to maintain clean and safe environment for better life.
- It teaches the citizen about the need for sustainable utilization of resources.
- The study enables theoretical knowledge into practice and to furnish ideas regarding the multiple use of the environment.
- Because of environmental studies has been seen to be multidisciplinary in nature so it is considered to be a subject with great scope.

- Environment age not limited to issues of sanitation and health but it is now concerned with pollution control, biodiversity conservation, waste management and conservation of natural resources.
- This requires expert eyes and hence are creating new job opportunities.
- The opportunities in this field are immense not only for scientists but also for engineers, biologists. There is a good chance of opportunity to find a job in this field as environmental journalists.

THE SCOPE OF ENVIRONMENTAL STUDIES IN INDUSTRY

- Environmental scientists work towards maintenance of ecological balance, they also work towards conservation of biodiversity and regulation of natural resources as well as on preservation of natural resources.
- Most of the industries have a separate environmental research and development section. These sections govern the impact that their industry has on the environment.
- Our environment is being degraded by the rapid industrialization. To combat this menace there is a growing trend towards manufacture of "green" goods and products.
- So we can say that there is a good scope in the field of industry from environmental studies.

ECOSYSTEM

Introduction

- The term ecosystem was coined by A.G.Tansley [1935]. "***Eco"***- refers to the 'environment' and "***system"*** refers to the 'complex co-ordination unit'. An ecosystem is the basic structural and functional ecological unit.
- The study of ecosystems mainly consists of the study of the processes that link the leaving organism or in other words biotic component to the non-living organism or abiotic component. So for the study of environment we should aware with biotic and abiotic components.

Definition:

- "Ecosystem" is the basic functional unit of ecology which includes both the living and non living environment each influences the properties of the other.
- "Ecosystem" is an organic community of plants and animals viewed with in its physical environment or habitat.
- "Ecosystem" is the system resulting from the integration of all living and non living factors of the environment.
- "Ecosystem" is the total assemblage of components entering into the interactions with a group of organisms

Concept of an Eco-system:

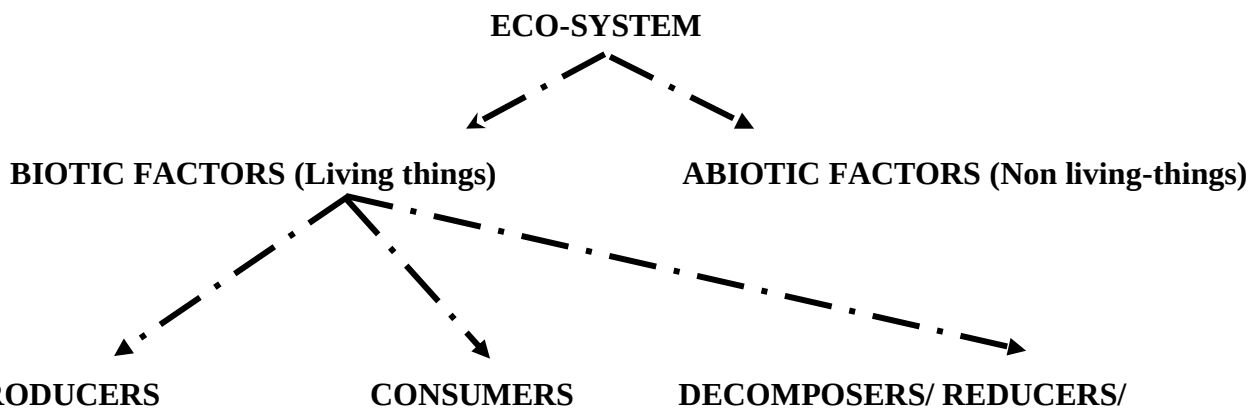
The study of an ecosystem is known as ecology. It consists of two major components;

1. Biotic factors (Living things)
2. A -biotic factors (Non-living things).

The study of living things and their interaction between other living and non-living things is known as eco-system. In a simplest way an ecosystem can be defined as a self-sustained community of plants & animals existing in its own environment.

STRUCTURE OF AN ECOSYSTEM

Explain in detail about the structure and functions of an ecosystem. (10 Marks)



(Autotrophs)
(Plants)

SAPROPHYTES (Micro- organisms)

PRIMARY **SECONDARY** **TERTIARY**
Herbivores **Carnivores** **Secondary carnivores**

Example: Grasshopper → Frog →Snake

Structure of an ecosystem:-

The structure of an ecosystem is formed of two components, namely

- **Biotic factor**
- **Abiotic factor**

Biotic factors:-

The biotic factor consists of living things. They are further classified into i. Producers, ii.Consumers iii. Decomposers.

1. Producers:

The living things which are having the ability/ capability to produce/ synthesis their own food/ energy are called as producers. The plants produce their required energy by photosynthetic reaction with the help of chlorophyll pigments and sunlight.

Chlorophyll

Carbon-di-oxide + water ----------→ Carbohydrate + Oxygen ↑

SUNLIGHT

Carbondioxide in the atmosphere and water present in the land is absorbed by the plants with the help of roots, as well as chlorophyll pigments present in the plants along with the sunlight produce carbohydrate and oxygen.

2. Consumers:

The living things which are not able of synthesing their own food material, consume producers (plants) are known as consumers. They are further classified into primary, secondary and tertiary consumers.

2.1) Primary consumers: The groups of animals that will eat plants are termed as primary consumers. They are also known as herbivores, (e.g.) Rabbit, deer, grasshopper, etc.

2.2) Secondary consumers: The groups of animals which depend upon primary consumers are known as secondary consumers, (e.g.) Fox, snake, birds, etc.

3.3) Tertiary consumers: The group of animals, which eat secondary consumers, are known as tertiary consumers, (e.g) Lion, tiger, cheetah, etc.

3. Decomposers:

The living organisms' that eats dead and decay materials are known as decomposers. They are also termed as saprophytes, includes bacteria, fungi etc. They act upon dead and decay organic matter to convert complex organic substances (carbohydrate, protein and fat) into simple inorganic substances such as (carbon, hydrogen, oxygen, etc.) so they are known as reducers. Decomposers play an important role in maintaining the nature of ecosystem by transfer of dead materials into another form, otherwise it remain on the earth without decaying.

B. Abiotic factors:

Abiotic components refer to non-living physical or environmental factors. The important factors are,

1. The organic substances like protein, carbohydrate, fat, etc.
2. The inorganic substances such as water, oxygen, carbon- di-oxide, carbon, hydrogen, etc., and
3. Physical factors such as light, temperature, wind, rainfall, etc.

Function of an eco-system:

The functioning of an ecosystem is important because all its components are responsible for the creation of the unique state of man-environment relationship.

Cycling of nutrients in an Eco-system (Biogeochemical cycle):

- The movement of nutrients and minerals from a-biotic system (Non-living things- soil, air and water) to a biotic (living things) system. This is known as biogeochemical cycle or nutrients cycle. Based upon the resource/ source it is classified and given below,

1. Gaseous cycle (Where the chemical resource/ source is air, e.g. carbon, nitrogen, etc.).
2, Sedimentary cycle (Where the chemical resource is rock or soil, e.g. phosphorous, sulphur, etc.).

The biogeochemical cycle has two phases namely.

1. Biotic phase - Flow of chemicals in living organisms.
2. A-biotic phase - Flow chemicals in non-living things.

Carbon cycle

- The movement of carbon from living things to nonliving things is known as carbon cycle.
- Carbon in the form of carbon-di-oxide is present more in the atmosphere; the carbon dioxide absorbed by the plant during photosynthesis is stored in the form of carbohydrate.
- When animals consume the plants, carbon in the form of carbohydrate enters into animal's body and it gives energy.
- During animals and plants respiration, carbon-di-oxide evolves to the atmosphere.
- Apart from these during burning of fossil fuels, volcanic eruption and forest fire. Carbon in the form of carbon-di-oxide and carbon monoxide are released to the atmosphere.
- In the marine environment, carbon-di-oxide dissolves in the seawater and stored as calcium carbonate in the marine animals as shells and hard outer organelles.
- When these organisms respire, carbon dioxide releases to the atmosphere.
- After the death of marine organisms, it will be decayed by decomposers, and then carbon dioxide is released to the atmosphere.

Nitrogen cycle

- Nitrogen is the major element present in the atmosphere (79%). But it is never taken directly from the atmosphere.
- Atmospheric nitrogen is fixed by the nitrogen fixing bacteria (Rhizobium) which is present in the root nodules of certain plant varieties (legume belongs to the family: ***Fabaceae***) in the form of nitrate.
- The nitrate is used by the plants as nutrients.
- In animals the nitrogen stored in the form of protein by consumption of plants (which is made up of amino acids contains nitrogen).
- Secondly fixation of the nitrogen is by lightning, huge amount of nitrogen is fixed in the soil as nitrate.
- After the death and decay of plants and animals, decomposers act upon them and convert it into ammonia by the special group of bacteria called ammonifying bacteria.
- Similarly nitrate bacteria convert ammonia into nitrate.
- This nitrite settled in the soil with the help of nitrate bacteria and it is converted into nitrite.

Oxygen cycle:

- The cycling of oxygen between biotic and a-biotic component is known as oxygen cycle.
- Oxygen in the atmosphere is taken up by plants during respiration in the night time and during photosynthesis in the day time, plants release oxygen with carbon as carbondioxide.
- Similarly in animals, during respiration plants intake oxygen and exhale oxygen along with carbon as carbon dioxide.

Sedimentary Cycle

Phosphorous cycle:

- Phosphorous cycle is a sedimentary cycle and it is a simple cycle.

- Phosphorus has only one form of phosphate.
- Phosphate rocks eroded, weathered, by wind, temperature, water, micro-organisms releases phosphates to eco system.
- It is one of the essential nutrients for plants, so plants intake phosphate and enters into animals and stored as bones and teeth when they consume it.
- After the death and decay of plants and animals, decomposers act upon them and convert it into phosphate, and settled in the soil.
- These components entered and formed into rocks by sedimentation process.

Energy flow in the ecosystem:

The flow of energy that occurs, along a food chain is called energy flow. The energy decreases at each trophic level from producers to consumers. When the food chain is short, final consumer will get huge amount of energy. When the food chain is long the final animal will get very less amount of energy. In each trophic level, loss of energy will become more due to respiration, locomotion (movement) and reproduction.

Ecological succession

Write short notes on Ecological succession: (5 Marks)

Introduction:-

The organisms in the eco-system are not stable. They are frequently changing their habitat for suitable survival, for the living community when death occurs or it may disappear in that location. The survival success depends upon many factors such as temperature, light, water, food, etc, if any variation occurs it will affect the eco-system entirely.

In a particular area, when one community is replaced by another community or by a series of communities (plants and animals). If the replaced community is stable in the particular area, is termed as ecological succession.

Classification:-

The ecological succession is classified into primary, secondary, tertiary (autotrophic and heterotrophic) succession.

1) Primary succession*:* The community development starts on a sterile area, which has not been occupied by any community previously. This type of succession is known as primary succession.

Example: Lichens occupied above the rocks after rainfall.

2) Secondary succession*:* The community development starts on, previously occupied developmental communities. This type of succession is known secondary succession.

Example: Forest community is disturbed and in that area agricultural land is expanded.

3) Autotrophic succession (Tertiary): Autotrophs are plants, in an eco-system where plants dominated, when compare to animals is called as autotrophic succession.

4) Heterotrophic succession: Heterotrophs are living things, which depends upon other animals and plants for food. In an eco-system where continued dominance of animals occurs, is termed as heterotrophic succession.

Food chain

Define Food chain and explain its types: (5 Marks)

Food chain:

- Flow of energy from one organism to the next organisms is known as food chain. The food chain starts from producers to consumers (primary, secondary and tertiary).
- Food chain shows that how organisms depends on other animals. The food chain is normally maximized with 4 to 5 links.
- In an ecosystem food chain is one of the important structures of the consumption of the animals. This chain starts from the base of producers and gradually increases to the next consumption category.
- The various steps in the food chains are called trophic levels.
- Every organism needs to obtain energy in order to live. For example, plants get energy from the sun, some animals eat plants, and some animals eat other animals.

- A food chain is the sequence of who eats whom in a biological community (an ecosystem) to obtain nutrition.
- A food chain starts with the primary energy source, usually the sun or boiling-hot deep sea vents. The next link in the chain is an organism that make its own food from the primary energy source -- an example is photosynthetic plants that make their own food from sunlight (using a process called **photosynthesis**) and chemosynthetic bacteria that make their food energy from chemicals in hydrothermal vents. These are called **autotrophs** or **primary producers**.
- Next come organisms that eat the autotrophs; these organisms are called **herbivores** or **primary consumers** -- an example is a rabbit that eats grass.
- The next link in the chain is animals that eat herbivores - these are called **secondary consumers** -- an example is a snake that eat rabbits.
- In turn, these animals are eaten by larger predators -- an example is an owl that eats snakes.
- The tertiary consumers are are eaten by **quaternary consumers** -- an example is a hawk that eats owls. Each food chain end with a **top predator**, and animal with no natural enemies (like an alligator, hawk, or polar bear).
- The arrows in a food chain show the flow of **energy**, from the sun or hydrothermal vent to a top predator.
- As the energy flows from organism to organism, energy is lost at each step. A network of many **food chains** is called a **food web**.

Food chain

Snake (Carnivores or tertiary consumers)

↓

Frog (Carnivores or secondary consumers)

↓

Grasshopper (Herbivores or primary consumers)

↓

Green plants (Producers)

Types of food chain:

1. Grazing food chain:

The grazing food chain starts from plants, goes through herbivores and ends in carnivores.

Example: Green plants -→ Goat →Man → Lion.

2. Predator food chain:

In predator food chain one animal captures another animal. The animal which is eaten is called prey and the animal which eats other animals is called predator.

Example: Mouse → Snake → Eagle → Lion.

3. Parasitic food chain:

The plants and animals of the grazing food chain are infected by parasite and the parasite derives their energy from their hosts.

4. Detritus food chain:

It starts from dead organic matter and ends in inorganic compounds.

Example: Dead organic materials → Detritivores → 6Co2 +6H2O

Food web

Define Food web: **(2 Marks)**

Food web: The inter-link of food-chain in an eco-system is known as food web. Food web shows that the organisms are interdependent and various options present in an ecosystem, for animals as food and it maintains the ecological balance.

- A **food web** is a graphical description of feeding relationships among species in an ecological community, that is, of who eats whom.It is also a means of showing how energy and materials (e.g., carbon) flow through a community of species as a result of these feeding relationships.
- The pioneering animal ecologist Charles Elton (1927) introduced the concept of the food web (which he called food cycle) to general ecological science.
- As he described it: "The herbivores are usually preyed upon by carnivores, which get the energy of the sunlight at third-hand, and these again may be preyed upon by other carnivores, and so on, until we reach an animal which has no enemies, and which forms, as it were, a terminus on this food cycle.
- There are, in fact, chains of animals linked together by food, and all dependent in the long run upon plants. We refer to these as 'food-chains',and to all the food chains in a community as the 'food-cycle.'"
- A food web differs from a food chain in that the latter shows only a portion of the food web involving a simple, linear series of species (e.g., predator, herbivore, plant) connected by feeding links.
- A food web aims to depict a more complete picture of the feeding relationships, and can be considered a bundle of many interconnected food chains occurring within the community. All species occupying the same position within a food chain comprise a trophic level within the food web.
- For instance, all of the plants in the foodweb comprise the first or "primary producer" tropic level, all herbivores comprise the second or "primary consumer" trophic level, and carnivores that eat herbivores comprise the third or "secondary consumer" trophic level.
- Additional levels, in which carnivores eat other carnivores, comprise a tertiary trophic level.

Significance of food web:-

The significance of food web is as follows,

- Helpful in understanding the mechanism of energy flow.
- It provides information about the biological diversity of an organisms.

Ecological pyramid

Write short notes on Ecological pyramids: (5 Marks)

Ecological pyramids:

The concept of ecological pyramids was introduced by Charles Elton. Ecological pyramid is the graphical representation of trophic structures and its function. It is shown in terms of number, biomass and energy .In each ecological pyramid, producer forms the base and consumer occupies the apex.

Types: -

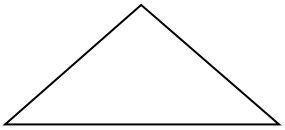
There are three different types of ecological pyramids in an ecosystem.

- Pyramid of number
- Pyramid of biomass
- Pyramid of energy

1. Pyramid of number:-

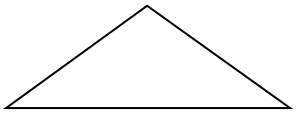
It shows the different trophic levels in a food chain, numerical relationship between the producers and consumers. Depending upon the type of ecosystem and food chain, the pyramids of number may be upright or inverted.

PYRAMID OF NUMBER



2. Pyramid of Biomass – Dry Weight of the living things present in each tropic level is taken into consideration. Its unit is kilogram or grams. The total biomass of successive trophic levels are arranged to form a pyramid is called pyramid of biomass.

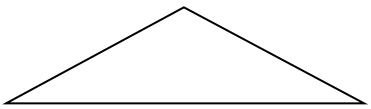
PYRAMID OF BIOMASS



3. **Pyramid of Energy** - It represents the amount of energy produced by each trophic level. The unit is either in calories or in kilocalories.

For example: In a pyramid assume producer at the base , 100 grasses were consumed by 75 grasshoppers, then 50 frogs consume it and then 25 snakes consume it. Similarly, to that biomass and energy of the food chain gradually decreases from producer level to consumer level and its unit is in kilograms or grams.

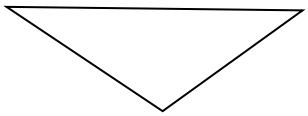
PYRAMID OF ENERGY



Inverted pyramid:-

In some cases the pyramids are also in inverted position, is termed as inverted pyramid. For example, one tree has 50 birds and these birds have enormous amount of pathogens such as mites and ticks. If we draw a pyramid it will be in inverted position.

INVERTED PYRAMID



Concept of Sustainable Development:

Introduction: -

Our earth is the only planet which maintains different kinds of living beings, since it is enriched with natural resources for their existence. The misuse of natural resources by mankind has caused a severe crisis on natural resource. To overcome the depletion of resources and retain the resources for the future generation, the concept of sustainable development has become an indispensable one.

Concept of sustainable development:-

The World Commission on Environment and Development (WCED) defines the sustainable development as meeting the needs of the present generations.

Need for sustainable development:-

Rapid population growth, industrialization and urbanization are the main reasons for the existing environmental deterioration. The present day lifestyle throws several threats to environment.

Challenges for sustainable development:-

The environment provides security for present and future generation. The health of the environment closely, connected with the health of humans and it is economically beneficial for the countries to prevent environmental degradation.

(UNIT - I Completed)

UNIT-II
NATURAL RESOURCES

What are natural resources? **(2 Marks)**

Introduction:-

- ⋆ Anything which is useful to man, or it can be transformed into a useful product or it can be used to produce a useful thing can be referred to as a resource. A natural resource is the resource obtained from nature.

- ★ Any part of our natural environment, such as land, water, air, mineral, forest, wildlife etc., which can be utilized by man to promote his welfare can be regarded as a natural resource.
- ★ Natural resources from the very basis of entire life on this planet. We use natural resources in our day today life. Almost all products, we use in our day today life, are the by-products of natural resources.

