# SKP Engineering College

## Tiruvannamalai – 606 611

A Course Material

on

Environmental Science and Engineering


By

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## Quality Certificate

This is to Certify that the Electronic Study Material

Subject Code: GE6351

Subject Name: Environmental Science and Engineering

Year/Sem: III/V

Being prepared by me and it meets the knowledge requirement of the University curriculum.

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**GE6351 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C 3 0 0 3**

**OBJECTIVES:**

To study the nature and facts about the environment.
• To finding and implementing scientific, technological, economic and political solutions to environmental problems.
• To study the interrelationship between living organism and environment.
• To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
• To study the dynamic processes and understand the features of the earth‟s interior and surface.
• To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

**UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 12**

Definition, scope and importance of Risk and hazards; Chemical hazards, Physical hazards, Biological hazards in the environment – concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers- Oxygen cycle and Nitrogen cycle – energy flow in the ecosystem – ecological succession processes – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds Field study of simple ecosystems – pond, river, hill slopes, etc.

**UNIT II ENVIRONMENTAL POLLUTION 10**

Definition – causes, effects and control measures of: (a) Air pollution (Atmospheric chemistry- Chemical composition of the atmosphere; Chemical and photochemical

reactions in the atmosphere - formation of smog, PAN, acid rain, oxygen and ozone chemistry;- Mitigation procedures- Control of particulate and gaseous emission, Control of SO2, NOX, CO and HC) (b) Water pollution : Physical and chemical properties of terrestrial and marine water and their environmental significance; Water quality parameters – physical, chemical and biological; absorption of heavy metals - Water treatment processes. (c) Soil pollution - soil waste management: causes, effects and control measures of municipal solid wastes – (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards–role of an individual in prevention of pollution – pollution case studies – Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

**UNIT III NATURAL RESOURCES 10**

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Energy Conversion processes – Biogas – production and uses, anaerobic digestion; case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Introduction to Environmental Biochemistry: Proteins –Biochemical degradation of pollutants, Bioconversion of pollutants. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

**UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7**

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – 12 Principles of green chemistry- nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air act – Water act – Wildlife protection act – Forest conservation act –The Biomedical Waste (Management and Handling) Rules; 1998 and amendments- scheme

of labeling of environmentally friendly products (Ecomark). enforcement machinery involved in environmental legislation- central and state pollution control boards- disaster management: floods, earthquake, cyclone and landslides. Public awareness.

**UNITV HUMAN POPULATION AND THE ENVIRONMENT 6**

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare –Environmental impact analysis (EIA)- -GIS-remote sensing-role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

**OUTCOMES:**

Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.

- Public awareness of environmental is at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions
- Development and improvement in std. of living has lead to serious environmental disasters.

**REFERENCES:**

1. Gilbert M.Masters, „Introduction to Environmental Engineering and Science", 2nd edition, Pearson Education, 2004
2. Benny Joseph, „Environmental Science and Engineering", Tata McGraw Hill, New Delhi, 2006.
3. Trivedi R.K. „Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media.
4. Cunningham W.P.Cooper., T.H. Gorhani, „Environmental Encyclopedia", Jaico Publishing House, Mumbai, 2001. 3. Dharmendra S. Sengar, „Environmental law", Prentice hall of India PVT LTD, New Delhi, 2007.
5. Rajagopalan R, „Environmental Studies - From Crisis to Cure", Oxford University Press, 2005

# CONTENTS

## Unit – I

## ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

### Part - A

**1. Define the term "Environment"? [CO1-L1]**

The environment is defined as, "the sum of total of all the living and non-living things around us influencing one another."

**2. Define "Environmental Science". [CO1-L1-JAN 2006]**

Environmental science is the study of the environment, its biotic (ie., biological ) and abiotic (ie., non biological) components and their interrelationship.

**3. Define "Environmental Science and Engineering". [CO1-L1-DEC 2008]**

Environmental science and engineering is defined as the application of engineering principles to the protection and enhancement of quality of environment and to the enhancement and protection of public health and welfare.

**4. What are the important components of environment? [CO1-L2-MAY 2007]**

1. Abiotic or Non-living component
2. Biotic or Living component
3. Energy component

**5. How are biotic components grouped? [CO1-L2-DEC 2007]**

The members of biotic components of an ecosystem are grouped into three groups based on how they get their food.

1. Producers.
2. Consumer.
3. Decomposers.

**6. Explain biosphere. [CO1-L1]**

The part of lithosphere, hydrosphere and atmosphere in which living organisms live and interact with one another is called biosphere.

**7. What are the functions of lithosphere? [CO1-L1]**

1. It is a home for human beings and wildlife.
2. It is a storehouse of minerals and organic matters.

**8. What is ecology? [CO1-L1-DEC 2009]**

Ecology is the study of interactions among organisms or group of organisms with their environment. The environment consists of both biotic components (living organisms) and abiotic components (non-living organisms).

**9. What are the types of hazards? [CO1-L1]**

1. Physical hazard (Ex. Cold, Heat, Noise)
2. Chemical hazard (Ex. Acids, Base, Fumes)
3. Biological hazard (Ex. Bacteria, Virus, Parasites)

**10. What is nutrient cycle? [CO1-L1]**

The cyclic flow of nutrients between the abiotic and biotic components is known as the nutrient cycle. It is also called as biogeochemical cycle.

**11. What is ecologial succession? [CO1-L1-DEC 2008, DEC 2009, JUNE 2005]**

The progressive replacement of one community by another till the development of stable community in a particular area is called ecologial succession.

**12. Write the name of the zones of oceanic ecosystem? [CO1-L1]**

1. Coastal zone, 2. Open sea, Euphotic zone, 3. Bathyal zone, 4. Abyssal zone.

**13. What is hydrological cycle? [CO1-L1]**

The natural movement of water in a cyclic manner is known as hydrological cycle.

**14. What is ecological succession? [CO1-L1- DEC 2008, DEC 2009, JUNE 2005]**

The progressive replacement of one community by another till the development of stable community in a particular area is called ecological succession.

**15. What are food chains? [CO1-L1]**

"The sequence of eating and being eaten in a ecosystem is known as food chain".

**16. What is food web? [CO1-L1-MAY 2010]**

An interlocking pattern of various food chains in an ecosystem is known as food web.

**17. What are the differences between a food chain and food web? [CO1-L2-DEC 2009]**

1. Food chain is a linear movement of food from one tropical level to other level. Food web is a complicated form of many food chains.
2. If one organism disappears, the whole food chain will be interrupted. If one organism disappears, it will not affect the food web.

**18. What are tropical levels (or) Feeding levels? [CO1-L1]**

The various steps through which food energy passes in an ecosystem is called as tropic levels.

**19. What is Ecological pyramids? [CO1-L1-MAY 2006]**

"Graphical representation of structure and function of tropic levels of an ecosystem, starting with producers at the bottom and each successive tropic forming the apex is known as ecological pyramids".

**20. Define Producers. [CO1-L1-DEC 2008, MAY 2008]**

Producers synthesize their food themselves through photosynthesis.

Example: All green plants, trees.

**21. Name the four ecosystems. [CO1-L1-JAN 2006]**

1. Forest ecosystems.

2. Grassland ecosystems.

3. Desert ecosystems. 4. Pond ecosystems.

**22. Define Biodiversity. Give its significance. [CO1-L2-DEC 2005, JUNE 2006]**

Biodiversity is defined as, “the variety and variability among all groups of living organisms and the ecosystem in which they occur”.

Signification of Biodiversity

1. Biodiversity is very important for human life, as we depend on plants, micro-organisms, earth’s animals for our food, medicine and industrial products.

2. Biodiversity protects the fresh air, clean water and productive land.

3. It is also important for forestry, fisheries and agriculture, which depend on rich variety of various biological resources available in nature.

4. Loss of biodiversity has serious economic and social cost for any country.

**23. Explain the classification of biodiversity. [CO1-L1]**

1. Genetic diversity.

2. Species diversity.

3. Community (or) Ecosystem diversity.

**24. What is point richness? [CO1-L1]**

It refers to the number of species that can be found at a single point in a given space.