Definition:

- ★ A natural resource is anything people can use which comes from nature. People do not make natural resources, but gather them from the earth. Examples of natural resources are air, water, copper, wood, oil, wind energy, hydro-electric energy, iron, and coal.
- ★ Most natural resources are limited. This means they will eventually run out. Some examples of perpetual resources include solar energy, tidal energy, and wind energy. Other examples are salt, stone, magnesium, and diamonds.
- ★ When people do not have some natural resources, their quality of life can get lower. So, we need to protect our resources from pollution. For example, when they can not get clean water, people may become ill; if there is not enough wood, trees will be cut and the forest will disappear over time (deforestation); if there are not enough fish in a sea, people can die of starvation.

Classification of natural resources and its types **(5 Marks)**

- ★ Natural resources can be classified,

1.On the basis of their origin of natural resources.
2.On the basis of their origin of their renewability
3.On the basis of their distribution
4.On the basis of their utility
5.On the basis of their origin of natural resources:-

1.On the basis of their origin of natural resources.

Natural resources can be classified into two classes,

a.Biotic or living b. Abiotic or non-living resource

a.Biotic resource:-

Biotic resource refer to living things, which are obtained from biosphere .They include all living organism or things which are useful to man .Wild animals, fishery, forest, grasses are biotic resources.

b. Abiotic resource:-

Abiotic resources refer to non –living things which satisfy man's needs. They are non-renewable .Once they used up; they cannot be replaced or reproduced. Mineral resources, power resources like coal, petroleum and natural gas are abiotic resources.

2.On the basis of their renewability:-

On the basis of their renewability natural resources are classified into,

a.. Renewable or inexhaustible resource
b. Non-renewable or exhaustible resource

a.Renewable resource:-

A renewable resource grows again and comes back again after we use it. For example, soil, sunlight, water and wood are renewable resources.

In otherwords ,Renewable resources or inexhaustible resources refer to natural resources which can be renewed or regenerated. These resources are renewed with in a short period of time. Forest, grasses, fishery resources are examples for renewable resources. They are mostly biotic in nature.

b.Non-renewable resources:

A non-renewable resource is a resource that does not grow and come back, or a resource that would take a very long time to come back. For example, coal is a non-renewable resource.

In otherwords,these are available only in finite amount in nature and their utilization leads to exhaustion of the supplies. But the rate of their replacement is very slow it may take over million of years. Non-renewable resources are minerals, crude oil, etc.

3.On the basis of their distribution:-

Natural resources can be classified into two types based on their distribution,

a.Ubiquitous resources
b.Localised resources

a.Ubiquitous resources:-

These resources are natural resources which occurs almost everywhere. Eg Oxygen in the atmosphere, sunshine etc.

b.Localised resources:-

Localised resources are natural resources which are concentrated at specific places. Eg Minerals, fossil fuel.

4.On the basis of utility:

On the basis of utility, resources can be classified into three types. They are

a.Food resource
b.Raw material
c.Energy resource

a.Food resource:-

Food resources refer to resources which are used by man as food.They include agricultural food crops, fish products, and salt.

b.Raw materials: -

Raw materials are those resources which are used as raw materials in industries. They may be agricultural products, fish products etc.

c.Energy resources: -

Energy resources refer to resources which are used as energy or power in ships, wind power, geothermal energy.

Mention the types of natural resources. **(5 Marks)**

Other important types of natural resources:-

★ The natural resources are classified in 3 ways, according to their

a) Chemical nature
b) Their abundances and availability
c) Their distribution.

a) Chemical nature:

★ They are of 3 types:

1)inorganic resources including air,water and metallic minerals.
2)organic resoureces including plants,animals,microorganisms and fossil fuels.
3)mixed resources including soil,which is an organic as well as inorganic resources.

b) their abundances and availability

★ The resources are of 2 types .they are :

1.Inexhaustible resource (these include air,clay,sand,tidal energy and precipitation. These are not likely to be exhausted by the human race)
2.Exhaustible resource (they are likely to be finished by human use.they are further of 2 kinds of renewable and non renewable)

c) their distribution.

★ The resources are of 3 types .they are :

1.National resoureces
2.Multinational resources
3.International resources

Other Types:

1.Continuous resources
2.Extrinsic resources

1.Continuous resources:

These resources continue to be available, and with the possible exception of solar energy, the receipt of which could be affected by atmospheric pollution, cannot be degraded, even with gross mismanagement. Eg: solar energy, wind, gravity, tidal energy, and geothermal energy.

2.Extrinsic resources:

These are prone to breakdown or degrade, yet their availability continuous, if it will be well managed. Eg: Human skills, institutions, management abilities and so

RENEWABLE RESOURCES : **(2 MARKS)**

- ★ Renewable resources are a part of Earth's natural environment and the largest components of its ecosphere.
- ★ Renewable Resources as: "*The total range of living organisms providing man with food, fibers, drugs, etc...*".

AIR RESOURCE

- ★ Air is the name given to earth's atmosphere used in breathing and photosynthesis. I t is essential for all form of life. Plants as well as animals and human beings are using air for their survival.

Advantages:-

- ❖ It is essential for the well being of living things.
- ❖ In the atmosphere air occurs in different forms such as nitrogen, oxygen and maintains the cell cycle in stable form.

WATER RESOURCES

Write briefly about the Water resources? (10 Marks)

Introduction:

- ⋆ Water is an indispensable natural resource on this earth on which all life depends. It is essential for the substance of all living organisms including plants, animals & man.
- ⋆ According to Thiruvalluvar when there is no water there is no life, on earth.
- ⋆ **The basic human physiological requirement for water is about 2.5 litres per day.**
- ★ In the hydrosphere, marine water accounts for 97% & 3% are fresh water.
- ★ The fresh water is stored as ice in the world's ice sheets and mountain glaciers. It is nearly 2.15% of total ground water.
- ★ Ground water accounts for 0.70% of the hydrosphere. This small portion is very important because it includes the water accounts for plants, animals and human use.
- ★ Soil water is held in the soil with in the reach of plant roots comprises, 0.005% of the total global water.

Based on quality, water can be of the following types:

Potable water : **Clean, safe water free from disagreeable taste, odour, harmful chemicals, turbidity and microorganisms is called potable water.**

Polluted water: **Water with added substances which impart colour, odour and taste is polluted water.**

Contaminated water: **This is water which is unsafe for drinking since it may have added discharges from human or animal intestines, or is rendered dangerous by addition of poisonous chemicals.**

Definition:

- ★ Water resources are sources of water that are useful or potentially useful. Uses of water include agricultural, industrial, household, recreational and environmental activities. The majority of human uses require fresh water.
- ★ Water is classified as a renewable source because about 90% of the surface of the earth is covered by water. Surface water is renewable as long as there is snow and rain to renew it as well as underground streams and springs to contribute to the water flow.
- ★ 97 percent of the water on the Earth is salt water and only three percent is fresh water; slightly over two thirds of this is frozen in glaciers and polar ice caps. The remaining unfrozen freshwater is found mainly as groundwater, with only a small fraction present above ground or in the air.
- ★ Fresh water is a renewable resource, yet the world's supply of groundwater is steadily decreasing, with depletion occurring most prominently in Asia and North America, although it is still unclear how much natural renewal balances this usage, and whether ecosystems are threatened.
- ★ The framework for allocating water resources to water users (where such a framework exists) is known as water rights.

Types of water resources:

There are two types of water resources based upon the availability.

Surface water: The water which is present on the surface of the earth, which includes dams, rivers, streams, estuaries, sea, ocean, etc. the surface water quantity depend upon the rainfall and the aquifers.

Ground water: The water stored in the underground is termed as ground water. The ground water is recharged by rainwater percolation.

Global distribution of the water:

- ★ About 97% of the earth's water is in the ocean, 2% in glaciers and Polar Regions, 0.009% in lakes and 0.00009% in the rivers and the remaining as the ground water. The oceans cover 71% of the total earth surface is thus the dominant in the environment.

Component	% of total water
Oceans	97.6
Ice sheets & glaciers	1.87
Ground water	0.5
Rivers, lakes & inland seas	0.01
Soil moisture.	0.005

- ★ Water pollution is one of the main concerns regarding water resources. It is estimated that 22% of worldwide water is used in industry.
- ★ Major industrial users include hydroelectric dams, thermoelectric power plants, which use water for cooling, ore and oil refineries, which use water in chemical processes, and manufacturing plants, which use water as a solvent.

Use and over utilization of water:

Uses of water:

- ★ It is a universal solvent.
- ★ Water is used for various potable purposes in the day -to-day life such as the washing, cleaning, etc.
- ★ Water is used in the water based processing industries such as the textile, tanneries (leather manufacturing unit), etc.
- ★ In agriculture, water is used for irrigation by which the nutrients are supplied to plants.
- ★ It helps to maintain the soil moisture.

Over utilization of surface and ground water:

- Human population is increasing day by day; there is an increasing need for large amount of water to fulfill the variety of basic needs.
- The over-utilization of water occurs at various levels.
- Most of the people use more water than really needed. .
- In domestic usage, most of us waste water during bathing, washing clothes, brushing, etc.

Conservation of fresh water resources:

- Increase efficiency of irrigation.
- Protect watersheds and wetlands.
- Afforestation, reforestation and forest conservation.
- Preventing wastage in
- Industries
- Leaking in dams & reservoirs.
- Leaking in municipal pipelines.
- Households.
- Recycling of waste water by setting up waste water treatment plants.
- Constructing a large number of small ponds, tanks etc, in low lying areas.
- Building, check dams at appropriate places in all rivers.
- Provide drainage facilities in canals and use drainage water for irrigation.
- Rainwater harvesting in rural and urban areas.
- Consider water as an economic good & reasonable charge to discourage its wastage.

SOIL RESOURCES

Introduction:-

- ★ The term soil is derived from the Latin word 'Solum' which means earthy material in which plants grows. Soil is defined as it is the thin layer of loose powdery material covering the earth. It contains a multitude of organic and inorganic substances.
- ★ Soil is made up of weathered, rock materials and decomposed vegetable and animal matter.

Factors influencing soil formation:-

Soil formation is influenced by a number of factors. They are,

1. Parent material: Soil is formed as a result of the weathering of parent rock material. It is broken into small parts contributes the formation of soil.

2. Local climate: It influences the formation of soil by contributing parent material and decomposition of plants, animals and other organisms.

3. Age of the soil: It is one of the factors responsible for soil formation. Depending upon the age of the soil, the quality of the soil varies**.**

Importance of soil resources:-

1.Soil supports all forms of life.

2.In the soil all plants finds their roots and they absorb life sustaining moisture and nutrients.

3.Soil determines animal life indirectly. Soil supports vegetation in turn supports animal life.

4. The natural vegetation of a region depends upon the nature of its soil.

5. Soil provides raw material for a number of industries such as brick, tiles etc.

6.Soil resources depends on some of the Physical (**Soil Texture , Soil Pore Space , Soil Colour ,Soil Aeration , Soil Temperature , Soil Water , Soil Structure) and** Chemical factors (**Soil Colloids , Soil Humus).**

LAND RESOURCES

Write briefly about the Land resources? (10 Marks)

Introduction:

Land is one of the major resources, which is abundant in the earth surface; it is a valuable and unlimited resource.

Land as resources:

The soil profile of land determines its ability to serve socio-economic needs. It has been estimated that more than 5,000 million tones of top soil is eroded annually along with 5 million tones of nutrients. About a third of this is lost to the sea, while the rest builds the silt load in reservoirs and river beds leading to floods.

About 38% of the area in India suffers from moderate to high degree of water-based erosion, most of which needs suitable soil and water conservation measures such as watershed development.Land resources in India envelop approximately 1.3 million sq miles and is a cape protruding into the Indian Ocean in between the Bay of Bengal on the east.

Land degradation:

Land degradation means change in the properties of the land. The land is degraded by many ways such as:

1. Soil erosion: Soil erosion means disintegration of the soil particles. This may occur due to over surface runoff by rainwater, de-vegetation, temperature variation, drought, etc., due to soil erosion the nutrients washed away and plants may not get enough nutrients.

2. Landslides: Huge amount of the land fell down are landslides. It may occur due to the overburden above the region such as the urbanization. The deforestation may be the reason for landslides.

3. Desertification: It occurs by the increase in the temperature and less rainfall. Due to desertification, the soil fertility decrease and change its soil property.

4. Volcanic eruption: During volcanic eruption lava, gets distributed which contain heavy metals, molten rock materials, and harmful chemicals.

5. Floods: Floods washout the top layer of the soil and settle on another place. During such occurrence, the nutrients get dissolve along with the soil particles.

6. Blasting: During war time atom bombs along with the radioactive element evolve and huge mass land excavated. This also reduces vegetation on the top of the land.

7. Over irrigation: When agricultural fields are over irrigated it resulted in water logging. Water is logged because the salinity and nutrients dissolve and degraded the land.

8. Chemical: In agricultural land synthetic fertilizers and pesticides are used enormously as industrial effluents. This will leads to change the chemical properties of the land.

9. Drought: The water holding of the soil during hot season decrease the soil properties and plant growth.

10. **Mining:** Mining process is done by blasting & other methods. During that time the minerals deposited on the adjacent area and pollute lands. After minerals exploitation the area become hole & it will be degraded.

Man- Induced Landslides:

Landslide is one of the important types of mass movement (down slope movement of materials due to gravity). It is a general term for rapid mass movements. Landslides can be triggered either by natural or human-induced causes or both. Some of the important human-induced causes are mismanagement of land and water. This could be caused due to

- ★ Cutting of forests trees on the slopes.
- ★ Clearing slopes for construction purposes.
- ★ Construction of buildings and lying of roads on hillsides can cause landslides.
- ★ Over irrigation on the slope of the mountains.
- ★ Diversion of surface water into sensitive slope areas.
- ★ Watering of sloping lawns profusely (this destabilizes slopes by reducing friction)

Soil erosion:

- ★ Soil is the movement of soil components especially top soil from one place to another place.
- ★ The important agent, which moves the top soil, is the wind.
- ★ Though soil erosion is a natural one its place can be rapidly accelerate by human activities.
- ★ The soil erosion occur by wind is found in the desert regions.
- ★ Naturally, soil erosion occurred by the floods, landslides, etc. and human induced by deforestation, poor construction of irrigational system, etc.
- ★ Soil erosion results in loss of fertility of top soil layer.
- ★ About 7% of the world top soil washes and blows into the rivers, lakes and oceans each year. So a large amount of the potential of cropland is eroded.
- ★ The plant nutrient loss from the erosion is about $ 18 billion per year.

Types of soil erosion:

Soil erosion is mainly of two types.

Natural geologic erosion – removal of topsoil by natural process.

Human accelerated erosion – it occurs due to human activities.

Causes of soil erosion:

There are mainly two types of agents which cause soil erosion.

Biotic agents – agents are overgrazing, deforestation and mining.

Climatic agents – wind & water are two climatic agents.

Role of an individual in conservation of natural resources:

- ★ Domestic wastewater can be use for gardening watering.
- ★ Check the leaks of water in taps.
- ★ Avoid over usage of water for basic needs such as bathing, washing, cleaning, etc.
- ★ Electrical appliances should not use un-necessary.
- ★ Use solar water heater because it is a renewable energy resources.
- ★ One vehicle for one person and for short distance use non-polluting vehicle.
- ★ Recycle materials should not burned and in the same certain materials can be reuse and recycled.
- ★ Instead of cutting a whole tree we can use branches.
- ★ Each person should plant one tree.
- ★ Avoid usage of polythene bags instead of that we can use paper bags and cloth bags.
- ★ Use natural fertilizers.
- ★ Construct rain water harvesting tank.

Equitable use of resources for sustainable lifestyles:

- ★ Population growth should be reduces by which resources can be equally distributed to all people.
- ★ Non-renewable resource can be recycled.
- ★ Utilization of renewable energy resources will keep our various non-renewable resources for future usage which can be utilize by our offspring.
- ★ People should educate about various resources how to use.

Wildlife resource (5 Marks)

Introduction:-

- ★ The term wild life refers to all the plants and animals on the planet that are not domesticated by humans. Protecting wild life is very important to the future of the environment, and there are many wild wide organization devoted to that protection.
- ★ Wildlife serves as a resource to maintain the ecological balance as well as source of entertainment besides acting as source to produce the meat, skins and other animal products.
- ★ The animal species like lion, tiger, cheetah, deer, bear, jackal and number of wild birds are included in wild life wealth.
- ★ Wild life resources form important natural resource of a nation.

Types and Distribution of Forest and Wildlife Resources:

These are classified under the following categories.

(i) Reserved Forests:

More than half of the total forest land has been declared reserved forests. Reserved forests are regarded as the most valuable as far as the conservation of forest and wildlife resources are concerned.

(ii) Protected Forests:

Almost one-third of the total forest area is protected forest, as declared by the Forest Department. This forest land are protected from any further depletion

(iii) Unclassed Forests:

These are other forests and wastelands belonging to both government and private individuals and communities.

Benefits of wild life:-

1. Benefits to people:-

Wildlife and nature have largely been associated with humans for numerous emotional and social reasons. It provides a fresh breath of life.

2. Benefits to natural process:-

It plays an essential role in ecological and biological processes significant to life. The normal functioning of biosphere depends on interactions among animals, plants and microorganisms.

3. Benefits to science, agriculture, and medicine:-

Studies indicate the significance of wild life and its habitat for preserving genetic diversity.

Importance of wild life conservation:-

1. Beauty:-

By their unique way of existence, wild creatures exaggerate the natural beauty of t he earth.

2. Economic Value:-

The financial value of wild species is important to the economics of several nation provide plant products, fibers, meat and other foods, fur or skin.

3. Scientific Value:-

Gained valuable knowledge about various life processes and discovered important medical products.

4. Survival Value:-

In maintaining the balanced living systems of earth, which consequently ensures survival of life.

B. NON –RENEWABLE RESOURCES
MINERAL RESOURCES

Write briefly about the Mineral resources? (10 Marks)

Introduction:

Mineral is one of the major non-renewable resources, which is abundant in the earth's crust. Mineral exploration is not new to humankind many years before itself man started to mined out minerals and utilized.

Mineral resources are nonrenewable. Minerals do reform after being used, however humans are consuming minerals far quicker than they can be renewed. For this reason, they are considered nonrenewable resources.

Types of minerals:

There are two types of minerals such as metallic and nonmetallic. This is found on the earth surface. The metallic minerals are those minerals, which are having the metallic properties such as conductor (passing electricity) and melt during heating. The non-metallic minerals are one which does not conduct electricity and it won't melt.

Major minerals available in the India:

Minerals show uneven distribution in the world. Some areas are very rich in mineral resources such as Canada, South Africa, while large areas like Amazon basin, Nether Land, Denmark etc., are comparatively poor.

In India, mining of minerals is mainly done in Uttar Pradesh, Bihar, Jharkhand, Orissa, Madhya Pradesh & Andhra Pradesh. India is rich in about 35 minerals.

Some of the major minerals which are available in India are Chromium, Iron ore, Coal (Lignite), Aluminum, Limestone, Dolomite, Mica, Manganese, etc.

Uses of Minerals:

- ★ To construct industrial plant and to fabricate machineries.
- ★ To construct of house and commercial building.
- ★ Generation of electricity e.g. coal, lignite, uranium, etc.
- ★ Transportation- To lay railroads and to fabricate vehicles, etc.
- ★ Gold, silver, rubies, gemstones are use as an ornaments.
- ★ Formation of alloys (combination of two or more metal).
- ★ In Agriculture- as fertilizers, fungicides, pesticides, etc,
- ★ Defense equipments are made up minerals.
- ★ Fuel includes coal, lignite, crude oil, natural gas etc.
- ★ Medicinal purpose such as Iron, Calcium, etc.
- ★ Potash, phosphate, etc Fertilizers.

Some of the particular minerals and their uses are listed below:

Minerals	**Major uses**
Aluminum	Packing food items, transportation and electrical wires.
Chromium	Used as steel alloy, textile industries, tanning and electroplating.
Copper	Electrical appliances such as wire.
Iron	Heavy machinery, construction and machineries.
Manganese	For making high strength, heat resistant steel alloys.
Gold	Ornaments and medicinal uses.
Silver	Photography, electronic component and ornaments.
Nickel	Chemical industry and electroplating.
Graphite	Pencil
Calcium	Toothpaste, white wash and medicine
Silicates	Sand, gravel and bricks for construction.
Gypsum	Cement and agriculture.
Potash & phosphate	Fertilizers
Sulphur	Medicines, car batteries, etc.

Exploitation of mineral resources:

Minerals are almost used for various purposes in day today life. Most minerals need to process before they become usable. Thus technology is dependent on both the presence of resources and the energy necessary to make them usable. Since minerals occur in varied form, different methods are required for their extraction from the surroundings rocks. The important methods include opencast mining, underground mining and placer mining.

A. Open cast mining: The top layer of the soil is cleared and then the minerals are extracted. This method of mining is cheapest and easiest way of extracting minerals.

B. Underground mining: The minerals lies deep below the surface are extracted by this method. This type of mining is very costly, required many safety precautions and much expensive equipment.

C. Placer mining: Placer mining is performing to take valuable sediments/ mineral grains can extract by screen bars and sieve, which found in the costal regions.

Environmental effects of extracting and using mineral resources:

1. Ground water contamination: During mining and storing of the minerals on the soil, along with Rain water it will enter into the underground by percolation and contaminates the underground water. Then if human consumes the water various health hazards may occur.

2. Surface water pollution: Heavy metals from mining area, acids from mine drainage and radioactive substances from mine waste contaminates water bodies like rivers, streams, lakes; ponds etc and kill the aquatic flora and fauna.

3. **Land subsidence:** It occurs by the underground mining. When more vacuum created the top land Slightly go below, it results in cracks house, building of roads destruction of rain tracks, leaking of gas pipes etc.

4. De-vegetation/Deforestation: De-vegetation/deforestation occurs due to mining leads to environmental losses, soil erosion and forest clearance.

5. **Occupational health hazard:** Mineworkers suffer from various disorders due to constant exposure to toxic substances and suspended particulate matter that originates from the mining area.

6. Noise pollution: During mining drilling, blasting, and transportation are the important process which cause noise pollution.

7. Air pollution: Noxious gases released to atmosphere during processing and generation of dust during various operation of mining such as transportation, blasting, etc.

8. Migration: Mining inside the forest leads to the migration of animals and where it leads to ecological imbalance.

Case studies:

The Kudremukh iron ore mining area:

Kudremukh is located on the Western Ghats of Chick Mangalore district in Karnataka. It is one of the famous Iron ore mine in India. The river Bhadra flows through the area. The iron ore deposits of the area remained unexploited until the company started operating in 1977 in a big way by mechanized open cast methods, mainly as an export venture. It has been found that the area in and around the mining place have been subjected to a variety of environmental problems and there include.

- ⋆ Deforestation occurs in the Kachiga and Kudremukh forest that is near to the mines.
- ⋆ Water pollution of the Bhadra River due to spill over from the tailing dam and rain water runoff from the mining areas during the rainy season.
- ⋆ Noise pollution occurs to near by area during mining and while transportation.
- ⋆ Many animals found in the area are migrated and disappeared.

Mining in Sariska Tiger reserve in Aravalli:

- ⋆ The Aravalli range is spread over about 692 km in the North-West India covering Gujarat, Rajasthan, and Harayana.
- ⋆ The hilly region is very rich in biodiversity as well as mineral resources.
- ⋆ Mining operations left many areas permanently infertile & barren. Wildlife is under serious thread.
- ⋆ We must preserve the Aravalli series as a National Heritage and the Supreme Court on December 31st, 1991 has given a judgement in response to a public interest litigation of Tarun Bharat Singh an NGO where in both centre & state Govt of Rajasthan have been directed to ensure that all mining activity within the park be stopped. More than 400 mines were shut immediately.

Uranium mining at Nalgonda, Andhra Pradesh:

- ⋆ The present reserves of uranium in Jaduguda mines in Jharkhand can supply the yellow cake (Uranium) only till 2004.
- ⋆ There is a pressing need for mining more uranium to meet the demands of India's nuclear program.
- ⋆ The Uranium Corporation of India Limited (UCIL) is to mine uranium from the deposits at Nalagonda district in Andhra Pradesh and a processing unit.
- ⋆ The plan is to extract the ore of 11.02million tons in 20years.

- ★ The UCIL is trying its best to the villagers through employment opportunities but experts are charge the company that the human settlement is just 1km.
- ★ The Nagarjuna Sagar dam which is 10kms and Akkampalli reservoir is 4kms from the mining area, which is Hyderabad's new source of drinking water.
- ★ It has estimated 20years of mining will generate about 7.5million metric tones of radioactive waste.
- ★ The villagers are very likely to affected by the radioactive wastes, though UCIL claims that there will not be any such accidents, no one can deny that is a highly hazardous industry and safety measures cannot be overlooked.
- ★ The proposed mines would cover about 445ha of Yellapurum reserve forest and the Rajeev Gandhi tiger sanctuary will be definitely destroyed.

Control of dereliction:

The dereliction of land – means the abandoned lands which are barren, useless and too badly damaged are known as derelict land. Dereliction can be controlled by two ways.

1. legislation and
2. Reclamation

1. ***Legislation – Government regulation***:

The Government can ask the mining companies to rehabilitate the land after it becomes uneconomic to extract the mineral. The Government should issue license only to those companies which undertake rehabilitation work, includes the levelling of land and planting of saplings of trees that suit the climatic conditions.

2. ***Reclamation:***

When the land is abandoned for many years, then the government agencies should reclaim the land. The reclaimation of derelict land can provide additional land for agriculture, for industry, for settlement or for other commercial purposes. For example, in Malaysia, the old mining pools are often used for fish-farming. Sometimes, the reclaimed land can be used to add tothe amenities like parks, sports fields and other facilities for outdoor reecreation. Big water pits are ideal for water sports, and old pits can be used for boating or sailing.

Current issues:

The coming Global Phosphate Crisis:

Phosphate is a mineral that is used in fertilizer to boost agricultural productivity. It is greatly rsponsible for the "Green " revolution and the increased output of farms around the world. Unfortunately, the world will be coming to a point, if certain trends hold, where we will run out of phosphate. The mineral is widely used, but utterly unrecycled. Like fossil fuels, phosphate may come to a point where it is too costly to use, and world hunger may be the consequence. The largest reserve of phosphate rack can be found in the country of Wester Sahara, just south of Morocco. The mines are at BouCraa which produces several million tons of phosphate rock each year. The farmers use 170 million tons of phosphat every year. One ton of phosphate is typically used for every 130 tons of grain. 15% of all phosphate comes from Western Sahara and Morocco. The other big producers are US and China. According to US –Geological Survey the world has 65 million tons of known phosphate reserves, but only 16 billion ton that are economically viable to mine. Almost 80% found in Western Sahara & Morocco. There are no substitute for phosphate. It must be mined and the mines are going to runout. Unless a solution can be found, the long term consequences may be lower yield of crops and a hungier world.

COAL

Introduction: -

Coal is considered a nonrenewable resource because it takes millions of years to make it from fossilized organic material. The rate that it is made is far to slow to consider it to have more being made. Since we are using it at a rate much faster than it can be made it is nonrenewable.

Coal has formed when the trees are uproot, covered with soil, due to earth's temperature, and air less condition it converts into coal. Time required coal formation is 255-350 million years. Depend upon the quality coal are of different types such as

1. Anthracite (Hard coal)

2. Bituminous (Soft coal)
3. Lignite (Brown coal)

In thermal power plant, coal used to generate electricity because it is having high heat generation and holding capacity. Water heated with the coal's burning heat to produce steam then this steam used to rotate turbines to generate electricity.

Advantage:

It gives enormous amount of heat energy.

Disadvantages:

1. The area around the thermal reactor is affect by thermal pollution.
2. During burning of coal noxious gases such as carbon monoxide, oxides of nitrogen, methane, etc, evolve from reactors because air pollution.
3. Coolant water that is use to cool thermal power plant will cause severe environmental problems in the marine or aquatic eco-system.

Oil

Introduction:-

Oil is a non-renewable energy .It is formed by remains of plants and animals. We can find oil in the bottom of the ocean. We can find oil in few places like Arabia, Russia, US and China. We get 92% of energy from non- renewable resources, mostly oil, coal and natural resources.

Crude Oil:-

Oil as it comes out of the ground is made of many different compounds, each with its specific boiling point. The refining process of oil extraction is world wide. We have 2.9% of world's oil reserve.

Pros of oil:-

- High net energy
- Easily transported
- Strong infrastructure

GAS

Introduction:-

Analysts view gas as the transition fuel, that will be useful, while we move to solar and hydrogen based energy systems. Natural gas is a primary fuel. Mostly methane and other gases are versatile with high net energy.

Advantages:-

- High net energy yield
- Low cost
- Less air pollution than any other fuels
- Easily transported through pipelines
- Good fuel for fuel cells and gas turbines

Environmental problems related to the extraction and use of natural resources :

Problems arising from the exploitation of natural resources are,

- Extinction of species
- Forced migration
- Soil erosion
- Deforestation
- Desertification
- Oil depletion
- Green house gas increase
- Water pollution
- Natural hazards/disaster

Environmental impacts of oil extraction: -

- The fossil fuel chain of destruction begins with new reverses of oil and gas. This search often results in the construction of roads, posing a threat to biological and cultural diversity.
- The extraction process results in leaks and seepage that causes massive environmental pollution and health problems for local communities.

- The fossil fuels are shipped on tankers around the World, sometimes resulting in oil spills affect marine ecosystem.
- A rapid increase in population, leads to greater demand for natural resources.

Effects on local communities:-

- When a mining company enters a developing country to extract raw materials, minimizing the potential negative effects gain co-operation of the local people.
- Advantageous factors are primarily in economic development, the Government could not provide health centers, and with economic development money becomes a dominant subject of interest.
- Local communities can bring about major conflicts that a developing country has never dealt with before.
- The fossil fuels are shipped on tankers around the World, sometimes resulting in oil spills affect the marine environment.
- About 80% of the World's energy consumption is sustained by the extraction of fossil fuels; which consist of oil, coal and gas.

(UNIT-II Completed)

UNIT-III
BIODIVERSITY

Introduction:

- The term 'biodiversity' is a contraction of the term "biological diversity". In the word 'biodiversity' "bio" means "life" and "diversity" refers to "the number, variety and variability of living organisms".
- The term "biodiversity" is indeed commonly used to describe the number, variety and variability of living organisms.
- **Biodiversity** is the degree of variation of life. This can refer to genetic variation, species variation, or ecosystem variation within an area, biome, or planet.
- Terrestrial biodiversity tends to be highest at low latitudes near the equator, which seems to be the result of the warm climate and high primary productivity.
- Marine biodiversity tends to be highest along coasts in the Western Pacific, where sea surface temperature is highest and in mid-latitudinal band in all oceans.
- Biodiversity generally tends to cluster in hotspots, and has been increasing through time but will be likely to slow in the future.
- Rapid environmental changes typically cause mass extinctions. One estimate is that <1%–3% of the species that have existed on Earth are extant.
- The earliest evidences for life on Earth are graphite found to be biogenic in 3.7 billion-year-old metasedimentary rocks discovered in Western Greenland and microbial mat fossils found in 3.48 billion-year-old sandstone discovered in Western Australia.
- Since life began on Earth, five major mass extinctions and several minor events have led to large and sudden drops in biodiversity.
- The Phanerozoic eon (the last 540 million years) marked a rapid growth in biodiversity via the Cambrian explosion—a period during which the majority of multicellular phyla first appeared.
- The next 400 million years included repeated, massive biodiversity losses classified as mass extinction events. In the Carboniferous, rainforest collapse led to a great loss of plant and animal life.
- The Permian–Triassic extinction event, 251 million years ago, was the worst; vertebrate recovery took 30 million years. The most recent, the Cretaceous–Paleogene extinction event, occurred 65 million years ago and has often attracted more attention than others because it resulted in the extinction of the dinosaurs.
- The period since the emergence of humans has displayed an ongoing biodiversity reduction and an accompanying loss of genetic diversity. Named theHolocene extinction, the reduction is caused primarily by human impacts, particularly habitat destruction.
- Conversely, biodiversity impacts human health in a number of ways, both positively and negatively.

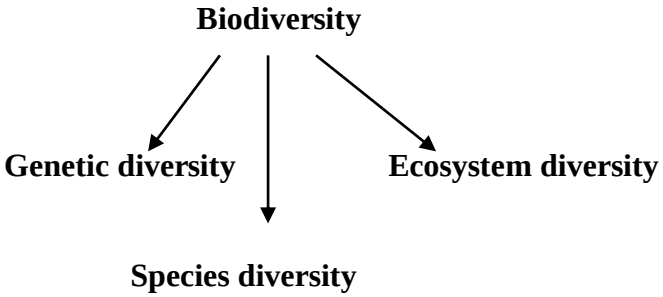
Define Biodiversity and explain its varieties or levels. (5 marks)

Biodiversity is defined "as the variety and variability among living organisms and the ecological complexes in which they occur".

It is also defined as "the totaling of genes, species and ecosystem in a region or the world".

The World Wild Fund defines 'biodiversity' as the millions of plants and animals and micro-organisms the gene they contain help to indicate ecosystem.

Levels of Biodiversity:
Biodiversity involves three levels.



1. Genetic diversity: "Genetic diversity" refers to the "diversity (variation) of genes within species". This diversity is hereditary, information (genes) within a species, which is passed to the offspring (next generation). Example: The tiger has eight subspecies such as the Asian tiger, white tiger, black tiger, etc.

2. Species diversity: The variety of living things of species within an area is termed as species diversity. Species richness varies in geographically warmer area. Each species is distinct from other species. At present conservation scientist have been able to identify and categorize about 1.8million species on earth. The areas which are rich in species richness are termed as 'hot spots'. Example: Tiger, lion, cow, etc.

3. Eco-system bio-diversity: "Ecosystem diversity" refers to the "variety of living things in their habitat" (Place or site the organism naturally live). This diversity has been developed over million of years before evolution. If we destroy this diversity it would disrupt the ecological balance. Example: Desert, Aquatic, and Grassland eco-system.

Explain the values of biodiversity: (5 Marks)
Values of biodiversity:

Basic needs of human beings are commonly fulfilled by the ecosystems and the species. World economy depends upon the main factors such as forest, grasslands, agricultural land and marine resources. People use these as raw materials for manufacturing their products.

a. Consumptive use:

Consumption use is the direct use of the biodiversity i.e. the use of products. Biodiversity is an essential requirement for the maintenance of global food supply. The main source of human food includes animals, fishes and plants.

Animals: Contains 100% protein from domesticated animals such as cattle, pig, sheep, goat, chicken, etc.
Fishes: Most of the Nations they depend upon the fish for food. It contains protein, essential nutrients, etc.
Plants: Only a very small portion of the World's plants has been used as food on large scale. More than 50,000 plants are edible, but only 150 plants are used as human food.

b. Productive use:

"Productive use" means 'the living things or its appendages are used as the product'.

Materials- Leather from animal skin such as goat, sheep and cow. Honey, construction materials such as wood, cod liver oil from codfish etc. Pesticide- Many plants were used to control pest. Neem has the ability to control 400 plant destroying pests. Chrysanthemum is similar to neem and it, is used to control lice. Presently tobacco leaves extract are also used to control pest. Hard wood of trees are used to make furniture and to decorate houses. Medicines are extracted from the plants such as Neem, Aloe vera, Phyllanthus, turmeric, etc. About 90 % of the total medicines are obtaining from plant materials.

c. Social value:

Sacred grooves are the dense area inside the forest, by tribal people the plants in that area are protected and they believed it as god and they satisfy their needs by gathering natural resources in the form of food, plants and animals. Most of the animals and plants are worshiped as god and they give more importance during festivals such as the snake, peacock, neem, cow, etc.

d. Ethical value:

People of ancient year have worshipped nature. Vembu, Vengai are some of the trees for deities worshipped by the Tamils. People give religious values to some of the plants and animals. They worship the plants and animals as God. Vedas, Upanishads, and Puranas have given religious importance of plants and animals. Killing of any living organisms is considered unethical by some people. Ethical believes protect the biological diversity.

e. Aesthetic value:

Aesthetic (Nature's beauty) - Colors and fragrance of flowers, colors of butterflies, birds sound, green trees. This gives recreation and mind freeness.

f. Option value:

Option value of species includes its potential to provide our economic benefits to human society. Reserve gene- in growing biotechnology field, wild varieties used as the reserve gene for new invention of plant varieties. Medicine stock- For many disease medicines are obtained from plants and for few diseases, which are yet not identifies may be obtain from the biodiversity.

Threats to biodiversity:

As human population rise an ever increasing demand for land, house, raw materials, fuels and food on the natural ecosystem if the present trend continues million of animals, plants and microorganisms may be destroyed in next few decades. Deforestation and the consequent soil erosion resulted in loss of biodiversity.

Habitat loss: Habitat loss is the major threatening to the living things. Habitat loss occurs due to various activities such as deforestation, implementation of new projects, construction of dams, industrials plants and hydroelectric projects. Animal activities such as overgrazing, laying roads inside the forest, mining of minerals and climatic change in the forest area will result in habitat loss.

Poaching of wild life: (For food, medicines and other valuable appendages): Poaching is the illegal hunting of wildlife. Many animals and plants are hunted for much useful content.

Food: Deer, rabbit, dolphin, etc – Hunted for its meat. Tiger- The whole body of tiger is used for medicinal purpose. Codfish- Cod fish have been hunted for its high nutritive value (oil in the liver). Crocodile- Crocodile's skin is used to make leather, which is more attractive. Bear- Bear's fur (hair) is used for making paint brushes. In addition, colder nation people use bear's fur for heat regulation by covering polar bears skin. Rhinoceros and deer's horns are used to make medicines. Tortoise shell is used to make decorative. Sandal tree- it is used to produce perfume. Teak- It is used in the manufacture

of furniture and decorative. Plants mostly have medicinal values and some of them are used for food, cosmetics, etc.

Man wildlife conflicts

Introduction:-

Man wildlife conflicts refer to damages caused by man in turn to wildlife: The misunderstanding between man and wildlife is known as conflicts. The conflicts are caused by many reasons; the major reasons are discussed below**.**

Road Construction: Road construction inside the forest area and sanctuaries across wildlife corridors and in the habitat leads to man and wildlife conflicts.

Habitat loss*:* When wild animal habitats are shrinking, animals displace to human being area. So they come out from the forest for food and water. Those people who survive on the border of the forest are severely hurt by the wildlife.

Ill and weak: The animals those are ill and weak normally have the tendency to attack human as well as animals with their young ones also attack human.

Preferred feed: In past years, that the forest department cultivates preferred feed in forest for animals. Recently due to insufficiency, of feed these animals intrude into agricultural field, plated with their like plants. So that problem is created from animals to humans.

Electrical using around agricultural fields: Agricultural fields that are adjacent to the forest are cover with electrical using minimum voltage. Therefore, when young one touches those big animals along with their communities changes violent. By this agricultural and other property of human are destroy by wild animals.

Implementation of new project: New projects were implemented in forest area. Due to noise pollution wild animals displace from their habitat and intrude into human living areas and damage their properties and conflicts began.

Hotspots of biodiversity

Explain Hot-Spots of Biodiversity in India: (5 Marks)

Definition:

Hot spots are areas that are extremely rich in plant and animals. In India, Eastern Himalayas and Western Ghats are identified as major hot spots and some of the areas are also identified by the ***Biodiversity Hotspots Conservation Programme (BHCP) of WWF-India*** launched in July 1992 .The term 'hotspot' of biodiversity was introduced by Myers.