**25. What are biodiversity hot-spots? [CO1-L1-]**

The hot spots are the geographic areas which posses the high endemic species.

**26. What are the criteria for recognizing hot spots? [CO1-L1]**

1. The richness of the endemic species is the primary criterion for recognizing hot spots.

2. The Hot sports should have a signification percentage of specialized species.

3. The site is under threat.

4. It should contain important gene pools of plants of potentially useful plants

**27. Explain threatened and endangered species. [CO1-L1-DEC 2006]**

A species is said to be endangered, when its number has been reduced to a critical level. Unless it is protected and conserved, it is in immediate danger of extinction.

**28. Explain vulnerable species. [CO1-L1]**

A species is said to be vulnerable when its population is facing continuous decline due to habitat destruction or over exploitation. Such a species is still abundant.

**29. What is the need of biodiversity conservation? [CO1-L1-DEC 2007]**

1. It provides immediate benefits to the society such as recreation and tourism,

2. Drugs, herbs, food and other important raw materials can be derived from plants and animals.

3. It also preserves the genetic diversity of plants and animals.

4. Ensures the sustainable utilization life supporting systems on earth.

**30. What is in-situ conservation? [CO1-L1]**

In-situ conservation involves protection of fauna and flora its natural habits, where the species normally occurs is called in-situ conservation.

**31. What is Ex-situ conservation? [CO1-L1]**

Ex-situ conservation involves protection of fauna and flora outside the natural habitats.

**32. What are the advantages and disadvantages of Ex-situ Conservation? [CO1-L1]**

**Advantages**

1. Survival of endangered species is increasing due to special care and attention.

2. In captive breeding, animals are assured food, water, shelter and also security and hence longer life span.

3. It is carried out in cases of endangered species, which do not have any chances of survival, in the wild.

**Disadvantages**

1. It is expensive method.

2. The freedom of wildlife is lost.

3. The animals cannot survive in natural environment.

**33. Enumerate the human activities which destroy the biodiversity. [CO1-L1-JAN 2006]**

1. The farmers prefer hybrid seeds, as a result, many plants species becomes extinct.

2. For the production of drugs the pharmaceutical companies collect wild plants, so several medicinal plants now become extinct.

3. Tropical forest is the main sources of world's medicine. Ever year these forest are disappearing due to agriculture, mining, logging.

**34. Define biodiversity. [CO1-L1-DEC 2005, JUNE 2006]**

Biodiversity is defined as the variety and variability among all group of living organisms and the ecosystem in which they occur.

**35. What are the threats to biodiversity? [CO1-L2]**

1. Habitat loss, 2. Poaching, 3. Man-wildlife conflicts.

**36. What is an endangered species? [CO1-L1-DEC 2006]**

A species is said to be endangered, when its number has been reduced to below critical level. Unless it is protected and conserved, it will face an immediate danger of extinction.

**37. Name the two hot spot region of India. [CO1-L1-DEC 2009]**

1. Eastern Himalaya (Indo-Burma region).

2. Western Ghats (Indo srilanka region).

**38. What is the role of national park? [CO1-L1]**

It is used for enjoyment through tourism, without affecting the environment.

It is used to protect, propagate and develop the wildlife.

**39.What is Cryo-preservation techniques? [CO1-L1]**

It involves the preservation of seeds, pollen of some important agricultural and horticultural crops by using liquid nitrogen at a temperature as low as -196 degree Celsius.

**PART – B**

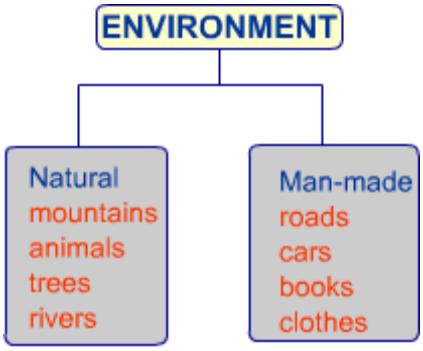
**1. Explain the physical, chemical and biological hazards in detail. [CO1-L2]**

Physical hazards are the most common hazards and are present in most workplaces at some time. Examples include: frayed electrical cords, unguarded machinery, exposed moving parts, constant loud **noise**, **vibrations**, working from ladders, scaffolding or heights, spills, **tripping** hazards.

A **chemical hazard** is a type of occupational hazard caused by exposure to chemicals in the workplace. Exposure to chemicals in the workplace can cause acute or long-term detrimental health effects. There are many types of hazardous chemicals, including neurotoxins, immune agents, dermatologic agents, carcinogens, reproductive toxins, systemic toxins, asthma gens, pneumoconiotic agents, and sensitizers. These hazards can cause physical and/or health risks. Depending on chemical, the hazards involved may be varied, thus it is important to know and apply the PPE especially during the lab.

**Biological hazards**, also known as biohazards, refer to **biological** substances that pose a threat to the health of living organisms, primarily that of humans. This can include medical waste or **samples** of a microorganism, virus or toxin (from a **biological** source) that can affect human health.

**2. Describe the components and structure of an environment? [CO1-L2]**




Our environment is constantly changing because of our needs.

Human beings are modifying or destroying the natural environment. The air is polluted by car fumes, water is collected in a pot, food is served in utensils and land is used for building houses and factories. Human beings are the ones who make cars, factories, houses, vessels, pots etc. thereby modifying the environment.

The natural component of the atmosphere comprises of air, water, land and living things. The natural environment refers to both biotic and abiotic conditions. The biotic conditions consist of the world of living organisms e.g. plants and animals. The abiotic conditions consist of the world of non–living elements like land.

The human made component of the environment are the creations by human beings which include bridges, roads, dams, parks and monument etc.

**3. Discuss the types, characteristics, structure and functions of forest ecosystem. [CO1-L2-JUNE 2005, MAY 2006]**

**Types and Characteristic Features:**

***(a) Temperate Forest Ecosystem:***

The temperate forest ecosystem is very important on Earth. Temperate forests are in regions where the climate changes a lot from summer to winter. Tropical rain forests are in regions where the climate stays constant all year long. Temperate forests are almost always made of two types of trees, deciduous and evergreen. Deciduous trees are trees that lose their leaves in the winter.

Evergreens are trees that keep them all year long, like pine trees. Forests can either be one or the other, or a combination of both. A fourth kind of forest is a temperate rain forest. These are found in California, Oregon and Washington in the United States.

These forests are made of redwoods and sequoias, the tallest trees in the world. The amount of rainfall in an area determines if a forest is present. If there is enough rain to support trees, then a forest will usually develop. Otherwise, the region will become grasslands.

***(b) The Tropical Rain Forest Ecosystem:***

Tropical rain forests are one of the most important areas on Earth. These special ecosystems are homes to thousands of species animals and plants. Contrary to popular belief, rain forests are not only densely packed plants, but are also full of tall trees that form a ceiling from the Sun above. This ceiling keeps smaller plants from growing. Areas where sunlight can reach the surface are full of interesting plants.

Do you know where rain forests get their name? They are so named because they receive a lot of rain – an average of 80 inches a year. The temperature doesn't change very much during the year. It is always warm and muggy. The famous Amazon jungle is located in Brazil, in South America. This particular forest is called the Neotropics. Other large blocks are located in Central and West Africa.

**(i) Insects of the Tropical Rain Forest:**

The most feared and well known spider in the world resides in the jungle. Tarantulas are one of the creepiest animals you will ever see. Most species of tarantula have poisonous fangs for killing prey and for protection.

Although some are life-threatening to humans, others are harmless. Army ants are just one species of ant in the rain forest. They are called army ants because they march in a long, thick line through the jungle. They only stop when the young larvae reach pupil stage. Once the queen lays its eggs, the ants start marching again.

Beautiful butterflies fill the forest, but at one time these insects weren't so pretty. Butterflies start out as caterpillars, which tend to be a tad on the ugly side. They go through metamorphosis, which is the process of changing into a butterfly. Centipedes aren't so lucky. They don't turn into butterflies, but instead roam the forest looking for food. Some centipedes use poison to kill their prey.