Hotspot of biodiversity on a Global level (i.e. in the World)

There are 25 hotspots of biodiversity in the World. Endemic plants are largely found in tropical rain forest .Most of the hotspots of the World is located in the tropics and most of them are forest.

The Indian hotspots are rich not only in floral wealth and endemic species of plants but also in reptiles, amphibians, butterflies and mammals Nilgiri Biosphere Reserve (Kerala, Karnataka and Tamilnadu). Nandadevi Biosphere Reserve (Uttar Pradesh). Nokrek Biosphere Reserve (Meghalaya). Great Nicobars Biosphere Reserve (Andaman and Nicobar). Gulf of Mannar Biosphere Reserve (Tamilnadu). Sundarbans Biosphere Reserve (West Bengal). Similipal Biosphere Reserve (Orissa). Namdapal Biosphere Reserve (Arunchal Pradesh). Kaziranga Biosphere Reserve (Assam) and Thar Desert Biosphere Reserve (Rajasthan).

Hotspots in India:-

The hotspots in India are

1. The Western Ghats 2.The Eastern Ghats (Himalayas)

The Western Ghats:-

The hotspot in Western Ghats extends, along 17,000km, steep forest in Maharashtra, Karnataka, Tamil Nadu and Kerala.

The major centres of biodiversity are Agastyamalai hills and Silent valley.

It is considered as one of the most important biogeographic zones of India
It is one of the richest centres of endemism.
About 1500 endemic species of dicotyledonous plants are reported from the Western Ghats, 245sp of orchids, are endemic to the region.

The Eastern Ghats:-

Phytogeographically, the Eastern Himalaya forms a distinct floral region.
It comprises neighbouring states of east and north-east India.
In the whole of Eastern Himalaya, there are an estimated with 5800 plant species.

CONSERVATION OF BIODIVERSITY

Discuss about the Conservation of biodiversity. (10 Marks)

Introduction:

Biodiversity are conserved because they are the property of the nation as well as sustainable for the present and future generation. Main reason for protection is due to endangerness and rare. Most of the species are endangered because they are not protected and also due to illegal hunting.

Need for conservation of biodiversity:

Biodiversity is the foundation for sustainable development.
Biodiversity provides assurance of food, raw materials for clothing, for shelter, fertilizer, fuel and medicine.
Sources of resources of industries mostly from biodiversity.
Conservation of biodiversity is very useful to the human kind to meet the challenges of global warming and ozone depletion.
The most important direct use of species is as food.
Medicinal drugs and herbals are derived from plants.
Forest is very important resource of biodiversity. They have an important role in stabilization of soil and climate.
Marine diversity provides food stuff to the people.
The biodiversity loss results in ecological and environmental deterioration. So the need for conservation of biodiversity is essential.

Approaches of biodiversity

There are two approaches of biodiversity conservation.

1. In-situ conservation 2.Ex-situ conservation

1. **In-situ biodiversity conservation** (With in habitat/ living area): Living things protected on its living area. Example:-Biodiversity reserve forest, National parks, Sanctuaries etc.

Biodiversity of plants and animals species are preserved in-situ by setting up of protected areas like national parks and wildlife sanctuaries.

1. Gir Sanctuary:-

In Gujarat, the Gir sanctuary protects the last population of Asiatic lion.

2. Desert National Park:-

In the Thar Desert, the wildlife is protected large number of black buck.

3. Corbett National park

It protects a rich diverse fauna such as tiger, sloth bear and reptiles like crocodile, python etc.

4. Kanha National Park:-

It is established in sal forest of M.P .It includes animals like tiger, black buck.

5. Manas Sanctuary:-

It is located in Assam .The rare golden langur, the small wild boar in the World are found in the sanctuary, contains wild animals such as wild buffalo, swamp deer etc.

2. **Ex-situ biodiversity conservation** (Outside habitat/ living area) The conservation of plants and animal species outside their living area is known as ex -situ conservation. Example: - Zoological parks, Botanical garden and Seed banks.

1. The endangered species of wild plants or animals which have reached a point of extinction in their natural habitat are transferred to other favorable habitat to ensure their survival.

2. Ex-situ conservation leads to the establishment of botanical garden for plants or zoological park for animals**.**

3. There are many experts in the zoological park and botanical garden to multiply the endangered species under artificially managed conditions.

4. There is also another form of preserving its germ plasm in a gene bank so that it can be used if needed in future.

5. In India, successful ex-situ conservation programs have been done for the three species of crocodiles.

6. Another recent success has been the breeding of the very rare pygmy hog in Gauhati zoo

7. Delhi zoo has successfully bred the rare Manipur brow antlered deer.

Merits of ex-situ conservation:-

- ❖ Important for conservation of crop varieties for future improvement programmes.
- ❖ Wide varieties of domesticated crops provide great opportunities to plant breeders and genetic engineers to transfer desired traits in high yielding varieties**.**

Problems involved in conservation of bio-diversity:

There are many problems involved in the conservation of the biodiversity; they are followed such as

- ⋆ **Climatic change**- Due to the climatic change living things can't able to with stand the temperature.
- ⋆ **Space**- Certain animals required wide area for their survival.
- ⋆ **Money-** Money allocated by the Government for the conservation of the wildlife is not enough.
- ⋆ **Deforestation -** Due to deforestation occur in all the area for road construction, implementation of new projects, raw materials for industries, urbanization, expansion of agricultural land, etc.
- ⋆ **Invasion of exotic species**- Some wildlife are introduced to increase its population but it will consume the native wildlife.

NATIONAL PARKS AND WILD LIFE SANCTUARIES IN INDIA:

National parks:

- Bhandipur- Karnataka
- Bandhavarh- Madhya Pradesh
- Corbett- Uttranchal
- Dachigam- Jammu& Kashmir
- Dadhwa- Uttar Pradesh
- Kauhna- Madhya Pradesh
- The Great Himalayan- Himachal Pradesh
- Rajaji- Uttaranchal
- Keoladeo- Rajasthan
- Sundarbans- Kolkata and West Bengal

- Nanda devi- Uttaranchal
- Kaziranga- Assam
- Gir- Gujarat
- Bandipur- Karnataka
- Periyar- kerala
- Ranthambore- Rajasthan
- Sariska- Rajasthan

Wild life sanctuaries:

- Aleohav- Punjab
- Srisailam- Andhra Pradesh
- Wild ass- Gujarat
- Idukki- Kerala
- Periyar- Kerala
- Neyyar- Kerala
- Peppara- Kerala
- Mudumalai- Tamil Nadu
- Sambhar – Rajasthan
- Hazaribagh- Bihar

BIOSPHERE RESERVES:

These are multipurpose protected area to preserve the genetic diversity of plants, animals and microorganisms. The setting up of these biosphere reserves is also to create awareness and provide facilities for education and research to the public in ecological conservation. So far 12 biosphere reserves are present.

ORGANIZATION INVOLVED IN CONSERVATION OF BIODIVERSITY:
Plan for the wild life conservation throughout the world:

- International Union for Conservation of Nature and Natural Resources (IUCN).
- United Nations Environmental Programme (UNEP).
- World Wild Life Fund (WWF).
- ZSI – Zoological Survey of India
- WII – Wildlife Institute of India.
- SACON – Salim Ali Centre for Ornithology and Natural History.
- BSI – Botanical Survey of India.
- BNHS – Bombay Natural History and Society of India.
- Green Belt Moment – Wangari Mathi got Nobel peace prize in 2004 – 1 crores tree saplings in Nairobi.
- Chipko Moment.

BIO-WEALTH

Introduction: -

There is a biodiversity at global, national and local levels. So it is necessary to asses the physical features and climatic conditions of the country have resulted in a diversity of ecological species and biodiversity richness.

Global Level:

- Life occurs in almost all diverse habitats ranging from high mountain peak more than 20,000 feet in height to deepest sea bottom of about 10,000 meter.
- Life originated on earth about three billion yeas ago. Living organism has been reported from ponds, hot springs and in cold Polar Regions.
- About 50-80% of global biodiversity lies in the rain forest. More than one fourth of World's prescription drugs are extracted from plants growing in tropical forests**.**

- ❖ Out of 3000 plants identified by National Cancer Research Institute as source of cancer fighting chemicals, 70% come from tropical rain forest.

National Level:-

- ❖ Over all six percent of the global species are found in India. India has tremendous biodiversity. It is recognized as a country uniquely rich in all aspects, genetics, as well as species and ecosystem.
- ❖ India also contains vast microbial diversity.
- ❖ Although the exact numbers of viruses, microscopic algae are not known, India has at least 850 species of bacteria and 12,500 fungi.

(UNIT – III Completed)

UNIT-IV
ENVIRONMENTAL POLLUTION

Introduction:

The unwanted substance added to the environment which cause discomfort or health hazard to living things is known as pollution. It changes the quality of air, water and land which interferes with the health of humans and other forms of lifes on earth.

- **Pollution** is the introduction of contaminants into the natural environment that cause adverse change. Pollution can take the form of chemical substances or energy, such as noise, heat or light.
- Pollutants, the components of pollution, can be either foreign substances/energies or naturally occurring contaminants.
- Pollution is often classed as point source or nonpoint source pollution.
- Air pollution has always accompanied civilizations.
- Pollution started from the prehistoric times when man created the first fires.
- According to a 1983 article in the journal Science, "soot found on ceilings of prehistoric caves provides ample evidence of the high levels of pollution that was associated with inadequate ventilation of open fires.
- " The forging of metals appears to be a key turning point in the creation of significant air pollution levels outside the home.
- Core samples of glaciers in Greenland indicate increases in pollution associated with Greek, Roman and Chinese metal production, but at that time the pollution was comparatively less and could be handled by nature.

Definition:

Pollution is an undesirable change in the physical, chemical and biological characteristics of our land, air and water that leads to health hazard or discomfort to living things.

Discuss in detail about different types of pollution. **(10 Marks)**

Types of Pollution:

- ★ Air Pollution
- ★ Water Pollution
- ★ Soil Pollution
- ★ Noise Pollution
- ★ Thermal Pollution
- ★ Nuclear Hazards.

AIR POLLUTION

Introduction:-

The rapid industrialization, fast urbanization, drastic increase in vehicles on the roads and other activities of human beings has disturbed the balance of natural atmosphere.

- Air pollution produced by ships may alter clouds, affecting global temperatures.

- Air pollution comes from both natural and human-made (anthropogenic) sources.
- Globally human-made pollutants from combustion, construction, mining, agriculture and warfare are increasingly significant in the air pollution equation.
- Motor vehicle emissions are one of the leading causes of air pollution. China, United States, Russia, IndiaMexico, and Japan are the world leaders in air pollution emissions.
- Principal stationary pollution sources include chemical plants, coal-fired power plants, oil refineries, petrochemicalplants, nuclear waste disposal activity, incinerators, large livestock farms (dairy cows, pigs, poultry, etc.), PVC factories, metals production factories, plastics factories, and other heavy industry.
- Agricultural air pollution comes from contemporary practices which include clear felling and burning of natural vegetation as well as spraying of pesticides and herbicidesAbout 400 million metric tons of hazardous wastes are generated each year.
- The United States alone produces about 250 million metric tons.
- Americans constitute less than 5% of the world's population, but produce roughly 25% of the world's CO_2, and generate approximately 30% ofworld's waste.
- In 2007, China has overtaken the United States as the world's biggest producer of CO_2, while still far behind based on per capita pollution - ranked 78th among the world's nations.

Definition:-

Air pollution is defined as the presence of one or more contaminants like dust, smoke, mist and odour in the atmosphere, which are injurious to human beings**.**

Causes:

Air pollution is caused by

- ❖ Natural
- ❖ Human -induced (Anthropogenic)

Natural causes:

Pollution not only occurs by human activities, it may also occur naturally.

Forest fire:

- After leaf litter, the leaves dry in the summer season where forest fire may occur.
- When bamboo trees rub each another, forest may get fire. It will produce huge amount of smoke, carbon monoxide, etc.

Volcanic eruption:

- During volcanic eruption, lava will come out along with minute solid, dust particles, gases, and radio-active materials which will emit radiation.

Pollen grains and spores:

- During pollination, pollen grains of flowers, weeds, grasses, trees and spores from fungi dispersed to the atmosphere cause allergy and respiratory system disorder to the human beings.
- The aero-allergens evolved by Parthenium plant species has resulted in the respiratory tract disorder to people, who were expose to it frequently.

Sand storms:

- Dust storms are most frequently found in the desert regions. In this area the soil is not closely packed due to less moisture.
- When wind flows at higher speed the less weighed particles fly over in the form of sand storms.
- During sand storms mass quantity of soil will replace to adjacent area.

Marshy land/ wet land:

- Marshy land usually found in the area where there is high rainfall.
- The stagnated water will decompose the vegetative materials and releases the gases such as methane and hydrogen sulphide.

Ant**hropogenic causes (Man- made):**

Deforestation:

Plants maintain the balance of carbon dioxide and oxygen in the atmosphere by photosynthesis.

- Cutting of trees will leads to increase in carbon dioxide in the atmosphere, because plants purify the air by taking carbon dioxide for their use during photosynthesis and liberating oxygen to be used up by animals during respiratory activities.
- Indiscriminate cutting of plants and trees will alter the balance of CO_2 and O_2 in the atmosphere.

Vehicular emission:

- Automobile exhaust is responsible for more than 75 percent of total air pollution.
- Automobiles such as cars, scooters, motors, trucks, etc. release huge amount of poisonous gases such as carbon monoxide (about 77%), nitrogen oxides (about 8%) and hydrocarbons (about 14%) in addition to leaded gas and particulate lead.

Domestic/ Indoor activities:

- Use of insecticide, pesticide and fire woods to keep house warm and cooking induce air pollution in domestic.
- These domestic pollutants cause severe health hazards such as respiratory disorders, skin allergy, etc.
- In olden day's feron were used as coolant in refrigerators and in air cooler, which is a major source for the release of CFC and it is responsible for ozone layer depletion.

Rapid industrialization:

- Air pollutants were released in higher rate from various industries such as cement, petroleum refineries, mining, cotton mills, thermal power plants, atomic power stations, metallurgical plants and smelters.

War:

- Air pollution may cause by various types of sophisticated explosives used in wars.
- Radioactive rays come out from nuclear explosion pollute the air extensively and affect mankind to a very large extent.

Burning of Solid Waste (MSW):

- In the present day generation solid waste has been increasing dramatically.
- Solid waste management done by burning of solid waste on the open places, releases huge amount of gases, smoke, and dioxins, burning of plastic may cause cancer.

Smoking:

- While smoking harmful gases such as carbon monoxide releases and pollutes the environment.
- The gas combines with haemoglobin to form carboxyhaemoglobin, which will decrease the function such as oxygen carrying rate.

Mining:

- Mining activities such as blasting, drilling and transportation leads to disperse of minute mineral particles in the air and it may leads to many diseases and respiratory disorder.

EFFECTS TO PLANTS:

- Air pollution mainly affects the leaves of plants. The pollutants settle on the soil and cause many disorders in plants, such as the following symptoms and disorders.

- **Necrosis**:
  Death or collapse of tissue in plants, for example in citrus plants.
- **Chlorosis**:
  Reduction or damage of chlorophyll pigments.
  The colour of leaves will change into yellow, pale green, brown or white
  This will leads to less production of energy during photosynthesis.
- **Abscission**
  Dropping of leaves i.e. the leaves will fall down after drying.
- **Epinasty**:
  Downward curvature of the leaves.
- **Stomata block**:
  Stomata block may occur due to dust particulates, gases, vapours, etc, deposit on leaves and plug stomata (holes which are present on the leaves for the exchange of materials during photosynthesis). Stomata blocking will result in death and dryness of plants.
- **Radiation**:
  Radiation is found to produce chromosomal mutation rather than gene mutation.

In general radiation affects the pollen, seeds, embryo and higher plants to a larger extent. Growth inhibition has been noticed in herbaceous plants. Such plants were found to show morphological changes in roots stems, buds, leaves and flowers.

✈ EFFECTS TO ANIMALS:

Asbestosis-

★ Asbestos is the fiber minerals which are used as raw materials for the asbestos sheet manufacture.
★ The people who engage in mining, processing and manufacturing units may cause a disease asbestosis.
★ The minerals get accumulated in lungs and it result in many respiratory disorders.

Inhibit RBC maturation-

★ Lead normally evolved from leaded fuel such as petrol from batteries manufacturing units.
★ Lead binds with RBC and it inhibits its maturation.

Silicosis-

★ Silicon is used in computer component. People who engaged may leads to the disease called silicosis.
★ Silicon particles bind with lung tissues and many holes formed were leads to malfunctioning of lungs.

Black lung disease-

★ People who involved in coal mining and processing may affected with black lung disease, the inner lining of the lungs coated with carbon particles may be the pathway of many respiratory disorders.

White lung disease-

★ The cotton fibers knit with each another inside the lungs, leads to many disorder to people who engaged in cotton.
★ Some of the harmful gases and air pollutants will lead to cough, sneezing nose, headache, asthma, eye irritation, etc
★ Chromosomal aberration/ mutation, skin cancer, still birth and genetic disorders may occur due to radiation from the radioactive materials.

Aquatic life:

★ Air pollutants mixing up in adjacent water source, such as lakes, ponds, dams, etc change the water property.
★ Due to this effect aquatic life such as plankton (plants), zooplankton (animals) will die.

Migration:

★ Insects are highly sensitive towards air pollution, when air pollutants continuously suspended in particular area, the insects emigrate from that area, as well as insects will not enter into the air polluted area.
★ If the air contaminants concentration increases, the insects may die.

Prolonged smoking

★ Exposure to air pollutants can overload or breakdown natural defenses causes disease such as lung cancer, asthma, and chronic bronchitis.

✈ EFFECTS TO ENVIRONMENT:

★ Air pollution is one of the major issues in today's World.
★ The major problem arise in cosmopolitan level is acid rain, global warming, ozone layer depletion, etc.
★ By this problems ecosystem is greatly affected because it is a common exposures to all.

✈ EFFECTS TO MATERIALS:

★ Materials such as walls and metals are affected more due to air pollution.
★ The air pollutants corrode the materials and decrease its value due to this huge loss occurred in the economy.
★ Our World wonder Taj Mahal is affected by air pollutant which is evolved from the Madura refineries, which is nearer to it.
★ Overview of main health effects on humans from some common types of pollution.
★ Adverse air quality can kill many organisms including humans.
★ Ozone pollution can cause respiratory disease, cardiovascular disease, throat inflammation, chest pain, and congestion. Water pollution causes approximately 14,000 deaths per day, mostly due to contamination of drinking water by untreated sewage in developing countries.

★ An estimated 500 million Indians have no access to a proper toilet, and 580 Indians die of water-related pollution every day.
★ Nearly 500 million Chinese lack access to safe drinking water. A 2010 analysis estimated that 1.2 million people died prematurely in a year in China because of air pollution.
★ In 2007 it was estimated that in India, air pollution is believed to cause 527,700 fatalities. Studies have estimated that the number of people killed annually in the US could be over 50,000.
★ Oil spills can cause skin irritations and rashes. Noise pollution induces hearing loss, high blood pressure, stress, and sleep disturbance.
★ Mercury has been linked to developmental deficits in children and neurologic symptoms. Older people are majorly exposed to diseases induced by air pollution.
★ Those with heart or lung disorders are at additional risk. Children and infants are also at serious risk.
★ Lead and other heavy metals have been shown to cause neurological problems.
★ Chemical and radioactivesubstances can cause cancer and as well as birth defects.

MITIGATATION MEASURES OF AIR POLLUTION:

1. Installation of industries in proper place.
2. Air pollution control devices must to be fixed in all the air polluting industries.
3. Air pollution control has found to be possible by planting trees and growing thick vegetation (Green Belts).
4. Use petroleum products and other fuels that have low sulphur and ash content.
5. Formation and enforcement of stringent environmental legislation.
6. Mass transportation and non polluting vehicles can minimize pollution.
7. Adopt renewable energy resources.
8. Vehicles must to serviced properly and the emission should be properly checked
9. Above all awareness regarding the sources and effects of air pollutants must to be prevalent among the public, such as not to burn the solid waste.

WATER POLLUTION

Introduction:

- The pollutants include sewage, industrial, chemical effluent, oil and other wastes besides chemical from air dissolved in rain water, fertilizers, pesticides and herbicides leached from the land also pollute water.
- The specific contaminants leading to pollution in water include a wide spectrum of chemicals, pathogens, and physical or sensory changes such as elevated temperature and discoloration.
- While many of the chemicals and substances that are regulated may be naturally occurring (calcium, sodium, iron, manganese, etc.)
- The concentration is often the key in determining what is a natural component of water, and what is a contaminant.
- High concentrations of naturally occurring substances can have negative impacts on aquatic flora and fauna.
- Oxygen-depleting substances may be natural materials, such as plant matter (e.g. leaves and grass) as well as man-made chemicals. Other natural and anthropogenic substances may causeturbidity (cloudiness) which blocks light and disrupts plant growth, and clogs the gills of some fish species.
- Many of the chemical substances are toxic. Pathogens can produce waterborne diseases in either human or animal hosts.
- Alteration of water's physical chemistry includes acidity (change inpH), electrical conductivity, temperature, and eutrophication.
- Eutrophication is an increase in the concentration of chemical nutrients in an ecosystem to an extent that increases in the primary productivity of the ecosystem.
- Depending on the degree of eutrophication,
- Subsequent negative environmental effects such as anoxia (oxygen depletion) and severe reductions in water quality may occur, affecting fish and other animal populations.

Definition:-

Water pollution is defined as the addition of any substances (solid or liquid) to water and changing its physical, chemical and biological characteristics which cause heath hazard or discomfort to living things or to the ecosystem.

Causes of Water Pollution:-

Anthropogenic Causes:

1. Domestic sewage:

★ Sewage means the liquid waste water which is generated from house.
★ It includes the dirty used- up water from houses and it contains large number of pathogenic bacteria and virus.
★ Sewage is directly released into the rivers on the city sides cause water pollution.

2. Industrial effluents:

★ Water based processing such as tanneries, textile dyeing, paper and pulp mills, steel industries, mining operations etc generate huge amount of liquid waste.
★ Due to its effects or effluents marine organisms are highly affected.

3. Radioactive wastes:

★ Radio active element wastes both liquid and solid are released into the sea from atomic power plants and industries.
★ The oceanic currents carry the radio active contaminants every where and the marine organisms are highly affected.

4. Agricultural pollution:

★ Synthetic fertilizers, pesticides, insecticides, herbicides, fertilizers, farm wastes, etc. results in heavy pollution of water.
★ Materials present in the soil on the agricultural fields were run-off along with rain water down to the stream and it causes water pollution.

5. Thermal pollution:

★ Thermal power plant, nuclear power plant and many industries use water as coolant , after the system is cooled, water is discharged into the near by water sources.
★ Water sources due to insusceptibility of aquatic organisms may suffer in the marine environment; coral reefs are mostly affected because they are highly sensitive towards temperature variation.

6. Oil pollution:

★ Oil pollution is due to cargo ship (vessel) accidents, ship breaking, loading and discharging of crude oil at the harbour, oil refineries and off-shore oil production.
★ The oil form an upper layer on the water surface and then marine organism's stick with oil is severely affected.

7. Dumping of solid waste:

★ Many islands they won't have enough space to store the solid waste generated in their area. So they take solid waste and dump it into the deep oceans.

NATURAL CAUSES:

1. Surface water run-off:

★ Naturally water gets polluted by mixing rain water with oil spills, mining & volcanic eruption mixing with sea water and increase in organic load (death and decay of aquatic plants and leaf litter in small water sources).
★ Acid rain leads to acidic condition and the organisms which present in the ecosystem are greatly affected.

2. Ground water percolation:

★ After rainfall water gets mixed with minerals, and soil pollutants found on the soil then, percolate into underground and contaminate the ground water.
★ In most of the regions people depend upon underground water for drinking and they are severely affected by the contaminants.

3. Volcanic eruption:

★ Volcanic eruption occurs inside the marine environment.

- ★ This may contain many hazardous materials and ashes, which will kill the marine organisms and change the properties of water.

4. High plant growth:

- ★ Some of the water sources have high nutrient content shows high plant growth and it will die inside the water.
- ★ Due to anaerobic condition the quality will diminish and it will degrade the water quality.

5. Acid rain:

- ★ Acid rain has become one of the major environmental problems.
- ★ In most of the industrialized country the carbon emission and gases from the industries and vehicles will lead to acid rain.
- ★ Due to this effect the entire the ecosystem is drastically affected.

EFFECTS TO PLANTS:

- ★ During rain fall water flow towards downward stream at that time, it will take organic debris and mix with sewage silt and chemical substances.
- ★ Aquatic plants are greatly disturbed and it leads to death. When polluted water is used for irrigation purpose, the chemical constitutes change the soil property and it never allows plants to get essentials materials from the soil.
- ★ Some high affinity chemical attaches to the plant constituents, leads to improper growth and finally leads to death.

EFFECTS TO ANIMALS:

Aquatic animals:

- ★ When fishes and aquatic animals swim in water contaminated oil stick on the animals body. Especially aquatic birds are mostly affected, their wings get attached to oil and they cannot move smoothly.
- ★ In marine environment oil float on water and not get aerated and it will be risky to aquatic animals for respiration, leads to insufficient air to respire and finally the animal may die.

In humans:-

Minamata disease:

- ★ This disease first appeared in a coastal town Minamata in Japan.
- ★ The primary cause for this disease was on the sea coast of Japan in 1905.
- ★ This disease is caused by mercury poisoning accumulated in marine animals. Later birds, cats and dogs, which ate the marine animals died. Finally many men who ate fish, crabs and shell fish died.
- ★ It occurred due to consumption of methyl mercury contaminated fish caught from minamata bay in Japan.
- ★ The primary cause for this disease was a chloro-alkali industry which is located in 1905 from this factory, a by-product called mercury was disposed into the sea.
- ★ The disease claimed 50 lives and permanently paralyzed over 700 people.
- ★ The initial symptoms of Minamata disease include the impairment of CNS (central nervous system), deafness and burning of vision. Finally it affects the brain.

Itai-itai:

- ★ In Japanese itai-itai means aioo-ouch.
- ★ This disease is caused by consumption of cadmium contaminated/ accumulated rice.
- ★ The rice fields were irrigated with industrial effluents from zinc smelters units and drainage water from mines in Japan.
- ★ In this disease bones, liver, kidney, lungs etc are severely affected.

Blue baby syndrome or Methaemoglobinemia:

- ★ This disease is caused by, the excess consumption of the nitrate which is present in the drinking water cause blue baby syndrome.
- ★ The nitrate concentration in drinking water, exceeds 25 mg/l, become the cause of a serious health hazard called "Blue **baby syndrome"** or **Methaemoglobinemia.**
- ★ This disease affects the infants to the maximum extent cause even death. The affected baby will survive for only 3-4months and at that time the baby will be in blue colour.

★ Water borne diseases: Water which is contaminated by poor sanitation acts as a vehicle for infecting agents for cholera, typhoid, jaundice, yellow fever, elephantiasis, etc.

Fluorosis:

★ In most of the countries the underground water was contaminated with fluoride.
★ Even though it is one of the most essential requirements for the human beings for the formation of bones and teeth, if the consumed water having high amount of the fluoride it leads to a disease called fluorosis.
★ Symptoms show disorder such as brittleness of the teeth and bones and easily lead to fracture.

EFFECTS ON ENVIRONMENT:

Mortality of plankton and fishes:

★ Industrial effluents from small scale industries, dyeing units, etc let-out directly to the lakes and with chlorine which is added to the water control the growth of algae and bacteria in the cooling system of power stations may persist in streams to cause the mortality of planktons and fishes.
★ Oil pollution prevents photosynthesis in phytoplankton.

Siltation:

★ Running and standing water sources are polluted with silt and debris.
★ Fish's gills and aquatic organisms are deposited with the silt causes heavy mortality in fishes and in aquatic environment the siltation undergoes many variations, may reduce the productivity of the aquatic environment and may cause death to aquatic animals.
★ The dispersion of the silt results in the turbidity of the water, which affects the movement of the fishes and other aquatic organisms.

Red tide:

★ If the coastal water is enriched with nutrients (phosphate and nitrate) of sewage, the special groups of microorganisms called dino-flagellates multiply rapidly form bloom in the sea.
★ The blooming of flagellates liberates toxic materials into water, result in large scale death of marine fishes and other animals.
★ Blooming is found in red color so it is named as red tide.

Poor oxygenation:

★ The water source polluted with oil will prevent water oxygenation.
★ Poor oxygenation reduces respiration and metabolism in aquatic organisms.

Eutrophication:

★ Domestic sewage contains nutrients (phosphate and nitrate) by the usage of soaps and detergents and after rainfall water takes the synthetic fertilizers from modern agricultural practices land.
★ When phosphate and nitrate sources mix with the lake and pond water, enrich the nutrient content.
★ Induce the aquatic plants growth, it will die first and again it will grow and this process will be repeated.
★ The rich supply of these nutrients makes blue green algae, algae and other phytoplankton to grow abundantly.
★ Aquatic eco-system degrades and decomposes to induce anaerobic environment.
★ Aquatic organisms require dissolved oxygen to respire and for their survival.
★ Due to eutrophication aquatic organisms are greatly affected.
★ Due to insufficient of oxygen other organisms, such as zooplankton, small and large fishes of the water depend on the blue green algae, algae and phytoplankton for their food, also die.
★ Thus eutrophication leads to the complete depletion of fauna of an ecosystem.
★ It leads to change in chemical, biological and physical properties of the entire water source which cannot be potable for any other activities such as industrial process.

Mitigation measures of water pollution:-

Minimal usage of water:

- ⋆ Minimal amount of water should be use to satisfy our basic needs such as cleaning, washing, etc., this might be an opportunity to reduce water to gets pollute with the soap, detergents and with organic materials.
- ⋆ In wet processing industries such as textile dyeing unit, food processing unit, tanneries, paper industries etc., usage of minimum amount of water will mitigate pollution.
- ⋆ After usage effluent must to be treated with appropriate techniques and then it should be use for various useful purposes.

Treatment of polluted water:

A). Sewage treatment:

- ⋆ Sewage mainly constitutes of organic materials, silts, solids (suspended and dissolved solids) such pollutants can be controlled by the following methods,

Sedimentation:

- ⋆ When sewage water is allowed to stands for certain time, suspended, settable and dissolved particles settle in the bottom by gravitational forces.
- ⋆ Then less polluted water on the top layer is taken to the next step.

Storage or oxidation pond:

- ⋆ After sedimentation water is taken to pond called oxidation pond.
- ⋆ Oxidation pond provides oxygen which pollutes water, micro-organisms in that environment utilize oxygen and consume organic material present in the sewage.
- ⋆ Finally complex organic substances such as carbohydrate, protein, lipids etc are converted into simple in-organics such as C, N, O, H, etc. gets percolate and recharges the ground water.

b). Industrial effluents:

The purification process is based on the nature of impurities in water. The most commonly available methods are, as follows.

1. Primary treatment:

Primary treatment includes the following methods,

- ❖ Screening, sedimentation, coagulation, filtration and water softening.

- ⋆ Screening – Filtering using iron bars.
- ⋆ Sedimentation – Sedimentation of solids in the waste water.
- ⋆ Coagulation – Sedimentation using coagulants (binding agent) and flocculation (rotating of water).
- ⋆ Filtration- Filter water using sand filters with or without pressure.
- ⋆ Water softening – It remove the salts which is responsible for hardness.

2 .Secondary treatment: (Biological treatment):

Based on the principle it is classified into,

- ⋆ Attached growth culture system; trickling filter and rotating biological contactor.
- ⋆ Suspended growth culture system: activated sludge process oxidation ditch, etc.

3. Tertiary treatment:

- ⋆ Reverse osmosis, electrolysis, activated carbon treatment, etc are tertiary treatment.
- ⋆ Though many acts existed in India; general awareness is the powerful tool to control water pollution to a significant extent.

Chlorination:

- ⋆ Addition of chlorine for the removal of the microorganisms.

Recycling:

- ⋆ Pollution can be prevented to certain extent by rectifying the waste water.

★ Domestic sewage treatment can be used for fish culture.
★ After industrial effluents are treated, the recycled water can be used for gardening, cleaning, washing and for other domestic uses

Public Awareness:-

★ The public should be given proper awareness to prevent certain extent by rectifying the waste water.
★ The water purifying organisms should be conserved.
★ Complete ban on the disposal of dead bodies into rivers.
★ People should be educated not to pollute water.
★ The water bodies provide for drinking purpose should not be used for washing.
★ Drinking water sources should be kept clean through regular cleaning.

Pathogens

- Pathogens is the common name for disease-causing micro-organisms.
- Although the vast majority of bacteria are harmless or beneficial, a few pathogenic bacteria can cause infectious diseases.
- Coliform bacteria are a commonly used bacterial indicator of water pollution, although not an actual cause of disease. Other microorganisms sometimes found in surface waters which have caused human health problems include:
- Burkholderia pseudomallei
- Cryptosporidium parvum
- Giardia lamblia
- Salmonella
- Novovirus and other viruses
- Parasitic worms (helminths).
- High levels of pathogens may result from inadequately treated sewage discharges. This can be caused by a sewage plant designed with less than secondary treatment (more typical in less-developed countries).
- In developed countries, older cities with aging infrastructure may have leaky sewage collection systems (pipes, pumps, valves), which can cause sanitary sewer overflows.
- Some cities also have combined sewers, which may discharge untreated sewage during rain storms.

SOIL POLLUTION

Introduction:

Soil is the upper layer of the earth crust which is found by the weathering of rocks**.**

Importance of soil:-

Soil constitutes an important medium, where human beings, animals and plant live. Soil is the most valuable heritage of a nation. Soil provides the homes and ideal environmental conditions for living beings.

Definition:-

Soil pollution is defined as the change in physical, chemical and biological conditions of the soil due to misuse of land resulting in degradation in the quality of the soil.

CAUSES:-

ANTHROPOGENIC CAUSES:-

Industries:-

Industrial wastes are the major source of sand or land pollution. Industrial waste are mainly caused by industrial solid wastes, such as paper mills, sugar mills, oil refineries, chemical manufacturing units, iron and steel plants, plastic dump etc.The chemicals discharged by industries often enters the surface of the land and pollute the soil.

Domestic waste and industrial waste:-

Domestic and municipal waste is one of the main sources of land or soil pollution. It include waste paper, broken toys, building wastes comprise dried sludge of sewage**.**

Radioactive materials:

Radioactive wastes produced by nuclear testing laboratories, nuclear reactors and industries are one of the sources of soil pollution. If radioactive materials are not properly disposed they will cause soil pollution, which continuously emits the radiation.

Agricultural sources:

1. Crop residue:

After seeds are taken from the crops like paddy, wheat, etc the husk is remained in the land to degrade the soil and also tubers top portion remain as to cause solid waste. In some special cases the fruit peelings and sugar cane bagasse leads to soil pollution

2. Synthetic fertilizers:

Synthetic fertilizers are employed to increase the soil fertility and crop productivity yield. The soil enriched by chemical fertilizers cannot support the microbial flora, which are so essential to enrich the humus that helps in plant growth, changes the soil property due to synthetic fertilizers such as water holding capacity, it nutrient value, etc.

3. Pesticide:

Pesticide applied to the crop is retained in the soil in considerable quantities. Due to this, useful micro-organisms are affected. Some persistent pesticide which constitutes heavy metals enters into plant tissue and magnifies to next level of organisms. Usage of huge amount of pesticide leads too many health hazards.

NATURAL CAUSES

Deforestation:

When the trees and plants are removed the leaf litter will not occur so the soil fertility decreases. When the forest are cleared the soil have the tendency to loss it fixation and it leads into soil erosion and fertility loss.

Over grazing:

Due to over grazing, herbivores consume more plants due to soil loss its capability have chance for soil erosion and loss in the fertility.

Volcanoes:

During volcanic eruption the lava flows into the adjacent area. The lava contains many harmful materials such as heavy metals ashes, radioactive elements, inert materials, etc. This will induce soil pollution.

Effects of soil pollution:

To plants:

Soil provides medium for plants to grow properly. If the soil is polluted with heavy metals, synthetic chemicals (such as fertilizers, pesticides), oil, solid waste from industries, etc. These substances change the soil property and suppress the productivity of plants. The heavy metals enter into the herbivores to form various disorders. The water holding capacities of the plants are also getting reduced.

To animals:

1. Cancer:

Soil pollutants such as **DDT** (DICHLORO DIPHENYL TRICHLORO ETHANE), heavy metals, radioactive elements, inert materials, etc produce cancer in human tissue and in animal organs.

2. Congenital birth defects:

Certain herbicide, insecticide, increases the birth defects in both people and animals. Some of the radioactive elements also induce congenital birth defects.

3. Diseases:

Sewage sludge has many types of pathogenic bacteria, viruses and intestinal worms, which may cause various types of diseases. Decomposing organic mater in the soil also produce toxic vapours.

To environment:

1. Biomagnifications:

Pesticides and non-degradable materials used in the modern agriculture have much affinity towards fat. They are passed up through the food chain at each trophic level.

2. Change in the soil property:

Application of pesticide, fertilizer and waste water disposal into the soil causes water logging, salinity loss, soil fertility and imbalance in soil texture and properties. Industrial wastes mainly consisting of organic

compounds along with the inorganic complexes and non-biodegradable materials become pollutants that affect and alter the chemical properties of the soil.

Mitigation measures of soil pollution:

1. Industrial effluents should properly be treated with appropriate methods before discharge them into the soil.
2. Solid waste generated by municipal and from other industries should be properly, collected, treated and dispose properly.
3. Recover of useful products should be done from the waste.
4. Solid waste containing some of the useful materials such as aluminum tins, paper, and plastics materials can be reuse, as well as it can be recycled into useful products.
5. Biodegradable organic waste such as vegetable market waste, poultry waste after harvesting etc., can be used to generate biogas, organic compost, vermi-compost, bio-manure, etc.,
6. Microbial degradation of biodegradable substances is one of the scientific approaches for reducing soil pollution such as oil spillage, municipal solid waste dump-age, etc.
7. Organic matters are dries and compressed to make pellets. These pellets are used along with the fuels to burn. It can be used in the industries, for domestic cooking purposes
8. Cattle dung should be used for methane generation.
9. Government and local bodies should be encouraged with public awareness regarding the causes and effects of soil pollution.
10. Students should teach with the proper management of waste and its importance.

NOISE POLLUTION

Introduction:

Noise has become a permanent part of our life because of the use of machinery, industry and technology. The term noise is derived from the Latin word 'Nausea'. The unpleasant and unwanted sound is called noise.

Definition:-

- Noise pollution is defined as an unwanted, unpleasant or undesirable sound that causes discomfort or health hazard.
- Noise is also defined as wrong sound in the wrong place at the wrong time. Noise pollution means "the unwanted sound dumped into the atmosphere leading to human health hazard".
- It is measured by the unit called decibel (dB). One decibel is equal to the finest sound hear by the human ears.