**(ii) Tropical Rain Forest Birds:**

The birds of the rain forest are the most beautiful in the world. A wide range of colors can be seen darting through the trees as the forest tops come to life. Many species of tropical birds are kept as pets because of their looks.

Hundreds of species of parrot live in the rain forest. The scarlet macaw is just one of these. It is also one of the longest, stretching to a length of 3 feet from its head to the tip of its tail. When these macaws eat a poisonous fruit, they eat a special type of clay that neutralizes the poison.

Toucans are also very interesting birds. They have large beaks that they use to reach fruit they can't get to. Scientists estimate there are 33 species of toucan in the rain forest. Not every tropical bird was blessed with looks. The hoatzin looks more like a peacock without the pretty tail.

Hoatzins are terrible flyers – crash landings are common practice. The brown kiwi is a flightless bird that looks more like a rodent with a long beak and feathers. Kiwis live on the ground instead of the trees. They have special claws used for running, digging and defence.

**(iii) Tropical Rain Forest Mammals:**

Birds aren't the only creatures that fly through the rain forests. Several species of flying mammals live in the jungle. From the harmless fruit bat to the unique flying squirrel, the tropical rain forests are full of surprises.

The Indian flying fox is one of the largest bats in the world. Its wings can spread out to 5 feet in width. Unlike bats in other parts of the world, these bats do not live in caves. They prefer to .hang in trees during the day. Hundreds or even thousands of bats can be spotted in a single tree.

Vampire bats live in the Amazon jungle in South America. The famous stories of blood-sucking bats probably originated here. These bats do in fact drink the blood of their victims. They usually attack farm animals, but have also enjoyed the blood of humans. But vampire bats only drink a very small amount of fluid.

**(iv) Tropical Rain Forest Reptiles:**

The tropical rain forests of the world are full of reptiles. Reptiles are cold blooded, which means their body temperature depends on their environment. So, it is important for

them to stay in warm climates. Snakes are reptiles, and the rain forests are home to many. The mamba family is the most poisonous of all. They kill their prey by injecting poison with their sharp fangs.

Anacondas make up another snake family. They are some of the longest creatures in the world, as they can reach 30 feet in length. Anacondas prefer to wrap themselves around their prey and squeeze, rather than inject poison. Anacondas swallow their prey whole and sleep while the food is digesting. Chameleons are interesting lizards that can change color.

This enables them to blend in with their surroundings. Not only is this a great disguise from predators, it is also an easy way to sneak up on their prey. Chameleons only eat insects. Geckos are very neat creatures. The flying gecko can glide from tree to tree to escape from predators. Their grip is so strong, that if you tried to pull one off a window, the glass would break before the gecko would let go.

**(v) Tropical Rain Forest Primates:**

Monkeys and their cousins are all primates. Humans are also primates. There are many species of monkeys in the tropical rain forests of the world. Monkeys can be divided into two groups: new world monkeys and old world monkeys. New world monkeys live only in South and Central America. Spider monkeys live in the rain forests in the Andes Mountains.

They look very strange with their long noses. Spider monkeys eat mostly fruit and nuts, so they are called frugivores. They are joined by the howler monkeys. These primates are so named because they have a special sac that makes their sounds louder.

Old world monkeys live only in Africa and Asia. The colobus monkey is one such kind. These monkeys are called foliovores because they eat leaves. They live in small groups of 15, but other primates live in larger groups of up to 200. There are too many species. Chimpanzees, orangutans and gorillas are all called pongids. These primates are more famous than the others. Gorillas are too big to climb trees, so they are found on the forest floor.

***(c) Boreal or Taiga Forests:***

The boreal forest ecosystem is the contiguous green belt of conifer and deciduous trees that encircles a large portion of the Northern Hemisphere. In North America, the boreal

forest stretches across most of northern Canada and into Alaska. It has long been identified as one of the world's great forest ecosystems.

This forest ecosystem covers roughly 35% of Canada's land mass and is the single largest land based ecosystem in North America. It also contains a significant proportion of Canada's biodiversity and has long been recognized as an important global carbon sink.

Although the boreal is relatively unknown, it is important as the "great lung" of North America, "breathing in" carbon dioxide and "exhaling" oxygen into the atmosphere. In short, the boreal forest manages to do what the rain forest of the Amazon does but with only the fraction of the flora and fauna.

This forest ecosystem houses the largest and smallest mammal species (wood bison & pygmy shrews) of the North American continent. The Boreal forest has many things: great lakes and northern rivers; vast bogs, fens and other organic wetlands. The rich wildlife diversity of the Boreal is a joy to behold: woodland caribou and lynx; whooping cranes and wood bison; northern owls; woodpeckers with three rather than four toes; colorful wood warblers.

The Boreal has more than 5,000 species of conspicuous and colorful fungi, celebrated far more in Scandinavia and Siberia than in North America. Then there are the precious old-growth forests, the richest and most biologically diverse of the Boreal forest communities that are essential for so many Boreal species.

**Structure of Forest Ecosystems:**

Different organisms exist within the forest layers. These organisms interact with each other and their surroundings. Each organism has a role or niche in sustaining the ecosystem.

**Some provide food for other organisms; others provide shelter or control populations through predation:**

***Producers:***

All living organisms' intake energy in order to survive. In a forest ecosystem, trees and other plants get their energy from sunlight. Plants produce their own food, in the form of carbohydrates. Plants are, therefore, called the primary producers, since

they produce the basic foodstuffs for other organisms within food chains and food webs. Photosynthesis is the chemical reaction that allows plants to produce their own food.

***Consumers:***

Animals cannot produce their own food. They must consume food sources for die energy they need to survive. All animals, including mammals, insects, and birds, are called consumers. Consumers rely on plants and other animals as a food source. Details of these animals in a forest ecosystem have been given earlier.

Primary consumers only eat plants and are referred to as herbivores. Secondary consumers are referred to as carnivores and feed on herbivores. Tertiary consumers are carnivores that feed on other carnivores. Omnivores eat both plant and animal matter.

***Decomposers:***

Leaves, needles, and old branches fall to the forest floor as trees grow. Eventually all plants and animals die. So what happens to all of this plant and animal material? Does it sit on the forest floor forever? Thankfully no. These materials are decomposed by worms, microbes, fungi, ants, and other bugs.

Decomposers break these items down into their smallest primary elements to be used again. Decomposers are important in that they sustain the nutrient cycle of ecosystems.

**4. Discuss the types, characteristics, structure and functions of desert ecosystem [CO1-L2-DEC 2009]**

Deserts are classified by their geographical location and dominant weather pattern as trade wind, multitude, rain shadow, coastal, monsoon, or polar deserts. Former desert areas presently in non-arid environments are paleo-deserts, and extraterrestrial deserts exist on other planets.

The trade winds in two belts on the equatorial sides of the Horse Latitudes heat up as they move toward the Equator. These dry winds dissipate cloud cover, allowing more sunlight to heat the land. Most of the major deserts of the world lie in areas crossed by the trade winds. The world's largest desert, the Sahara of North Africa, which has experienced temperatures as high as 57° C, is a trade wind desert.

Polar deserts are areas with annual precipitation less than 250 millimeters and a mean temperature during the warmest month of less than 10° C. Polar deserts on the Earth

cover nearly 5 million square kilometers and are mostly bedrock or gravel plains. Sand dunes are not prominent features in these deserts, but snow dunes occur commonly in areas where precipitation is locally more abundant. Temperature changes in polar deserts frequently cross the freezing point of water. This "freeze-thaw" alternation forms patterned textures on the ground, as much as 5 meters in diameter.

Rain shadow deserts are formed because tall mountain ranges prevent moisture-rich clouds from reaching areas on the lee, or protected side, of the range. As air rises over the mountain, water is precipitated and the air loses its moisture content. A desert is formed in the leeside "shadow" of the range.

**Structure and Function:**

**The different components of a desert ecosystem are:**

***(A) Abiotic Component:***

The abiotic component includes the nutrients present in the soil and the aerial environment. The characteristic feature of the abiotic component is lack of organic matter in the soil and scarcity of water.

***(B) Biotic Component:***

**The various biotic components representing three functional groups are:**

**(a) Producer organisms:**

The producers are mainly shrubs or bushes, some grasses and a few trees. Surprisingly, there are many species of plants that survive in the desert. Most of them are succulents, which mean they store water. Others have seeds that lay dormant until a rain awakens them. Regardless, these plants find a way to get water and protect themselves from the heat.

The most famous desert plant is the cactus. There are many species of cacti. The saguaro cactus is the tall, pole shaped cactus. The saguaro can grow up to 40 feet tall. It can hold several tons of water inside its soft tissue. Like all cacti, the saguaro has a thick, waxy layer that protects it from the Sun.

Other succulents include the desert rose and the living rock. This strange plant looks like a spiny rock. It’s disguise protects it from predators. The welwitschia is a weird

looking plant. It has two long leaves and a big root. This plant is actually a type of tree and it can live for thousands of years.

There are many other kinds of desert plants. Some of them have thorns others have beautiful flowers and deadly poisons. Even in the worst conditions, these plants continue to thrive.

**(b) Consumers:**

These include animals such as insects and reptiles. Besides them, some rodents, birds and some mammalian vertebrates are also found.

**Desert Insects and Arachnids:**

There are plenty of insects in the desert. One of the most common and destructive pests is the locust. A locust is a special type of grasshopper. They travel from place to place, eating all the vegetation they find. Locusts can destroy many crops in a single day.

Not all desert insects are bad, though. The yucca moth is very important to the yucca plant, because it carries pollen from the flower to the stigma. The darkling beetle has a hard, white, wing case that reflects the Sun's energy. This allows the bug to look for food during the day.

There are also several species of ants in the desert. The harvester ants gather seeds and store them for use during the dry season. And the honey pot ants have a very weird habit. Some members of the colony eat large amounts of sugar, so much that their abdomens get too large for them to move. The rest of the colony feeds off this sugar.

There are also arachnids in the desert. Spiders are the most notable arachnids, but scorpions also belong in this group. Some species of scorpions have poison in their sharp tails. They sting their predators and their prey with the piercing tip.

**Desert Reptiles:**

Reptiles are some of the most interesting creatures of the desert. Reptiles can withstand the extreme temperatures because they can control their body temperatures very easily. You can put most of the desert reptiles into one of two categories: snakes and lizards.

Many species of rattlesnakes can be found in the desert. Rattlesnakes have a noisy rattle they use to warn enemies to stay away. If the predator isn't careful, the rattlesnake will strike, injecting venom with its sharp fangs. Other desert snakes include the cobra, king snake and the hognose.

Lizards make up the second category of desert reptiles. They are probably the most bizarre looking animals in the desert. While some change colors and have sharp scales for defense, others change their appearance to look more threatening.

One such creature is the frilled hazard. When enemies are near, the lizard opens its mouth, unveiling a wide frill. This makes the hazard look bigger and scarier. The shingle back has a tail with the same shape as its head. When a predator bites at the tail, the shingle back turns around and bites back. There are only two venomous lizards in the world, and one of them is the gila monster. It has a very painful bite.

**Desert Birds:**

Like the other inhabitants of the desert, birds come up with interesting ways to survive in the harsh climate. The sand grouse has special feathers that soak up water. It can then carry the water to its young trapped in the nest.

Other birds, like the gila woodpecker, depend on the giant saguaro as its home. This woodpecker hollows out a hole in the cactus for a nest. The cool, damp inside is safe for the babies.

The roadrunner is probably the most well known desert bird. Roadrunners are so named because they prefer to run rather than fly. Ostriches also prefer to use their feet. Even the young depend on walking to find food and water. The galah is one of the prettiest desert birds. It is one of the few species that return to the same nest year after year.

Galahs are interesting birds, in that the number of eggs they lay depends on the climate. If the desert is in a drought, they don't lay any. However, during more tolerable years, the galah may lay as many as five eggs.

**Desert Mammals:**

There are several species of mammals in the desert. They range in size from a few inches to several feet in length. Like other desert wildlife, mammals have to find ways to stay cool and drink plenty of water. Many desert mammals are burrowers.

They dig holes in the ground and stay there during the hot days. They return to the surface at night to feed. Hamsters, rats and their relatives are all burrowers. Not only do the burrows keep the animals cool, they are also a great place to store food.

Of course, not all animals have in holes in the ground. The kangaroo and spiny anteater both live in the Australian desert region. Spiny anteaters are unusual mammals because they lay eggs.

The desert is also full of wild horses, foxes and jackals, which are part of the canine family. And we can't forget the cats. Lions are found all over the deserts of southern Africa. They get their water from the blood of their prey.

**Camels – The Cars of the Desert:**

Camels could be included in the mammal section. Camels are the cars of the desert. Without them, people would have great difficulty crossing the hot terrain. There are two types of camels: Bactrian and dromedary. The main difference between the two is the number of humps. Dromedaries have one hump, and Bactrian have two. Both kinds are used by people, but only Bactrian's are found in the wild.

Camels are great for transportation because they use very little water. Camels can withstand very high temperatures without sweating. They also store fat in their humps for food. If a Bactrian camel travels a long distance without eating, its hump will actually get smaller.

**(c) Decomposers:**

Due to poor vegetation the amount of dead organic matter is very less. As a result the decomposers are very few. The common decomposers are some bacteria and fungi, most of which are thermophile.

**5. What is estuary? What are the human impacts on estuarine ecosystem? [CO1-L2-DEC 2008]**

Estuaries form a transition zone between river environments and maritime environments. They are subject both to marine influences—such as tides, waves, and the influx of saline water—and to riverine influences—such as flows of fresh water and sediment. The inflows of both sea water and fresh water provide high levels of nutrients both in the water column and in sediment, making estuaries among the most productive natural habitats in the world.

Most existing estuaries formed during the Holocene epoch with the flooding of river-eroded or glacially scoured valleys when the sea level began to rise about 10,000–12,000 years ago. Estuaries are typically classified according to their geomorphological features or to water-circulation patterns. They can have many different names, such as bays, harbors, lagoons, inlets, or sounds, although some of these water bodies do not strictly meet the above definition of an estuary and may be fully saline.

The banks of many estuaries are amongst the most heavily populated areas of the world, with about 60% of the world's population living along estuaries and the coast. As a result, many estuaries suffer degradation by many factors.

1. **Human impact**

Of the thirty-two largest cities in the world, twenty-two are located on estuaries. For example, New York City is located at the mouth of the Hudson River estuary.

As ecosystems, estuaries are under threat from human activities such as pollution and overfishing. They are also threatened by sewage, coastal settlement, land clearance and much more. Estuaries are affected by events far upstream, and concentrate materials such as pollutants and sediments. Land run-off and industrial, agricultural, and domestic waste enter rivers and are discharged into estuaries. Contaminants can be introduced which do not disintegrate rapidly in the marine environment, such as plastics, pesticides, furans, dioxins, phenols and heavy metals.

Such toxins can accumulate in the tissues of many species of aquatic life in a process called bioaccumulation. They also accumulate in benthic environments, such as estuaries and bay muds: a geological record of human activities of the last century.

For example, Chinese and Russian industrial pollution, such as phenols and heavy metals, has devastated fish stocks in the Amur river and damaged its estuary soil.

Estuaries tend to be naturally eutrophic because land runoff discharges nutrients into estuaries. With human activities, land run-off also now includes the many chemicals used as fertilizers in agriculture as well as waste from livestock and humans. Excess oxygen-depleting chemicals in the water can lead to hypoxia and the creation of dead zones. This can result in reductions in water quality, fish, and other animal populations.

Overfishing also occurs. Chespeake Bay once had a flourishing oyster population that has been almost wiped out by overfishing. Oysters filter these pollutants, and either eat them or shape them into small packets that are deposited on the bottom where they are

harmless. Historically the oysters filtered the estuary's entire water volume of excess nutrients every three or four days.