Causes:

1. Natural causes:

- ★ Natural sources of noise pollution include thunder, cyclone, wild animals sound, lightning, volcanic eruptions, sound of the ocean waves etc.
- ★ Natural causes occasionally vary from time to time and space to space.
- ★ The impact of natural sources of noise pollution is local**.**

2. Anthropogenic causes:

2.1. Industrial noise:

- ★ Industries are one of the important sources of noise pollution.
- ★ Manufacturing industries produce considerable amount of noise.
- ★ The machines and generators used in the manufacturing industries produce unbearable noise.
- ★ The impact of noise created by manufacturing industries exists a list of sources of noise pollution includes different machines of numerous factories, industries and mills.

2.2. Transport noise:

- ★ The main source of noise pollution is the noise associated with transportation, particularly in big cities.
- ★ Trains are also one of the sources of noise pollution. It is also produced by whistle of rail engines. The noise created by trains is mostly confined to railway stations.
- ★ It mainly due to road traffic noise, due to motor cycles and also include aircraft and rail traffic noise.
- ★ Loud noise produces by high speed jet aircrafts is not only disturbing communication, comfort and health but also damage hearing permanently.

***2.3*. Road building industries**:

★ Road building industry is also a source of noise pollution.

★ The various types of machines used for road building produce unbearable noise.

.2.4Musical instrument:-

★ Musical instruments especially electronic musical instruments are one of the important sources of noise pollution.

★ The musical and loud speakers used in social, religious, political or public functions produce a large volume of noise.

.2.5. Wars:

★ During wars, explosion of bombs and other defensive equipments cause noise pollution.

★ ***2.6*. Construction activities**: -

★ Building construction industries are also one of the sources of noise pollution.

★ The drilling machines the earth movers, the cranes, the cement mixers and other machines used for construction work creates a large volume of noise during construction activities.

2.7. Noise created by hawkers in busy shopping streets:-

★ Hawkers in busy shopping streets are one of the sources of noise pollution.

★ Hawkers produce unbearable noise by shouting while selling their products.

2.8. Mining activities:

★ Mining industry is also a source of noise pollution.

★ The blasting and drilling machines used in mining activities produce a large amount of noise.

2.9. Thermal power stations:-

★ Thermal power stations also cause noise pollution and general public interfering with their comfort and welfare.

Effects of noise pollution:

To plants:

Due to high noise pollution, plants show variation in growth, physiological changes etc.

To animals:

1. Noise induces hearing loss:

❖ Exposure to intense noise for a long duration results in damage to the inner ear and thus decreases one's ability to hear.

❖ The louder the noise, the less fine it takes to cause hearing loss.

❖ There is a evidence that prolonged exposure to noise levels at or above 85dB can cause deafness.

2. Non-auditory physiological effects:

❖ Noise pollution affects the human life adversely.

❖ In addition to hearing noise other physiological effects, such as hypertension, giddiness, peptic ulcer, blood pressure changes, gastro-intestinal disorders and hepatic disease causes loss of mental peace and it result in emotional behavior.

3. Effects on sleep:

❖ It is common that noise can disturb sleep.

❖ It has been found that in almost all cases increases levels of noise were associated with sleep disturbances including shorter sleep duration, more frequent awakening, etc.

4. Communication interference:

❖ Noise pollution can have a considerable effect on communication.

❖ Noise can mark speech and even when speech is accurately understood, background noise may result in greater effort on the part of the speaker and listener.

5. To ecology:

❖ Noise pollution generated from construction, transports, mining activities, etc inside or nearer to forest area affects wild animals.

❖ Birds migrate to another place and they won't be found in the native area and the food chains are greatly affected.

Mitigation measures:-

1. Noise pollution created by railways can be controlled by constructing ballast less rail tracks.

2. Special measures should be undertaken to check noise near the airport.

3. The public should be educated about the adverse effects of unwanted noise and should be asked to co-operate with the Government authority in controlling unwanted noise in their own interest.
4. Workers in factories should be protected against noise pollution by providing them with ear-wearing devices like earplugs and muffs.
5. As trees absorb and reduce noise trees of various kind should be grown around the factories, along the highways, streets and at other places.
6. Noise producing industries must be located far away from residential areas.
7. Laws should be enacted to regulate and control noise. Through law, the use of automobile horns should be minimized. For instance indiscriminate use of local speakers in public places. Silence zones may be created near educational institutions, hospitals etc.
8. The old automobiles and old machines in factories should be well maintained, if needed they should be replaced**.**
9. The factories can use glass doors and windows to reduce noise to a great extent.
10. Proper lubrication should be used in machineries, which reduce noise.

Pollution control Board in India:

In India, Central Pollution Control Board (CPCB) which periodically conducts noise pollution surveys in Delhi, Chennai, Calcutta, Bangalore, Mumbai, Hyderabad, Kanpur and Jaipur.

Noise regulation

- Up until the 1970s governments viewed noise as a "nuisance" rather than an environmental problem. In the United States, there are federal standards for highway and aircraft noise; states and local governments typically have very specific statutes on building codes, urban planning, and roadway development.
- Noise laws and ordinances vary widely among municipalities and indeed do not even exist in some cities. An ordinance may contain a general prohibition against making noise that is a nuisance, or it may set out specific guidelines for the level of noise allowable at certain times of the day and for certain activities.
- The Environmental Protection Agency retains authority to investigate and study noise and its effect, disseminate information to the public regarding noise pollution and its adverse health effects, respond to inquiries on matters related to noise, and evaluate the effectiveness of existing regulations for protecting the public health and welfare, pursuant to the Noise Control Act of 1972 and the Quiet Communities Act of 1978.

THERMAL POLLUTION

Introduction:

Thermal pollution is the pollution of water by the discharge of hot effluents or water by thermal plants.

Definition:-

Thermal pollution is defined as the warming up of an aquatic system such as a river, lake or sea to a point where desirable organism are adversely affected.

Causes:

Natural causes:

It includes volcanic eruption enters into the water sources such as ocean, river and sea**.** By this water temperature increase and it leads to thermal pollution. Hot springs also cause thermal pollution.

Anthropogenic causes:

1. For aquatic ecosystem:-

Due to thermal pollution oxygen holding capacity is not good, causes the death of varieties of fishes which require a minimum concentration of oxygen**.**

2. Coal:-

Thermal pollution of fired power plant effluents affects living organisms.

3. Hydro-electric power effluents:-

It affects varieties of fishes, such as shellfish, oyster**.**

4. Nuclear power plants or atomic power plants:-

Due to its effect the physical and chemical properties of the water bodies are highly affected.

5. Industrial effluents:-

Industrial effluents from pharmaceutical, ceramic and pesticides lead to global warming**.**

Effects:

To plants:

Due to thermal pollution aquatic plants are not able to grow proper if the temperature exceeds more after extreme exposure it leads to death.

To animals:

- ★ Temperature plays a major role (physiology, metabolism, and biochemical process) in controlling respiratory rates, digestion, excretion, and overall development of aquatic organisms.
- ★ Temperature changes totally disrupt the entire eco-system.
- ★ Increase in temperature triggers the deposition of eggs by the female, for e.g., shell fish oysters and clams spawn within four hours when the water temperature reaches the critical level.

Invasion of destructive organisms:

- ★ Thermal pollutants may permit the invasion of ship worms.
- ★ Discharge of heated water near the shores can disturb spawning and can even kill young ones.

To environment:-

Undesirable changes in algal population:-

- ★ Excess nutrients from washout water from farm land combined with thermal pollution cause an excessive algal growth.
- ★ Major group of algae like diatoms, green, blue green algae have tolerance for water with high temperature promotes blue green algal, blooms which disrupt the aquatic food chain.

Changes in water properties:-

- ★ A rise in temperature changes the physical and chemical properties of water.
- ★ In water dissolved oxygen content is decreased at high temperature, becomes a barrier for oxygen penetration into deep cold water.

Reduction in dissolved oxygen:-

Concentration of dissolved oxygen decreases in temperature, thus cold water fish swimming at 10°c require more oxygen cannot tolerate hot water of 30°c and it may die.

Control or Mitigation Measures:-

Cooling ponds:-

Most effluents are allowed to discharge into the lake's shallow and 1 or 2 meters deep. Then the water let out into the ponds.

Cooling towers:

Wet cooling towers: Hot water sprayed over large containers where cool air enters into the containers and takes away the heat and cools the water. This cool water can be reuse or may be discharge. This method induces to generate large amount fog. This is not good for environment and severely damage vegetation.

Dry cooling towers:

Hot water flows in a system of pipes. Hot pipes are supplied with dry air with fans. In this method no water loss occurs because it is not having any exposure to atmosphere. This method is too cost to install.

Spray ponds:

The water from condensers is received in spray ponds. Here the water is sprayed through nozzles are formed. Heat from these fine droplets is sprayed to the atmosphere.

Growing of trees:-

Growing of trees in the compound of factories should be made compulsory.

NUCLEAR HAZARDS

Write short note on nuclear hazards. (5 Marks)

Introduction:

Nuclear hazards are the waste, comprises of radioactive elements such as uranium, thorium, etc are used in nuclear and atomic power reactor produce enormous amount of heat can be converted into electrical energy.

Definition:-.

Nuclear hazard is defined as the waste that results from nuclear reaction in the form of pollution.

Causes of nuclear hazards:-

The important sources of radioactive hazards are**,**

1. Mining and refining of radioactive ores.
2. Nuclear bombing and nuclear weapon tests
3. Transportation of nuclear waste from one place to another. (in any form of transport**)**

NUCLEAR HAZARDS

- ✈ Disposal of nuclear waste such as mining, medical use etc.
- ✈ Medical x-rays
- ✈ Research laboratories
- ✈ Minor cause such as TV sets luminous wrist watches and wall clocks.

Effects of nuclear hazards (To plants, animals and environment)

- Radioactive material act as environmental poison and it result in damage of entire environment.
- Radiation cause mutation result in change of genetic make up of cells.
- Increase in mortality rate of planktons affects food chain.
- Due to nuclear hazards in plants chlorosis, necrosis and mutation may occur.
- In plants due to its effect plant respiration takes place through stomata.

Control measures of nuclear hazards:-

- ★ Radioactive waste generated from the atomic power plants can be buried deeply into the ground or buried under the islands of non human interference area with proper protection shield.
- ★ The only alternative to nuclear holocaust is a ban on nuclear testing.
- ★ Nuclear plant should have proper safety measures around the reactor.
- ★ Nuclear devices should never be explored in air. If these activities are extremely necessary they should be exploded underground.
- ★ Nuclear reactors must be enclosed in broad concrete walls to prevent radiations that emerge out.
- ★ Workers should wear anti radioactive protective garments and glass spectacles.
- ★ Extreme care should be exercised in the disposal of industrial waste.
- ★ Transportation of radioactive hazards should done in thick lead box.

SOLID WASTE MANAGEMENT

Describe in detail about solid waste management (10 Marks)

Introduction:-

Solid waste refers to any unwanted material include both solid and semisolid waste.

Definition of solid waste:

The solid and semisolid materials discarded from residential, educational, commercial, industrial, mining, health care centre (hospital), and agricultural activities that cause environmental problems and it may cause health hazard or discomfort to the living things is termed as solid wastes.

Definition of Hazardous waste:

Hazardous waste is any discarded solid or liquid material that is toxic, ignitable, corrosive, or reactive enough to explode or release toxic fumes, which cause harm to humans or the environment. Modern society produces large quantities of hazardous waste that are generated by chemical manufacturing companies, petroleum refineries, paper mills, smelters, and other industries.

Classification of solid waste:-

Solid waste can be classified into the following types,

Biodegradable waste:

Biodegradable waste is that waste which has the ability to breakdown quickly by biological means into raw material of nature and disappears into the environment**.**

Non biodegradable waste:-

Non biodegradable waste is that waste which does not break down into simple and harmful products by natural agents like bacteria and fungi**.**

- **Toxic waste:-**

  Toxic waste is also known as hazardous waste. It includes heavy metals like lead, mercury etc.

- **Non-toxic waste:-**

  Non toxic waste is the waste which does not pose any problem to animals, plants or to the environment.

- **Biomedical waste:-**

  Biomedical are the waste which are generated from the hospital activities including laboratories.

- **Garbage**:-

  The term garbage includes biodegradable waste. It comprises of animal waste, fruit peeling, paper, Vegetable residues resulting from handling, preparation

- **Rubbish:-**

  The term rubbish is used to denote non-degradable solid waste which includes combustible materials (clothes, plastic, tyre, glass etc) as well as non-combustible material such as broken crockery, metals, glass etc generated from households, institutional, commercial activities etc.

- **Ashes and residues***:*

  Material remaining from the burning of wood, coal, coke and other combustible waste in homes, stores industrial and municipal facilities for the purpose of heating, cooking and disposing of combustible Waste is categorized as ashes and residues.

- **Demolition and construction waste***:*

  Waste from raised buildings and other structures are classified as demolition wastes. It includes stones, concrete, bricks, and electrical things. These include hazardous waste from different sources. Example: Radio active wastes, biological products- such as enzyme antibiotics, pathogenic and pathological waste.

- **Treatment plant waste***:*

  The solid wastes from waste water and industrial waste treatment facilities are included in this Classification.

- **Agricultural wastes***:*

  Wastes results from live stock, paddy husk, crop residue, pesticide tins etc.

Sources:

The amount of waste produced by human activities is increasing in most part of the world.

1. Municipal solid wastes (MSW):

It mostly comprises wastes from houses, such as paper, vegetable, food waste, fruit peelings, plastic covers, glass, cloth, etc.

2. Industrial waste:

In most of the industries such as textile, paper, thermal power plant, radioactive elements from the atomic/ nuclear power plants, sludge from the treatment process, etc

3. Hospital wastes or health care wastes:

It comprises of stocked blood, soiled cotton, needles, diseases causing microorganisms, organs, medicine tins, bottles, etc.

4. Agricultural wastes:

Agricultural waste consists of crop residue, husk, and pesticides bottles, etc.

5. Mining:

During mining minerals along with the soil and debris cause solid waste.

6. Construction activities:

During construction, demolition, renovation, etc huge amount of the solid waste is generated such as bricks, cement covers, paint tins, sand, iron rods, etc.

Effects:

To plants:

- ⋆ Municipal solid waste, which is dumped in land, consists of plastic and glass pieces will not allow the soil to aerate and light penetration.
- ⋆ If the hazardous solid wastes have the property, of dissolving, it will change the soil property and plants will not grow properly.
- ⋆ The upper layer by these materials reduces seed germination.
- ⋆ Industrial wastes which consist of radioactive materials and harmful chemicals results in mutation and leads to many disorders such as chlorosis, necrosis, etc.

To animals:

- ⋆ Biodegradable/ non-biodegradable solid waste becomes store house for various pathogenic micro-organisms and results in the out break of different diseases such as plague, dumping of waste induce breeding of mosquitoes which is the vector of many diseases such as malaria, elephantiasis, etc and also it is having the efficiency to breed intestinal worms, etc.
- ⋆ Rag pickers who have the higher chance to deal with the waste everyday have higher chances for being affected by the pathogens and they may suffer from occupational health hazards such as skin disease, respiratory tract infections, stomach infection, eye irritation, tetanus, etc.
- ⋆ Hazardous substances include heavy metals like chromium, cadmium and mercury. It results in bioaccumulation and finally biomagnifications.
- ⋆ Burning of solid wastes constitutes of plastic cause respiratory disorder and it leads to cancer in various parts of the body.

To environment:

- ⋆ The dumping of solid waste results in seepage of liquid contaminants that pollute the ground water and due to this effect surface runoff water is also affected to a considerable extent.
- ⋆ Some of the solid waste is having the tendency of volatilization and emission of radiation.
- ⋆ The hazardous solid waste contaminants reduce the solid quality and lead to unfertile land.

Control measures:

1. **Resource recovery*:***

Resource recovery is a method to turn wastes into resources by recovering unusable products-both material and energy. The waste, which is combustible, can be taken to the industries where heat is required for the process. The combustible waste is crushed into powder and compressed into small pellets and then it is used for industrial burning process.

2. Reuse:

Certain solid waste can be reuse- again and again, it helps to reduce the problem of waste disposal and create problem to the environment. For example: Plastic covers can be use for much time, because plastic is an inert material disturbs soil property. The materials, which are made up of glass, plastic, ceramic, etc, can be reusable.

3. **Recycle*:***

Materials made up of metals such as aluminum, iron copper, etc., such as tin, utensils, old vehicles, electrical wirings, etc and also materials made up of plastic. If the plastic size thickness of more than 20 microns consists of plastic ware, bags, etc are recyclable and can be made into another product.

4. **Open dumping*:***

The low-lying areas or areas outside the residential, and cities are used for dumping of solid waste. It cause public health problem but it is practiced extensively in India because it is cheap and require no-prior planning. Due to this problem, the soil fertility and the properties are also affected. If the open dumping present near to the residential area it may cause various health problems and it will damage the environment largely.

5. **Ocean dumping*:***

Due to insufficient space for disposal of solid waste materials generated from both urban and industrial waste to minimize the problem of waste dumped into the ocean. The waste materials consist of floating, dissolving and submergible items. Marine animals are greatly disturbed and may die by swallowing it.

6. Composting*:*

The biodegradable waste from the vegetable market, commercial activities, agricultural waste, street sweepings, etc. are taken to composting process and it can be convert into manure as well as it can be converted into vermicompost.

7. Pyrolysis*:*

In this process, the combustible constituents of the solid waste are heated in special chamber known as pyrolysis reactor at 600°C to 1000°C in a low oxygen or oxygen free environment. In this process huge amount of ashes and residue will generate and further disposal will be a problem.

8. **Incineration*:***

Incineration is another MSW disposal practices that helps to reduce the amount of landfill space needed. It can be defined as a controlled combustion process for burning solid and combustible wastes and reuse them primarily to carbon dioxide and another gases water vapor and non-combustible solid waste residue.

9. Landfill*:*

Landfills are engineered areas with waste is placed into the land. Landfills usually have liner systems and other safeguard to prevent ground water contamination. Landfills for disposal of hazardous wastes are required to meet very strong standards to protect public health and the environment. Hazardous waste landfills must be engineered with double composite liners and leach-ate collecting system above and between the liners, as well as a leak detection system capable of detecting, collecting and removing any leakage between the liners at the earliest practical time. It is removed and treated to protect the ground water.

10. Gasification:

It is a process in which chemical decomposition of biomass takes place in the presence of controlled amounts of oxygen, producing a gas. This gas is cleaned and used in an internal combustion engine to produce electric power. Even without clean up, the gas can be used in boilers to produce electric power. The gasification technology is highly suited to generate electric power from plant materials, rice husk, groundnut shell, wooden twigs, and so on. The clean up of the gas is essential to save combustion equipment.

11. Anaerobic Digestion:

In this process, animal wastes, food processing wastes and other organic matter are chemically decomposed in a controlled environment producing a gas called 'biogas'. It contains methane and carbon dioxide. The feed stock and the digestor design decide the content of methane in the biogas is used for heating purposes, cooking and water heating, or can be used to produce electricity by fuelling a combustion engine generator combination. This technology is highly matured and the latest digestor produce nearly 95 percent of methane-contained biogas. The byproduct of this technology is 'slurry' settled at the bottom of the digestor. This is a good substitute for chemical manure; and it is also used as soil regenerator. In India, biogas plants are very popular in rural areas where animal dung is available in plenty.