Today that process takes almost a year, and sediment, nutrients, and algae can cause problems in local waters including sedimentation from soil erosion from deforestation, overgrazing, and other poor; overfishing, drainage and filling of wetlands; eutrophication due to excessive nutrients from sewage and animal wastes; pollutants including heavy metals, polychlorinated biphenyls, radionuclides and hydrocarbones from sewage inputs; and diking or damming for flood control or water diversion.

**6. Define biodiversity. Explain the different diversities with examples. [CO1-L2-DEC 2006]**

Biological diversity' means the variety and variability among all living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.

Genetic diversity is the total number of genetic characteristics in the genetic makeup of a species. It is distinguished from genetic variability, which describes the tendency of genetic characteristics to vary. Genetic diversity serves as a way for populations to adapt to changing environments.

**Species diversity** is the number of different species that are represented in a given community (a dataset). The effective number of species refers to the number of equally abundant species needed to obtain the same mean proportional species abundance as that observed in the dataset of interest (where all species may not be equally abundant). Species diversity consists of two components: species richness and species evenness.

Ecosystem diversity refers to the variety of ecosystems in a given place. Within any broader landscape there is a mosaic of interconnected ecosystems. To conserve biodiversity, conservation at the landscape level is critical.

**7. What are the values of biodiversity? Explain with necessary examples. [CO1-L2-DEC 2008, DEC 2009, JUNE 2013]**

**Direct values**

These are those ways by which we can directly use biodiversity for our benefit. For example we can use plants as food of for deriving medicines in the laboratory. Economic value and recreational value comes under this category.

*Direct values are further classified into:*

- ***Consumptive use Value:*** Consumptive use value is the value put on the products of nature which are consumed directly without passing through a market. For example, if we use firewood by cutting down a tree or consume an animal after hunting it.
- ***Productive use value:*** Productive use value is the value put on the products of nature which are consumed after passing through a market. For example, if we buy fish from the market then it will have productive use value.

Indirect values or Non-Consumptive value

These are those ways by which we don't physically use a plant or animal, but by virtue of its existence it provides services that keep the ecosystem healthy. Indirect values would include ethical or moral value, existence value, ecological value, aesthetic value, cultural or spiritual value, option value and scientific or educational value.

**Social values**

Social value of biodiversity lies in the more and more use of resources by affluent societies. Local use or sale of products if biodiversity is not included in it. Yet, 'ecosystem people' value biodiversity as a part of their livelihood as well as through cultural and religious sentiments. Now a day's Government is spending a lot of money on lush green vegetation and Coral Reef Island for the purpose of tourism. Apart from traditional agricultural systems, in recent years, farmers have begun to receive economic incentives to grow each crop for national or international markets rather than to supply local needs. This has resulted in local food shortages, unemployment, landlessness and increased tendency to drought and floods.

**Ethical and Moral value**

Every species has its moral right to exist on earth. Every human culture, religion and society has its own ethical values. There are several cultural, moral and ethical values, which are associated with the conservation of biodiversity. We have in our country a large number of sacred grooves or deolis preserved by tribal people in several States. These sacred groves around ancient sacred sites and temples act as gene banks for wild plants.

**Economical value**

We depend heavily on biological products for our survival. Biodiversity has economic value

**Economical value**

We depend heavily on biological products for our survival. Biodiversity has economic value because

***Some of these products are :***

- Food supplies: Agriculture, the very basis of human survival, depends on plants and animals.
- Source of medicines: A large number of medicines are obtained from plants and animals. Cinchonas, Belladonna are important medicinal plants. Snake venom is used in making medicines.
- Source of raw materials for industries.
- It supports the economy of a country. Industries and agriculture generate revenue or income. They also generate employment. In fact the economy of many countries is heavily dependent on biodiversity.

**Aesthetic value**

Nature contributes immensely to the beauty of the world. Can you imagine a world without trees, grass, flowers, birds or animals? Thus, biodiversity has immense aesthetic value for us.

**Ecological value**

Every species plays a unique role in the ecosystem. Through this role its maintains the ecological balance. Thus, the ecosystems don't get disrupted. So, even if we do not use a plant or animal for making products in our industries, by virtue of its very existence in the wild it provides us with many important services. These services maintain ecological balance and the ecosystem.
***Some of these services are:***

- ***Waste Management:***

Nature has a unique way of managing wastes. The waste of one organism becomes food for another organism. So, wastes don't accumulate. For example, forests absorb greenhouse gases like carbon dioxide during photosynthesis. This helps to reduce global warming. Forests also contribute to precipitation due to transpiration. Many other plants and animals help to keep forests healthy. So, the entire biodiversity contributes towards maintaining climate stability.

**Scientific value or Educational value**

**Biodiversity is of great scientific value.** Many species of plants and animals are the subjects of our research. We use many species for research and in turn get a lot of knowledge from their study. Through research on plants, insects and animals we find better ways of making medicines, hybrid plants, engineering designs and many other things that are of immense value to human beings. For example, the design of Velcro is developed from cockle-burrs which cling fast to clothing as we walk in the woods.

**Cultural and Spiritual value**

Many cultures of human beings are closely related to many species of plants and animals. For example, Hindus Identify owls as the transport of Goddess Lakshmi. Many religions identify themselves with such plants and animals which renders to them a cultural or spiritual value.

**Option value**

There are many plants and animals which have not yet been discovered or even if they have been discovered we do not know if they can be of any use to us. This untapped potential is referred to discovered we do not know if they can be of any use to us. This untapped potential is referred to as option value. For example, there might be a plant or animal which we can use in the future to find a cure for corner. If we destroy

biodiversity then we lose this chance of finding a cure for cancer. Thus biodiversity has great potential of being useful to us in the future.

**8. Why India is said to be a Mega biodiversity region? [CO1-L3-DEC 2009]**

A mega-diverse country is one that harbors the majority of the Earth's species and is therefore considered extremely biodiverse. India is rich in biodiversity from north to south and from east to west. India contains many species that world's gone country have. It has 14 major basins through which drain numerous rivers. The annual rainfall varies from less than 37 cm in Rajasthan to 1500m in Cherapunji. The country experiences three different seasons – winter, summer, and monsoons. It has two global terrestrial biodiversity hot spots – the North-eastern States and the Western Ghats. The Western Ghats have moist deciduous forests and rainforests. The region shows high species diversity as well as high levels of endemism. Around 62% of reptile and 77% of amphibians are found in here. The North-eastern States depicts high altitudinal variations. This area has at least 163 globally threatened species like one-horned rhinoceros and the wild Asian water buffalo. The Relict Dragonfly, an endangered species found here. This zone houses the Himalayan Newt the only salamander species found within Indian limits.

**9. Discuss the anthropogenic threats to biodiversity. [CO1-L2-JUNE 2013, JAN 2006, JUNE 2005]**

**Biodiversity** is under serious **threat** as a result of human activities. The main dangers worldwide are population growth and resource consumption, climate change and global warming, habitat conversion and urbanisation, invasive alien species, over-exploitation of natural resources and environmental degradation

**5 major threats to biodiversity**

**1. Climate change**

Changes in climate throughout our planet's history have, of course, altered life on Earth in the long run — ecosystems have come and gone and species routinely go extinct. But rapid, manmade climate change speeds up the process, without affording ecosystems and species the time to adapt. For example, rising ocean temperatures and diminishing Arctic sea ice affects marine biodiversity and can shift vegetation zones, having global implications.

Overall, climate is a major factor in the distribution of species across the globe; climate change forces them to adjust. But many are not able to cope, causing them to die out.

**2.Deforestation and habitat loss**

Deforestation is a direct cause of extinction and loss of biodiversity. An estimated 18 million acres of forest are lost each year, due in part to logging and other human practices, destroying the ecosystems on which many species depend. Tropical rainforests in particular, such as the Amazon, hold a high percentage of the world's known species, yet the regions themselves are in decline due to humans.

**3. Overexploitation**

Overhunting, overfishing and over-harvesting contribute greatly to the loss of biodiversity, killing off numerous species over the past several hundred years. Poaching and other forms of hunting for profit increase the risk of extinction; the extinction of an apex predator — or, a predator at the top of a food chain — can result in catastrophic consequences for ecosystems.

**4. Invasive species**

The introduction of non-native species into an ecosystem can threaten endemic wildlife (either as predators or competing for resources), affect human health and upset economies.

**5. Pollution**

From the burning of fossil fuels (releasing dangerous chemicals into the atmosphere and, in some cases, depleting ozone levels) to dumping 19 billion pounds of plastic into the ocean every year, pollution completely disrupts the Earth's ecosystems. While it may not necessarily cause extinction, pollutants do have the potential to influents species' habits.

For example, acid rain, which is typically caused by the burning of fossil fuels, can acidify smaller bodies of water and soil, negatively affecting the species that live there by changing breeding and feeding habits.

**10. Discuss the In-situ and Ex-situ conservation of biodiversity. [CO1-L2-MAY 2006, MAY 2008, DEC 2008, DEC 2009, NOV 2012]**

**In-situ conservation**

In-situ conservation, the conservation of species in their natural habitats, is considered the most appropriate way of conserving biodiversity.

Conserving the areas where populations of species exist naturally is an underlying condition for the conservation of biodiversity. That's why protected areas form a central element of any national strategy to conserve biodiversity. Around 4% of the total geographical area of the country is used for in situ conservation. The following methods are presently used for in situ conservation.

**In-situ conservation Numbers available**

| | |
|---|---|
| Biosphere Reserves | 18 |
| National Parks | 80 |
| Wild-life Sanctuaries | 420 |

**Biosphere reserves**

Biosphere reserves cover very large areas, often more than 5000 $km^2$. It is used to protect species for a long time.

**Name of Biosphere State**

| | |
|---|---|
| Nanda Devi | Uttrakhand |
| Nokrek | Meghalaya |
| Manas | Assam |

**National Parks**

A national park is an area dedicated for the conservation of wildlife along with its environment. It is usually a small reserve covering an area of about 100 to 500 square kilometers. Within biosphere reserves, one or more national parks may also exist.

| Name Of National Park | State | Important wildlife |
|---|---|---|
| Kaziranga | Assam | One Horned Rhino |

| | | |
|---|---|---|
| Gir National Park | Gujarat | Asiatic Lions |
| Bandipur | Karnataka | Elephant |
| Dachigam | J & K | Hangul |
| Kanha | M.P | Tiger |
| Periyar | Kerala | Tiger, Elephant |

**Wild Sanctuaries**

A wild sanctuary is an area which is reserved for the conservation of animals only. Currently, there are 492 wild sanctuaries.

| Name of sanctuary | State | Major wild Life |
|---|---|---|
| Hazaribagh sanctuary | Jharkhand | Tiger, Leopard |
| Ghana Bird sanctuary | Rajasthan | 300 Species of Birds |
| Sultanpur Bird Sanctuary | Haryana | Migratory Birds |
| Abohar Wild life Sanctuary | Punjab | Black Buck |
| Nal sarovar Bird Sanctuary | Gujarat | Water Birds |
| Mudumalai Wild life Sanctuary | Tamil Nadu | Tiger, Elephant, Leopard |
| Vedanthangal Bird Sanctuary | Tamil Nadu | Water Birds |

**Gene Sanctuary**

A gene sanctuary is an area where the plants are conserved.

**Ex-situ conservation**

**Ex-situ conservation** is the preservation of components of **biological diversity** outside their natural habitats. This involves **conservation** of genetic resources, as well as wild and cultivated or species, and draws on a diverse body of techniques and facilities.

**Botanical gardens, zoos, and aquaria**

The primary facilities that hold *ex situ* conservation collections of plants and animals are aquaria, botanical gardens, and zoos. Globally there is an estimated total of 2,107 aquaria and zoos in 125 counties. Additionally many private collectors or other not-for-profit groups hold animals and they engage in conservation or reintroduction efforts. Similarly there are approximately 2,000 botanical gardens in 148 counties cultivating or storing an estimated 80,000 taxa of plants.

## UNIT II

## ENVIRONMENTAL POLLUTION

### PART A

**1. Name any three air pollutants and their sources and effects. [CO2-L1-June2005]**

- **Carbon dioxide:**
  - **Sources:** Cigarette smoking, incomplete burning of fossil fuels.
  - **Effect:** Coma, brain cell damage.
- **Nitrogen dioxide:**
  - **Sources:** Burning of fossil fuels.
  - **Effect:** Acid rain, Lung damage.
- **Sulphur dioxide**
  - **Sources:** Coal buring.
  - **Effect:** Breathing problem, acid rain.

**2. Name the sources and effects of marine pollution. [CO2-L1-June2005]**.

**i) Sources:** Dumping the wastes

**Effects:** Marine birds ingest plastic which causes gastro-intestinal dis orders.

**ii) Sources:** Oil

**Effect:** Damage to marine fauna and flora, retard the rate of oxygen uptake by water.

**3. Define thermal pollution. [CO2-L1-Dec 2008 & 2009]**

Thermal pollution is defined as the addition of excess of undesirable heat to water that makes it harmful toman, animal or aquatic life or otherwise causes significant departures from the normal activities of aquatic communities in water.

**4. Define hazardous wastes. [CO2-L1-Dec 2009& 2006]**

Wastes like toxic chemicals, radioactive (or) biological substances which contribute to an increase in mortality or in serious irreversible illness to human health and environment are called hazardous wastes.

**5. What are types of solid wastes? [CO2-L2-Dec 2006 &June 2007]**

1. Municipal wastes.
2. Industrial wastes.
3. Hazardous wastes.

6**. When a sound causes noise pollution? [CO2-L3-Jan 2006]**

Noise beyond 120Db causes niose pollution.

**7. Write any four major water pollutants. [CO2-L2-June2006]**

1. Pesticides and biocides.
2. Heavy metals, mercury, crude oil, plastics.
3. Industrial and agri cultural wastes.
4. Thermal pollution.

**8. Define photo chemical smog. [CO2-L1-Dec 2006]**

The brownish smoke like appearance that frequently forms on clear, sunny days over large cities with significant amounts of automobile traffic. It is mainly due to chemical reactions among nitrogen oxides and hydrocarbon by sunlight.

9**. Write any two causes of soil pollution. [CO2-L2-Jan 2006]**

1. Industrial wastes.
2. Urban wastes.
3. Agricultural practices.
4. Radioactive pollutants.
5. Biological agents.

**10. When does a sound causes noise pollution? [CO2-L3-Jan 2006]**

The sound intensity is measured in decibel (dB), which is tenth part of the longest unit Bel.one dB is equal to the faintest sound, a human ear can hear. If the intensity of the sound exceeds 1dB noise pollution occurs.

**11. Give any four methods to control noise pollution. [CO2-L2-June2007]**

- Reduce noise at the source, block the path of noise, increase the path length and protect the recipient.
- In general, the best control method is to reduce noise levels at the source.
- Source reduction can be done by effectively muffling vehicles and machinery to reduce the noise. In industries noise reduction can be done by using rigid sealed enclosures around machinery lined with acoustic absorbing material. Isolating machines and their enclosures from the floor using special spring mounts or absorbent mounts and pads and using flexible couplings for interior pipelines also contribute to reducing noise pollution at the source.

**12. Define soil pollution. [CO2-L1-May 2008]**

The contamination of soil by human and natural activities which may cause harmful effect on living beings beings.

**13. Differentiate between recycling and reuse. [CO2-L2-Dec 2007]**

**i) Reuse of waste material**

a) Refillable container, which are discarded after use and can be reused.

b) Rubberrings can be made from the discarded cycle tubes, which reduces the waste generation during manufacture of rubber bands.

**14. What is meant by BOD and COD? [CO2-L2-Dec 2008]**

**BOD** is defined as the amount of DO required to aerobically decompose biodegradable organic matter of a given volume of water over a period of days at $20^0$C.