Role of individual in the prevention of pollution:

1. Individuals should monitor pollution level in the water bodies, land, and surrounding.
2. To avoid further environmental pollution, population stabilization should be achieved. Hence individuals can prefer small family concept.
3. Recycle and reuse of solid waste greatly reduce the volume of waste. Therefore, the waste must be reduced and recycled to the maximum possible extent. Reusable waste material can be use many times to minimize the waste generation and by which we can minimize adverse effects on the environment.
4. In the agricultural field farmers can opt for the utilization of bio-fertilizers and bio-pesticides instead of chemical pesticides and fertilizers, which has the capacity to degrade the soil nature and it leads to soil pollution.
5. Further they also help in creating litter free zone environmental forestry zone, smokeless zone, noise free zone, plastic free zone, etc in their living area and the dependent area.
6. Each individual must first upgrade their knowledge regarding the environmental resources and how it is essential and how it is working.
7. Wastage of water, electricity, paper, etc must be strictly prohibited.
8. Cloth and paper bags can be used in place of polythene bags which is eco-friendly.
9. Individuals can avoid using two wheelers for short distance frequently and switch over to bicycles or by walk.

10. Individuals can approach the related government organizations to take stringent measures on polluting the environment to a maximum.
11. Municipal Solid Waste burning should be avoided, which leads to air pollution.
12. Try to plant trees wherever you can and it is more important to take care of them. They reduce air pollution.
13. Don't use aerosol spray products and commercial air-fresheners. They may damage the ozone layer.
14. Do not pour pesticides, paints, solvents, oil or other products containing harmful chemicals down to the drain or onto the ground.
15. Buy consumer goods in refillable glass containers instead of cans or throwaway bottles.
16. Use rechargeable batteries.

Climate Change – Acid rain

Introduction:-

Acid rain is a challenge face by man today. The term acid rain was coined by Robert Angus. This term is used to describe precipitation, snow and dew that are more acidic and normal.

Definition:-

Acid rain is defined as a condition in which normal precipitation becomes acidic after reacting chemically with pollutants in the air. So acid rain is the rain which contains higher level of acid than normal. Usually rain with pH below 5 or 4.5 is termed as acid rain.

Causes of acid rain:-

Acid rain is a man made phenomenon. The acid rain problem has increased due to industrialization. The main causes for acid rain are

1. Burning of fossil fuel like coal and oil for generation of thermal power is mainly responsible for the main acid forming pollutants.
2. Automobile exhausts are also responsible for acid rain.
3. Volcanoes, fires etc are the natural causes for acid rain.
4. Decomposing matter emitting pollutants is also a cause for acid rain.

Effects of acid rain on plants, animals and environment:-

1. Acid rain changes the soil property and it won't allow plants to grow and stop seed germination.
2. It affects crop productivity.
3. Acid rain has ill effect on vegetation .They cause change in the colour of the leaves. They cause premature drop of leaves and flowers.
4. Acid rain has ill-effect on monuments, statues and buildings.
5. Acid rain has ill-effect on man. Human health maybe affected by increased respiratory and skin problems.

Control Measures:-

1. Reduce the usage of fossil fuels and burning of solid waste should be stopped.
2. Use low sulphur coal and renewable resources
3. Plant more trees to absorb air pollutants.
4. Control device should be use to remove the air pollutant in industries stack

Climate Change

Introduction:

- Generally the climatic conditions changes occur at all time. But the activites of the people cause changes on the earth and its climatic changes.
- The average temperature in many regions has been increasing in recent decades.
- The global average surface temperature has increased by 0.6º C-0.2º C over the last century.
- Climatologists of the intergovernmental panel on climatic change (IPCC) has reviewed the result of the several experiments in order to estimate changes in climate in the course of this century.
- Human societies will be seriously affected by the extremes of climate such as droughts and floods.

Effects of climatic changes:

- Public health depends on safe drinking water, sufficient food, secure shelter and good social conditions, All these factors are affected by the climatic changes.
- Fresh water supplies may be seriously affected ,reducing the availability of clean water for drinking and washing during drought as well as floods.
- Water can be contaminated and sewage systems may be damaged .
- The risk of spread of infectious diseases such as diarrheal disease will increase.
- The reduction of food production would lead to starvation and malnutrition with long term health consequences,especially for children.

Microbes in climatic changes:

- Microbes have the capacity to alter the environment.
- Microbes are involved in many processes, such as the carbon and nitrogen cycles, and are responsible for both the production and consumption of green house gases such as carbon dioxide and methane.
- The reason is that microbes live in very diverse communities that interact with other organisms and the environment in complex ways, which makes it difficult to make predictions about the effects of microbes on climate change,
- Sudden increase in atmospheric oxygen remain shrouded in controversy, it is widely agreed that Cyanobacteria in the oceans were the first organisms to produce oxygen: there is little doubt that these microbes played a major role.
- Microbes are the drivers of the oxygen cycle and an essential part of the nitrogen cycle.
- Microbes could have various positive and negative feedback responses to temperature change.
- Microbial decomposition of organic matter is crucial to the terrestrial carbon cycle.
- Phytoplankton could absorb huge quantities of carbon dioxide.
- The mechanics of this oceanic carbon cycle are dominated by micro-, nano-, and picoplankton, including bacteria and archaea.
- Another example of microbial interaction: vast areas of Arctic and alpine tundra are warming due to climate change. As it heats up, the tundra is producing increasing quantities of methane. The main source of methane in permafrost soils is methanogenic (methane-producing) archaea, while the only known terrestrial sink is methanotrophic (methane-consuming) bacteria.
- The balance between these methane-generating and methane-absorbing processes is poorly understood, but since methane is a far more effective greenhouse gas than carbon dioxide, our understanding needs to improve, and quickly.

Release of CO_2 to the atmosphere:

- People use fossil fuels such as coal,oil and gas,which contain carbon .when it is burnt the carbon di oxide gas is released.
- Carbon di oxide absorbs the solar heat in the atmosphere.
- When more carbon di oxide is added to the atmosphere solar heat finds it difficult to getout.
- The average temperature of the atmosphere would increase.

Global Warming

Introduction:-

- Global warming is one of the most serious challenges that we are facing today to protect the health and economic well-being of our current and future generations.

Definition:-

- Global warming is the gradual increase in the global temperature of the earth atmosphere caused by the green house effects of the green house gases that trap sun's heat in the earth atmosphere.

Effects of global warming on plants, animals and environment:-

- The primary effect of global warming is increasing carbon dioxide and increasing global average surface temperature.
- From the increasing global average surface temperature, a number of secondary effects flow.

They are,

1. Rising sea levels.

2. Impact on agriculture
3. Reduction in ozone level
4. Change in ecosystem
5. Melting of polar icecaps
6. Alter habitat, migration or extinction
7. Cause desertification, drought and soil erosion
8. Declining of food production
9. Change in rainfall pattern
10. In animal skin pigment will be affected and it leads to cancer and various skin diseases.

Control measures:-

1. Conservation of forest.
2. Ban on CFCs and nuclear explosions.
3. Population control
4. Environmental education
5. International co-operation for attempting the reduction of green house effect.
6. By reducing the consumption of fossil fuels like coal, oil and natural gas using fuels such as solar power, wind power, which limit green house gases, global warming can be controlled.
7. Encouraging the use of alternatives source of energy.
8. Learning to adopt and accept the changing climate.
9. Reduction in the use of automobiles.
10. Afforestation and encouraging community forestry.

Environmental laws and regulations in India

Introduction:-

- Environmental laws are laws which provide the frame work for regulating and protecting the environment.

Environmental laws help in

1. Regulating the use of resources
2. Protecting the environment
3. Protecting the biodiversity
4. Prohibiting violate environmental adversely.
5. Punishing those who violate environmental legislation.

- Beside the constitution of India, certain other laws of the country also provide for the protection of India.

Some of the other laws of India are,

Environment protection act 1986:

- The act enacted on 23rd may 1986 with an aim to protect and improve environment.
- It deals with the general power of the Central Government to take measures in order to protect the environment.
- This provides the standard quality for air, soil, and water, and also the maximum allowable concentration of various pollutants.
- Public concern and support is crucial for implementing the EPA.
- The power of State and Central Pollution Control Board authorities enter and inspect any industry at any time.
- They also have the eligibility to collect the sample and to check the samples.
- These samples can be taken and it should be analyzed by the government analyst.
- The company will be punished by the government with penalty of put one lakh rupee or it extend to Rs 5000 or imprisonment of five years.

The air (Prevention and Control Pollution) Act 1981:

- As a result of the UN conference on human environment held on June 1872, steps were taken to prevent all natural amenities, and it extends to whole of India.
- It deals with the information regarding CPCB and SPCB, their constitution, terms and condition.
- The Government passed this Act in 1981 to cleanup our air by controlling pollution.

- It states that sources of air pollution such as industry,vehicles,power plants,etc., are not permitted to release particulate matter, lead, carbon monoxide, sulfur dioxide, nitrogen oxide, volatile organic compounds(VOCs) or other toxic substances beyond a prescribed level.
- Function of Central Board and State Board such as to collect sample, compile and publish the data regarding air pollution.
- The board is authorized to declare the air pollution control areas and to instruct the emission.
- The power of State and Central Pollution Control Board authorities to enter and inspect any industry at any time.
- They are eligible to collect the sample and to check the samples.
- The industry or person fails to follow the standards, will be punished with imprisonment for not less than one year and 6 months, it may extend to 6years and with fine.

The Water (Prevention and Control of pollution) Act 1984

- This act was framed and enacted in the Parliament in 1974 to prevent and to control water pollution with an aim to protect and restore purity of water.
- It has a power to give directions to concerned authorities.
- It explains the power of State Government to collect samples of effluent, analyze in Government laboratory and to publish the result. On publish of the result they may discharge.
- It deals with the maintenance of funds of Central and State Board budget , annual report and auditing
- This gives penalty in case of offences committed by companies.
- 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 Rs. 5000 will be imposed for every day.

The Wild life (Protection) Act, 1972:

- This act (1972) framed for protection of wild animals, birds and plants. This act extended to a whole of India except Jammu and Kashmir.
- It clearly explains the authorities to be appointed, formation of wild life advisory board and its duties.
- It emphasizes the maintenance of record of wild animals killed or captured. Details regarding hunting of wild animals and regarding the license holder are elaborated.
- It gives a note on sanctuaries, national parks, prohibited area, district collector's power.
- It tells about the trade of wild animals, animal products, etc.
- This gives about the penalties when found guilty under act, 2 years imprisonment, Rs. 2000 fine either or both, and maximum 6 years.

The Forest Conservation Act, 1980:

- The forest (conservation) act, 1980 was adopted.
- The main aim of the act is to protect all types of forest. Thus indirectly it helps to maintain the eco-system.
- This act stress that the State Government would not empower the reserve forest.
- India's first policy was enunciated in 1952 .Between 1952 and 1988, the extent of deforestration was so great that it became essential to formulate a new policy on forests and their utilization.
- The constitution of forest advisory committee was explained.
- The penalties when the act is violated. It includes simple imprisonment up to a period of 15 days.

Penalties for offences in Reserved forest:

- No person is allowed to make clearing or set fire to a reserved forest.
- Cattle are not allowed to permitted to trepass into the reserved forest.
- Felling, collecting of timber, bark or leaves or collecting of forest product is punishable with imprisonment for a term of six months or with a fine which may extend to Rs.500 or both.

Penalties for offences in Protected forest:

- A person who commits any of the following offences like felling of trees,stripping the bark or leaves trees,set fire to such forests,kindles a fire without taking precautions to prevent its spreading to any tree mentioned in the act,whether standing or felled,fells any tree,drags,timber or permits cattle to damage any tree,shall be punishable with imprisonment for a term which may extend to six month or with a fine which may extend to Rs.500 or both.

Issues involved in the enforcement of environment legislation:

Environment legislation has been formulated with an aim of restoring the natural environment and paving a way for sustainable development. Though, the enforcement of such legislation has not been successful in many occasions, it has been proved to be applicable for certain activities.

- When such laws are violated, the public health and environment faces a threat. The legal action should be necessarily taken.
- In developed countries pollution control devices are not been effective.
- In real world, monitoring pollution is very often costly or impossible, and thus it might be more effective to use selective taxes or regulations to stimulate pollution control indirectly.
- In Government offices there are insufficient personnel to monitor all emission controls within their jurisdiction.
- Public must boycott the product which is harmful to the environment.

Earth Summit

Introduction:-

Earth summit is a pattern of production – particularly the production of toxic components. Alternative source of energy are being sought to replace the use of fossil fuel which are linked to global climate change. There is much greater awareness of and concern over the growing scarcity of water.

Definition:

Earth summit is a large international meeting held in Rio de Janeiro in Brazil at which the leaders of the countries of the United Nation discussed ways of protecting the environment and preserving the Earths Biodiversity of different plants and animals on the earth. It is also known as Rio summit.

Earth Summit-2012:-

Earth Summit 2012 was hosted by the Government. The key themes are,

Green Economy:-

★ In the content of sustainable development and poverty eradication.
★ Institutional frame work for sustainable development including Global Environment Governance.
★ Emerging issues- Critical issues that should be incorporated into the sustainable agenda.
★ Review of existing commitment – looking at the progress made over the past 20 years.

Uses:-

- All Countries should take part in the greening of the world "through forest, planting and conservation.
- The sustainable use of forest will require sustainable patterns of production and consumption at Global level.

(UNIT- IV Completed)

UNIT-V
POPULATION AND ENVIRONMENT

Introduction:

In 1800 the earth's population was about 1 billion people. Due to the drastic population growth presently we have crossed about 6 million; if this situation follows we may reach 11 billion by 2045 as per World's banks estimation. With the scientific and technological advancement, life expectancy of humans improved. People started living in definite settlements leading a more stable life with better sanitation, food, and medical facilities victory over famine related deaths and infant mortality became instrumental for a rapid increase in population size.

India stands in a somewhat different state,compared to the developed world. In India about 70 percent of the population reside in the villages.

Meaning:-

Population is a number of people living in a particular area, region, country or world at a particular point of time.

Population growth and variation among nations

Write short notes on Population growth and variation among nations**.** **(5 Marks)**

Introduction:-

Man lives in every part of the earth. He is found even in the highest mountain like the Himalayas, in the thickest forest like Amazon, in the hottest desert like the Sahara and in the coldest desert like the Tundra's.

Several factors are responsible for the variation in the distribution of population growth among the different nations of the world. Some of the important factors are climate, topography, soil, presence of adequate water supply, natural vegetation, religious, social factors and also political factors.

India is now a country with one billion people i.e.16% of the world population,on 2.4% of the global land area.If current trends continue , In the first half of the 1900's human numbers were growing rapidly in most developing countries such as India and China.

India may overtake China in 2045,to become the most populous country in the world. Stabilizing population is an essential requirement for promoting sustainable development with more equitable distribution and poverty allevation. A poor environment undermines development ,while inadequate development results in a lack of resources for environmental protection.

There are cultural ,economic,political and demographic reasons that explain the differences in the rate of decline in different countries.

1. Exponential growth: The population size increases by a constant ratio with reference to time (period) is said to be exponential growth. Population growth takes place exponentially and that explains the dramatic increase in global population in the past 150 years.

(e.g.) Population of particular area exceeds such as 2, 4, 8… In million

2. Doubling time: The time needed for a population to double in size is said to be doubling time.

Td=70/r

70 - Total population

r - Annual growth rate of the population in %

e.g. its growth rate is 2% in an year

Td=70/2=35 years.

After 35years the population will be double in its size.

3. Total fertility rate: It is one of the key measurements of a nation's population growth. This is defined as the average number of children that born to a woman during her life time. The total fertility varies 1.9 in developed nation and 4.7 in developing nation. This varies from place and time, however, due to changes in cultural and technological set up of societies and Government policies the TFR has come down which is a welcome change.

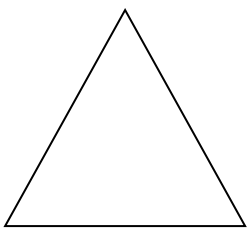
4. Infant mortality rates: It is an important parameter affecting the future growth of a population of the nation. The number of infants died out of the number of infants born. Although this rate, has declined in the last 50 years, but the pattern differs widely in developed and developing countries.

5. Replacement level: This is an important concept of the population studies. Two parents bearing two children will be replaced by offspring's. But due to infant mortality this level changed.

6. Age structure: This is a graphical representation of age group. Age structure is very useful for the planning of that community. Age structure of population of a nation can be represented by age pyramids, based upon people belonging to different age, classes like pre reproductive (0- 14 years), reproductive (15-44 years) and post reproductive (45 years and above), we get the pyramid.

For example:

Age group	No. of people
Above 45	40
15 – 44	50
0-14	10



The example given above which shows the number of the people in the age group results that, age group between (15-44 years) number of people are more when compare to other. So that the age group requirement should be analyzed such as employment opportunity.

Population Explosion

Write short note on population explosion.

Introduction:-

Population explosion may be defined as a very high increase in the growth of population in a specific area at a given time. In other words, population explosion means the rapid growth in population which is unexpected and unimaginable.

Effects of population Explosion:

There will be over-consumption of natural resources and consequent depletion in natural resources.

1. The environment gets polluted.
2. There will be deforestation, soil erosion.
3. Population explosion will result in increased levels of air pollution, water pollution, soil pollution and noise pollution.
4. Population explosion will result in global warming and climate change.

Reasons for population explosion:

High Natality (Birth rate):-

Some of the religions they are following the practices of increasing their offspring's, as well as illiteracy of the people in the underdeveloped countries are the major reason for high natality.

Low mortality (Death rate):-

Invention of modern facilities in the medical reduces the death rate leads to high life expectancy. In present situation identification, treatment with modern equipments and pharmaceuticals advancement leads to less death rate. This plays a major role in decreasing population. In 1950 the life expectancy was about 40 years, but currently life expectancy was about 61 years.

Food:-

In olden days death occurs mainly due to famine and starvation. Most of the nations are not sufficient with their production and they were depending upon other nations for food, but nowadays all the nations have good communication, transport facilities and increasing agricultural production. Due to this food products shuttled to each other, by this stabilization of population is attained.

Good Sanitation:-

Proper sanitation and hygienic life style of people leads to top healthy life. This reduces less disease causing death rate.

Family Welfare for Population Control

Introduction

India seriously took up an effective Family Planning Program,which was renamed as Family Welfare Program. Control of population explosion is quite necessary. For control of population explosion certain control measures must be taken. Those remedial measures are,

1. Provision of general education to people:-

Illiteracy of the people is one of the major causes responsible for the rapid growth of population. So, general education should be provided , education will make the people to understand the importance and benefits of family planning from their own point of view as well as the nation.

2. Family planning:-

Strict implementation of family planning program by the government will control the population growth helps to lead family welfare and country. Campaign should be launched to promote small family concept.

3. Mass media:-

Mass media like radio, TV etc can be bused for canvassing the people to adopt birth control. By mass media we can approach the society about the problem, arise to women if she gives birth too many offspring to the nation and to personal economic status. Through mass media we can control population growth which leads to family welfare.

4. Countries

Countries should put forward birth control measure planning. In China they are following a rule that one family should have one child, if a family consists of more than one child means the government stops all the facilities provided by the government to that family. Similarly countries plan and policy should be framed according to that to control population.

Female fertilization is the most popular method of contraception used in developing countries at present.This is followed by the use of oral contraception pills ,intrauterine devices (IUD's) for woman, and the use of condoms for men.

India and China have been using permanent sterilization more effectively than many other countries in the developing world.

Environment and human health

Introduction;-

Environment related issues that affect our health have been one of the most important trigerrs in the increasing awareness of the need for better environmental management.

In general health may refer to physical fitness and absence of any diseases. According to World Health Organization (WHO). "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity".