**COD** is the amount of oxygen required to oxidize the organic matter by using strong oxidant like dichromate or permanganate at room temperature.

**15. What is acid rain? [CO2-L1-Dec 2009]**

The presence of excessive acids in rain water is known as acid rain.

## PART B

**1. (i) Explain the following [CO2-L2]**

a. Criteria pollutants.

b. Bhopal gas tragedy.

c. BOD and COD

d. List any 4 Water quality standards as per WHO.

**1. (a) Criteria pollutants:**

They are a set of air pollutants that cause smog, acid rain, and other health hazards. They are typically emitted from many sources in industry, mining, transportation, electricity generation and agriculture. In most cases they are the products of the combustion of fossil fuels or industrial processes. The common 6 criteria air pollutants are, particulate matter, ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead.

**(b) Bhopal gas tragedy:**

1. It occurred on the night of December 2–3, 1984 at the Union Carbide India Limited (UCIL) pesticide plant in Bhopal, Madhya Pradesh, India. A leak of **methyl isocyanate**

gas and other chemicals from the plant resulted in the exposure of hundreds of thousands of people.

2. During the night of December 2–3, large amounts of water entered tank 610, containing 42 tons of methyl isocyanate. The resulting exothermic reaction increased the temperature inside the tank to over 200 °C (392 °F), raising the pressure to a level the tank was not designed to withstand.

3. Apart from MIC (methyl isocyanate) the gas cloud may have contained phosgene, hydrogen cyanide and carbon monoxide.

**Effects:**

1. The initial effects of exposure were coughing, vomiting, severe eye irritation and a feeling of suffocation.
2. Around 6000 people have been died and over 70,000 people have developed sever eye, respiratory and CNS problems.

**(c) BOD and COD:**

**BOD** is defined as the amount of DO required to aerobically decompose biodegradable organic matter of a given volume of water over a period of days at $20^0$C.

**COD** is the amount of oxygen required to oxidize the organic matter by using strong oxidant like dichromate or permanganate at room temperature.

**(d) List any 4 Water quality standards as per WHO**

1. It should be clear and odorless.

2. It should be pleasant to taste.

3. pH of the water should be in between 7-8.5 and Chloride content should be less than 250ppm

4. It should be free from all sorts of pathogens.

**2. Define water pollution? How will you purify waste water by Activated sludge process**? **[CO2-L3-June 2005, MAY 2007, DEC 2008, DEC 2012, NOV 2011]**

**Water pollution:**

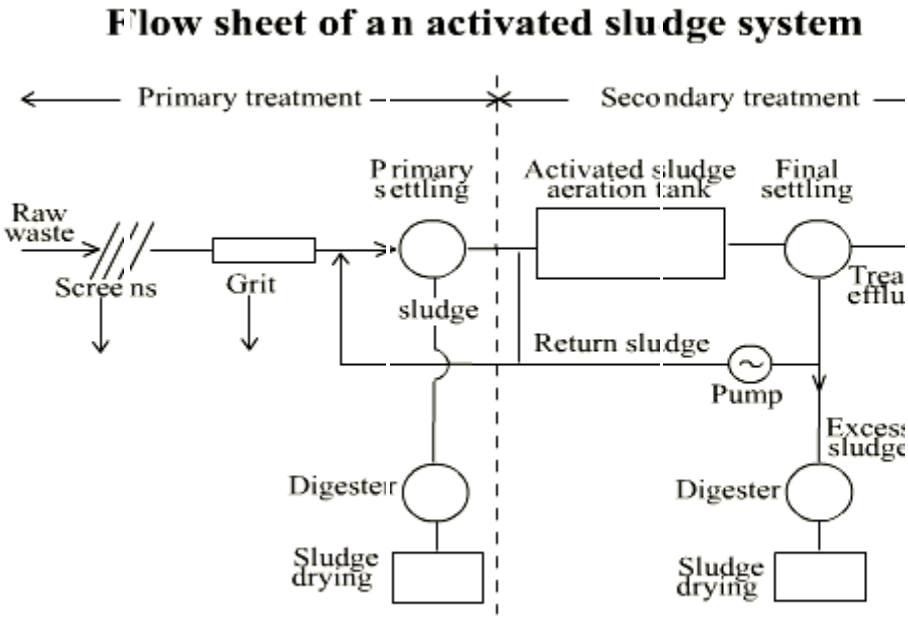
"It is defined as the any undesirable change in the physical and chemical properties of water, which may cause harmful effects to human system and aquatic life". It may be due to following two types of sources, namely

(i) point sources and

(ii) non-point sources.

**Waste water treatment by activated sludge process:**

The most common suspended growth process used for municipal wastewater treatment is the activated sludge process as shown in figure.




**Activated sludge plant involves:**

1. Wastewater aeration in the presence of a microbial suspension,
2. Solid-liquid separation following aeration,
3. Discharge of clarified effluent,

4. Wasting of excess biomass, and

5. Return of remaining biomass to the aeration tank.

**1.** In activated sludge process wastewater containing organic matter is aerated in an aeration basin in which micro-organisms metabolize the suspended and soluble organic matter.

**2.** Part of organic matter is synthesized into new cells and part is oxidized to $CO_2$ and water to derive energy.

**3.** In activated sludge systems the new cells formed in the reaction are removed from the liquid stream in the form of a flocculent sludge in settling tanks.

**4**. A part of this settled biomass, described as activated sludge is returned to the aeration tank and the remaining forms waste or excess sludge.

**5.** After the secondary treatment, the effluent is mixed with lime to remove phosphates in a flocculent tank. It is then adjusted to pH 11 by passing through ammonia tank where ammonium ion is removed as ammonia gas. It is finally removed by activated charcoal to remove any waste and the effluent is disinfected by chlorination.

**3. Write a note on source and hazards by any 3 air pollutants with the help of a control device. How will you control the air pollution? [CO2-L2-DEC 2006, MAY 2008]**

**1. Sulfur dioxides**

- colorless and odorless gas, associated with gray smog
- primarily from coal and power plants
- major component of acid rain
- major impact is corrosion of paint and metals, crop damage, and plant damage

**2. Nitrogen Oxides**

- many forms, most prominently $NO_2$, light brown gas
- toxic and quite corrosive

- its major impact is in the formation of photochemical smog, secondary contribution is as acid rain
- almost all NOx is anthropogenic, mostly automobiles and power plants

**3. CO (Carbon Monoxide)**

- Main impact is to interrupt blood oxygen uptake, i.e. 200 times more affinity towards (Hb) hemoglobin compare to Oxygen, causing asphyxia(excessive suffocation) due to formation faint blue color CO-Hb(carboxy hemoglobin) which may be fatal.
- Mostly due to fossil fuel burning and automobile emissions.

**Control measures of Air pollution by Cyclone separator:**

**1. Source control:**

The following are the some of the action to be taken at the source level.

1. Use only unleaded petrol.

2. By making efficient public transport system we can reduce the number of private automobiles in the road.

3. Plant as many tree as possible, which can absorb particulates and CO.

4. Try to use maximum amount of Non-conventional energy resources (solar energy etc.,) to minimize the emission of CO and $CO_2$

**Control measures in the industrial level:**

1. All the industry should keep he emission level with in the permissible limit.

2. Fixing of air pollution control devices must be made mandatory.

3. It should be periodically monitored by respective PCB's.

**4. What are the effects and control measures of Noise pollution? [CO2-L2-DEC 2008]**

**Effects of Noise Pollution:**

**Lack of concentration**:- For better quality of work there should be concentration , Noise causes lack of concentration

**Fatigue**: - Because of Noise Pollution, people cannot concentrate on their work. Thus they have to give their more time for completing the work and they feel tiring

**Abortion is caused**: - There should be cool and calm atmosphere during the pregnancy. Sudden Noise causes abortion in females.

**Blood Pressure**: Continuous exposure to noise pollution causes disease like blood pressure or mental illness, gastro-intestinal disorders, peptic ulcers and behavioral changes etc.