Definition:-

The term environmental health is defined as the theory and practice of assessing, controlling and preventing those factors in the environment that can potentially affect the health of the present and the future generation**.**

Factors influencing Human health:-

Human health is influenced by many factors like biological, chemical, nutritional and psychological factors.These factors may cause harmful changes in the human body condition called diseases and it adversely affect human health change.

There are three sets of environmental factors affecting human health .They are,

- ❖ The quality of environment in the place where man lives.
- ❖ The quality of environment in the place of his work.
- ❖ The quality of environment in the place around him.

To be specific, the various environmental factors that affect human health are,

Air pollution and human health:-

Air pollution is on a global scale. Automobiles and industries are mainly responsible for air pollution. Some of the diseases caused to human by air pollution are

1. **Silicosis:-**

Silicon is used to manufacture computer components, electronic components, glass etc the employee in industry and mining area are affected by this disease. In lungs many holes were formed and it leads to malfunctioning of the lungs and finally leads to death.

2.Asbestosis: This disease is caused by asbestos, which is used to manufacture asbestos sheet. It affects human similar to silicon. Asbestos is a fiber mineral, the fiber twists each another inside lungs and it leads to many problems.

3. Black lung disease: The person who is working with carbon such as in the coal mining, thermal power plant, etc normally suffered by this disease. Carbon particles sticks in lungs and forms a thin black layer and change the lung function.

4. White lung disease: This disease is caused by cotton fibers. One who is working in cotton processing units, cotton textile manufacturing units suffer with this disease. Cotton fibers enter into the lungs and it affects the respiratory system path and affects respiration.

5. Allergy: Due to dust particles, noxious gases, smoke, etc cause allergies in the respiratory system such as nasal block, sneezing nose, sinus, etc.

Pesticides and its effects to human health:-

Pesticides are generally very powerful toxic chemicals which do not get destroyed along with the pests for which do not get destroyed along with the pest for which they are employed. Pesticides are harmful to consumers of that food which is accumulated. They also affect everyone who works with them in some way. For instance 3 % of the agricultural workers in developing countries are estimated to suffer an episode of pesticide poisoning every year. Many harmful pesticides and fertilizers cause many disorders such as cancer, skin problems, various respiratory disorders etc. while spraying. In many cases the pesticides leads to the bio- accumulation and bio-magnification.

Health hazards due to noise pollution:

The noise pollution disturbs and distracts our normal work and produces several health problems. Noise pollution creates impaired hearing; break down of nervous system, high blood pressure, sleeping disturbance and various physiological problems.

Some of the health hazard caused by water contamination and pollution:

1. Mina Mata disease: Minamata disease caused by mercury poisoning which is discharged by the industries. It affects CNS (central nervous system), deafness, blurring of vision, etc.

2. Itai-itai: This disease is caused by cadmium poisoning it affects bones, liver, kidney, lungs, pancreas, and thyroid glands. Cadmium released from industries creates several health problems. The characteristic symptoms include discoloration of teeth and anemia.

3. Blue baby syndrome: Nitrate presence excess in their drinking water cause blue baby syndrome. The nitrate concentration in the water exceeds 25 mg/L, they become the cause of a serious health hazard called blue baby syndrome. The baby born will be blue in color and within two months the baby will die.

4. Water borne diseases: The sewage discharged into the river and those who consume that river water will creates many water borne diseases like cholera, amoebiasis, typhoid, jaundice, nausea, diarrhea, dysentery etc. Contaminated water also spreads the diseases like brain fever, malaria, filarial, dengue, etc and these exclusively affect the children.

5. Flurosis: It is caused by exceed concentration of fluoride in drinking water which is taken out from the underground. This disease shows brittleness of teeth and bones and it can be easily breakable.

6. Arsenic: It is an element which is naturally present in the soil. When rain falls the fluoride present in the soil enters into the underground water and contaminates it. Those people who consume that water leads to many problems such as black spots on skin, cancer, kidney disorder, etc.

7. Lead: Lead which is commonly used in pesticide after rainfall due to the surface runoff it will enters into the drinking water source. If suppose this water consumed by human it will affects and stops the RBC maturation

HUMAN RIGHTS

- India is a democratic country. The aim of our government is to ensure happiness to all citizens with equal comforts, opportunities and rights; every citizen enjoys rights and has certain duties towards the country.
- It was only after the II nd World War the concept of Human Right came to be accepted.
- Human Rights are internationally drawn standards, rules or values which regulate the conduct states towards their citizens and others.
- Human rights refer to universal rights held to belong to individuals by virtue of their being human, encompassing civil, political, economic, social and cultural rights and freedom and is based on the motion of personal human dignity and worth.
- In India, the National Human Right Commission (NHRC) was set up in the year 1993 by the Government of India.
- Human Right has thus emerged as a vital area of work which preserves and protects the basic human rights to live in dignity, freedom and peace.

Every citizen in India has six fundamental rights. They are

1. Right to equality
2. Right to freedom of speech and activity
3. Right against exploitation
4. Right to freedom of religious
5. Cultural and educational rights and
6. Right to constitutional remedies

1. Right to equality: This right give that all the citizen of India are equal in the eyes of law. There should not be any discrimination against any citizen on grounds of religious, languages, caste, color, etc.

2. Right to freedom of speech and activity: Everyone in the India have the right to speak write and express our views freely. We have the right to form associations groups or unions. We have the right to live anywhere and work anywhere without disturbing other people.

3. Right against exploitation: Every individual of the nation has the right to fight against exploitation. No child below the age group of fourteen can be employed to do any work. To force people to work more, to underpay them and to ill-treat and degrade workers are punishable in the court of law.

4. Right to freedom of religion: Indian has the freedom to follow any religious of his choice. Every citizen has the freedom to practice and propagate any religion. He can maintain religious and charitable institutions. They can expand their religious thoughts all the India.

5. Cultural and educational remedies rights: Citizens of India have the right to maintain educational institution of their choice. They also have the right to conserve their language, script and culture. One can purse any course of education. He is free to study in the institution of his choice. He can follow any culture he likes.

6. Right to constitutional remedies: If a citizen is denied any of these fundamental rights, he or she can appeal to high court or Supreme Court for protection. In addition to fundament right, our constitution also guarantees to every citizen of India some political rights. Such as Right to vote, Right to elect, Right to hold public office, Right to join public offices.

Value Education:

- ❖ Value education is crucial to the retention of national identity and to a peaceful and harmonious society.
- ❖ The education should give over all development of the student's personality.
- ❖ The main function of education is to produce citizens with sound character and a healthy personality.
- ❖ Good citizens are the only hope for the progress and prosperity of the country.
- ❖ Inspiring values, proper moral conduct and life based upon good principles are essential requisites.
- ❖ Values deals with ones own principles and standards from which we judge what is right and wrong behavior to the environment.
- ❖ The main function of education is to produce citizens with sound character and a healthy personality.
- ❖ Good citizen are the only hope for the progress and prosperity of the country.
- ❖ Education should not focus only the personal development but it should be in the country's development and the environmental status.

HIV/AIDS

Introduction:

The major threatening disease of the entire world in the twentieth century is **AIDS- ACQUIRED IMMUNO-DEFICIENCY SYNDROME**. It is caused by HIV stands for **HUMAN IMMUNO-DEFICIENCY VIRUS**; this virus can damage the body defensive system so that it cannot fight off certain infections. The virus is in the spherical shape made up of protein and lipid. This disease was first explored in Africa from wild chimpanzee and then it spread to the human beingh

Scenario:

- ❖ HIV/AIDS is now the leading cause of death in Africa and fourth leading cause of death worldwide. 42% of death occurs in middle and low income countries.
- ❖ In Africa 67% are affected by Aids.
- ❖ In 2002 there were 3million children living with HIV and it is projected that by 2010 the number of aids orphans globally would touch the 25million mark.
- ❖ The total number of AIDS affected people around world is about 33.4 million of that 3, 30,000 children.
- ❖ AIDS was first recognized by United States Center for Disease Control and prevention in 1981.
- ❖ The HIV virus was first discovered by French scientist- Luc Montagnier and America's Robert Gallo in 1983.
- ❖ The number of AIDS patients in India is estimated about 5million.
- ❖ It is second largest number of people living with AIDS after South Africa.
- ➢ The India first HIV +ve case was identified in Chennai on 1986. Six of the Indian states declared as being "high prevalence states" are Tamilnadu, Andhra, Karnataka, Manipur, Nagaland and Maharashtra.

Symptoms: Sleeping sickness, High sweat during night time, Loss of body weight, Skin rashes, prolonged fever, cough, etc.

Method of transmission:

- The common mode of transmission is occurred through illegal sexual contacts if the partner is already infected with HIV.
- It can also transmit through during blood transfusion, organ transplantation, syringes, needles, etc which is used in medical field if it is taken from the AIDS patients. This can be avoided by using disposal

syringes and needles, during blood transfusion and organ transplantation it should by properly test whether it contains HIV.

- The third route of transmission is through from mother to child. This transmission is from an infected mother to her child during pregnancy. This probability of transmission of HIV by this route is about 30% and also by breast feeding.

HIV are not spread by: Saliva, Tears, Urine, Faces, Vomit, Sweat, Blister fluids, Clothes, Food, Air, Kissing, Cough and sneezing, Mosquito and flies, Hand shake, etc.

Prevention:

- Use of disposal syringes and needles.
- Blood should transfuse only after HIV testing.
- Illegal sexual contacts should be avoided. Sexual relations should be only between husband and wife.
- Organ transplantation can be performing only after proper testing.
- Sexual contacts can be performing by the using condom.

Clinical test:

DIRECT TEST: Testing of p^{24} and PCR (Polymerase chain reaction).

INDIRECT TEST:

1. Preliminary-ELISA- Enzyme Linked Immuno Sorbent Assay which can be performed only after 6 months.

2. SecondaryWESTERN BLOTTING.

Treatment: No medicine is found to cure AIDS but Azidothiamine (AZT) is the medicine used to given for aids patents to extend the days for survival in the olden days. Presently Antireretoviral therapy (ART), three doses of Antireretoviral (ARV) drug is given to suppress the HIV viruses. Currently HIV-I is under trial

Women And Child Welfare

- The department of women and child development was set up in the year 1985 as a part of the Ministry resource development by the Government of India to give the much needed in women and child welfare. This welfare mainly consist of Supplementary nutrition, Immunization, Health check-up and referral services.
- There are several environmental factors that are closely linked to the welfare of women and children. Each year, close to eleven million children worldwide are estimated to have died from the effects of disease and inadequate nutrition.
- Most of these deaths are in the developing world.

The diagnosis of common childhood disease conditions.

Symptom	Possible cause
Cough or fast breathing	Pneumonia, severe anemia
Lethargy or unconsciousness	Cerebral malaria, meningitis, severe dehydration, very severe pneumonia
Measles rash	Pneumonia, diarrhea, ear infection
"Very sick" young infant	Pneumonia, meningitis, sepsis

Pre-school non-formal education:

To maintain good health and resist disease, we need fairly large amount of macro nutrients and smaller amount of micronutrients consisting of various vitamins and minerals. People who cannot buy enough food to meet their basic energy needs suffer from under nutrition. Chronically undernourished children are likely to suffer from mental retardation and stunted growth. They also tend to be much more susceptible to infectious disease (e.g. Diarrhea). This kills one child in four in developing countries.

According to the World health Organization 120-140 million children in developing countries are deficient in vitamin-A. This puts them at risk to blindness and premature death. Globally about 2,50,000 children under are 6 are going to blind each year from the lack of vitamin A. Iron deficiency cause anemia, fatigue and increase a women's death especially in pregnant women.

As per WHO seven of ten deaths of children under age 5 in developing countries are affected by Malnutrition, Pneumonia, Diarrhea, Measles and Malaria

The nutrition related and disease based can be rectified

- Immunizing children for many diseases such as measles, polio, hepatitis-B, etc

- Encouraging breast-feeding
- Preventing blindness by giving children a vitamin-A capsule twice a year
- Educating women with insisting on nutrition, pure drinking water, sterilization and child care.

Many of the world's poor can afford to live only on a low protein, high carbohydrate diet. Many of them suffer from malnutrition (deficiencies of protein and other key nutrients). Many of the world's desperately poor people, especially children suffer from both chronic under nutrition and chronic malnutrition.
Iron deficiency causes anemia, fatigue and increase a women's chance of dying at the time of delivery. According to WHO, one of every three people, mostly women and children in tropical countries suffer from iron deficiency. In India, more than 80% of all pregnant women are having anemia.

- ❖ Women and girls are often the last to eat, as their role in traditional society is to cook the family meal and feed their husband and sons first. This leads to malnutrition and anemia due to inadequate nutrition.
- ❖ The girl child is given less attention and educational facilities as compared to boys in india. Thus, they are unable to compete with men in later life. This social- environmental divide is a major concern that needs to be corrected throughout the country.

Resettlement and rehabilitation of people

Introduction:-

There are many issues and harms attached with the displacement or the resettlement of the people due to the natural or manmade reasons. The main objective and purpose of rehabilitation in mind while displaying the people. Current nuclear crisis in Japan have already displaced millions of people. There are various instances and example if displacement and resettlement of people due to mining activities, resettlement due to dams and other multipurpose project.

Resettlement and rehabilitation:

- ❖ The agricultural development depends on the crop production. Due to population explosion, the agricultural production continue to dominate the sectoral plan for agriculture.The agricultural production has to be intensified to meet the ever increasing demand of the population.
- ❖ There is a need for a comprehensive strategy to tackle bio-physical, socio-economic and cultural problems arising out of the construction of an irrigation project.
- ❖ The environmental problems in downstream depends to a great deal on integration and coordination of command area development processes conforming to project objectives. It requires the **farmers** participation in various programmes of command area development.
- ❖ Recently, some effots have been made to ensure farmer's participation in irrigation management.
- ❖ However, successful policies are yet to be formulated and implemented.
- ❖ The environmental awareness among masses, and the water management among farmers should be created to avoid adverse effects.
- ❖ The digging of canals and roads should not affect the natural drainage system. The natural drainage system has to be maintained through periodic desilting and weed clearance.
- ❖ The use of canal and ground water has to be considered an integral part of design and execution of irrigation projects.
- ❖ In majority of irrigation command areas habitation has to be organised.

Resettlement Guideline:-

Based on the resettlement policy the wishes of the affected people and maintain their current production and living traditions. Based on consultation of local affected peoples the economic rehabilitation will be based on developing replaced farming resources with in their own township and villages

Planting will be focus of economic rehabilitation strategy by developing new farmland and improving the remaining farmland in the affected villages and supplemented by developing various income generation opportunities in the project area.

Role Of Information Technology In Environment

- ➢ Now-a-days the world is ruled by computers.
- ➢ Computers are very much useful in the office, institution and all business centres.

- Now, the research and development (R&D) work is mainly carried out with the help of computers.
- Hence, the application of computer in various fields is numerous.
- In some manner, the computer usage in environmental aspects is also countless.
- In India, during the last decade of 20th century, information technology (IT) has emerged as the most important technology revolutionizing the various spheres of the life.
- This has created many new avenues of employment.

Information:

- The term information has been defined by Eliahu Hoffinan as an aggregate (collection and accumulation) of statement, or facts or figures. Information is French term "Informatique".
- There are several on-line use instruments, by which data can be collected automatically at fixed interval of time.
- For example, in order to monitor micro-meteorological studies the parameters like temperature, humidity, and rainfall, wind speed, wind direction, barometric pressure etc. can be monitored.
- Information technology (IT) is a broad term covering all aspects of managing and processing information.
- Computer hardware, software and internet are key to these systems that are designed, developed, supported or managed by IT professionals.
- The discovery of computers and subsequent development of IT is one of the most significant achievements of the twentieth century.
- Information technology can be especially useful in the education sector. A large number of software is available for self learning and evaluation on various subjects.
- This technology can also be used for distant education over the computer communication networks and would be advantageous for the adult literacy programmes.

Remote sensing:

- The term remote sensing is defined as the science and art of acquiring information about a material object by making measurements, at a distance from (i.e., without coming into a physical contact with).
- The advent of satellite remote sensing is a timely technological development in view of the serious pressure on our natural resources.
- There is a need to obtain reliable data about vegetation, resources, land degradation, deforestation, wildlife and other environmental related information.
- The remote sensing technique is very much useful to solve the above problems.
- It is of obtaining information about the terrestrial objects through cameras in the satellite from the space.
- Above a particular distance from the earth satellites are fixed that are called as geostationary satellites.
- The satellites which evolve along with earth rotation are called as geo-synchronous satellites.
- These satellites get energy from the sun and picture the image on the earth surface; these are controlled by NRSA-National remote sensing Agency and IRSA-Indian space research agency.
- The images which are taken are classified and processed they are said to be 'digital image processing' during the processing the individual representation are resolute high and form a box they are said to be pixel.
- The remote sensing is very much useful in the military surveyors, agriculture, forestry, meteorology, town planning, mineral exploration, etc.

Geographical Information System (GIS):

GIS is a system of hardware, software and procedures designed for support, capture, management, manipulation, analysis, modeling and display of spatially referenced data, for solving complex planning and management problems. The data which is occupied from the remote sensing can be used for the GIS.

It is computer based information processing map preparation system using pixel and color variation. It is more useful in the analysis of geographical presentation such as forest cover, river, mineral, water quality and quantity, type of forest, etc. the most commonly using software are Arch info, Geo-media, etc.

Applications of REMOTE SENSING and GIS:

❖ Remote sensing and GIS are useful for evaluating ocean resource and coral reef mapping.

- ❖ It is useful in forestry.
- ❖ To assess loss of biological diversity/ biosphere reserves/ ecologically hot-spot area/ wetland environment.
- ❖ Useful for forest cover mapping and for / Forest stock mapping/ Deforestation/ Afforestation.
- ❖ Wild life habitat assessments, Environmental Impact Assessment (EIA) are also done by remote sensing and GIS.
- ❖ To study about the water quality and the quantity.
- ❖ To accesses the mineral resources.
- ❖ It is useful for the town planning and for the urbanization.
- ❖ Specialized software can analyze data for epidemiological studies, population dynamics and a variety of key environmental concerns.
- ❖ The relationship between the environment and health has been established due to the growing utilization of computer technology.
- ❖ This looks at infection rates, morbidity or mortality and the etiology (causative factors) of a disease. As our knowledge expands, computers will become increasingly efficient.

The present age is dominated by technology in which IT by virtue of its meta resource nature is very influential. No aspect of life or service has been left untouched by IT. This powerful tool has been instrumental in improving the performance of every sector where it is used. The best approach to utilize IT in everyday life is to identify the areas where it can be applied and then to evolve a strategy to achieve it.

Environmental Awareness

Introduction:-

Environmental awareness is a form of education which provides knowledge and skills to the people and helps them to reach their fullest potential to meet their challenges of environmental degradation and depletion of resources.

Need for Environmental Awareness:-

With the advancement of science and technology and fast economic development and changing lifestyle, there has been reckless and over-exploitation of natural resources and environment by man.

- ★ The impact of environmental problem is so severe that the future generations may be threatened with scarcity of many natural resources.
- ★ Environmentally sustainable economic development, which not only satisfies the requirements of the present generation but also takes care of the need of future generation.
- ★ The above facts clearly emphasize the need for the conservation of natural resources and protection of environment for ensuring environmentally sustainable economic development.

Objectives of Environmental awareness:-

Environmental public awareness has certain objectives. Those objectives are:

- ➢ To improve the quality of environment.
- ➢ To create awareness on environmental problems and conservation of environment.
- ➢ To fit enough to participate in decision making and develop their capabilities to evaluate the developmental programmes.

(UNIT-V Completed)

BEST OF LUCK.