**Effect on Vegetation**: Noise pollution causes poor quality of crops in a pleasant atmosphere.

**Loss of Hearing**: Due sudden excessive noise irreparable damage to the ear drum will occur, leading to the permanent loss of hearing.

**Control measures of Noise pollution:**

**At Source level:**

Source of noise pollution like heavy vehicles and old vehicles may not be allowed to ply in the populated areas.

**At Receptor level:**

- Noise making machines should be kept in containers with sound absorbing media. As a result noise will be cut off, hence it may not reach workers.
- Proper oiling will reduce the noise from the machinery.
- Use of silencers can reduce noise by absorbing it. For this, various types of fibrous material could be used.
- Planting more trees with broad leaves can also minimize noise.

By adopting strict Law, it can be controlled in the congested area.

**5. Explain the causes, effects and control measures of thermal pollution. [CO2-L2-DEC 2008]**

**Causes of thermal pollution:**

- ✓ The most common human or anthropogenic, causes of thermal pollution are coolant release from power production(nuclear power plant and coal plant) and manufacturing plants, urban runoff from hospitals and domestic area.
- ✓ In the industrial area, petroleum refineries, pulp/paper mills, chemical plants, steel mills and smelters are the big contributors to thermal heat pollution.
- ✓ Natural causes include geothermal and volcanic activity, either under the oceans and seas or from above ground lava flow.
- ✓ Lightening strikes can also introduce massive amounts of heat in to the water bodies.

**Effects of Thermal pollution:**

- ✓ The DO of water and solubility of water decreases drastically at high temperature.
- ✓ With increase in temperature the penetration of oxygen decreases in to deep.
- ✓ Metabolic activities (such as respiration etc.,) of aquatic organism increases at high temperature, which in turn requires more amount of oxygen.
- ✓ Large scale loss of young fishes and spawning will result.
- ✓ Solubility of pesticides, detergents and toxic chemicals will increase at elevated temperature causing complete loss of aquatic system.
- ✓ With rise in temperature, composition of floras and faunas will change leading in to the replacement of sensitive species in to temperature tolerant species.

Control measures of thermal pollution:

**The following are the some of the methods for controlling the thermal pollution.**

1. **Cooling towers.**

Cooling towers transfer some of the heat from cooling water to the atmosphere, most probably through the evaporation of water. Evaporative cooling towers are of the following two types.

**(a) Natural draft towers**.

In such towers, hot water is sprayed down through a rising current of air. The water vapor gives its heat to the counter-current air and gets cooled. The cooled water is collected at the bottom and returned to the water body. However, the installation and operation costs of such towers are high.

**(b) Mechanical draft towers**.

In such towers, air flow is forced or induced by fans. Hot water during its passage to water course gets cooled by the action of air. However, these towers are not preferred, as they create annoyable noise due to the operation of fans and operation cost is also high.

Evaporative cooling towers cool the water by 10°C or more, but they. evaporate nearly 2 per cent or more of water during evaporation. One of the demerits of such towers is that they may form fog under cold weather, creating driving hazards over an extended area. Similarly, in non-evaporative cooling towers, heat is transferred directly to the air by means of heat exchangers. It, however, involves high operational cost.

**2. Artificial lakes or cooling ponds:**

These are the man-made bodies of water which offer one possible alternative to ‘one-through cooling’. The heated effluents can be discharged into the lake at one end and the water for cooling purposes may be drawn at the other end since the heat would eventually be dissipated through evaporation, the cooling pond would have to be replenished continuously. Such cooling ponds are in use in some locations, but they are not a very attractive alternative since they require so much space. -A one megawatt plant, for example, would require cooling pond with 1000-2000 acres of surface area. In many areas, the cost of using land for this purpose would be too great to justify the procedure.

**6. Write a note on disaster management. [CO2-L1]**

**Disaster management:**

Disaster is any sudden event of calamity which causes great effect on the human population, plants, animals and property. Disasters are of two types

• Natural

• Man made

**Natural Disasters**

**1. Earthquake**

Sudden tremors of the earth's surface are produced due to movement of tectonic plates under the earth. This displacement of earth's crust releases energy stored within the earth's interior which produces vibratory waves. The intensity of earthquake is measured by Richter Scale which ranges from 0 to 9. The point from which the earthquake originates is called as epicenter.

**Magnitude of earthquake**

| Richter Scale | Effect |
|---|---|
| Less than 4 | insignificant |
| 4-4.9 | minor |
| 5-5.9 | Damaging |
| 6-6.9 | Destructive |
| 7-7.9 | Major |
| More than 8 | Devastating |

**Prevention, Control & Mitigation**

(i) Constructing earthquake resistant building in the known earthquake prone zones e.g. wooden houses are preferred in Japan.

(ii) Installation of earthquake study centres studying seismic ;activities and analysis of seismic zones.

(iii) There must be insurance policies for earthquake victims to rehabilitate them.

(iv) Creation of special task forces, fully trained and equipped, to manage such calamities within shortest possible time.

**2. Tsunami (Tsu – harbour, nami-wave)**.

The impact of earthquake is high at sea area of origin. In this, most serious form of earthquake, giant seismic tidal waves of as high as 100m or more travel at the speed of 1,000 km/hour or faster, away from the epicentre of the earthquake. Tsunamis may also be caused due to underwater volcanic eruptions or seafloor slumping.

**Prevention, Control & Mitigation**

(i) Planting more trees on the coastal areas.

(ii) Timely warning and speedy evacuation of people.

(iii) Conservation of mangroves in the coastal areas.

(iv) Construction of embankments in inhabitable areas.

(v) Immediate relief and rehabilitation to the affected people.

**3. Drought**.

A drought is the drying up condition of the land due to insufficient or absence of rainfall for a long period affecting the vegetation, animal and human life.

**Control Measures**

(i) Rain water harvesting and canal irrigation.

(ii) Improvement of agricultural practices like dryland forming to conserve water in drought prone areas.

(iii) Stopping paddy cultivation in areas of water scarcity and growing drought resistant variety of crops.

(iv) Promoting social forestry and wasteland reclamation, growing species according to the ecological requirements of the area.

(v) Supplying food, fodder and water to drought-hit people and their rehabilitation with all essential requirements of life.

**4. Flood**

A flood occurs due to continuous heavy rainfall in an area, overflowing of rivers and submerging the surrounding areas damaging life and property. Creation of special task forces, fully trained and equipped, to manage such calamities within shortest possible time.

**Control**

(i) Various preventive measures are proper embankment of water bodies, building check dams on flood-prone streams, prohibiting cultivation in flood plain of rivers and growing forests and perennial trees, interlinking of river of the country and constructing houses on raised platforms and supported by reinforced stilts.

(ii) Floods can be controlled by collecting data from meteorological department and alerting the people of affecting area.

(iii) Educating the people about the steps to be taken in the event of disaster.

(iv) Hill slopes and catchment areas of rivers must be afforested and reforested.

**5. Cyclones.**

A cyclone is powerful circular or oval swirling storm of high velocity wind in the coastal regions of Indian Ocean.

It is called hurricane in Atlantic Ocean, typhoon in Western Pacific and Willy-willy in sea around Australia.

**Control**

(i) Afforestation of coastal areas is the best measure.

(ii) Construction ol'dams, embankments, wind breakers etc.

(iii) Conservation of mangrooveS in coastal plains.

(iv) Better forecast, warning systems with the help of remote sensing satellites.

(v) Construction of cyclone proof houses and building in coastal areas.

**6. Landslides.**

Landslide is the sudden down slope movement of a mass of rock or soil due to gravitational pull, generally in the rainy season or due to soil erosion.

(i) Reforestation in the landslide prone areas is the best measure.

(ii) There should be no construction activity in sloppy areas in the hilly region.

(iii) Proper drainage of surface and sub surface water.

(iv) Making concrete support at the base of slope along the road.

(v) Construction of curved stone blocks in the risky areas.

**7. Discuss the strategy adopted for solid waste management. [CO2-L2-DEC 2009, DC 2012, DEC 2008, JUNE 2013]**

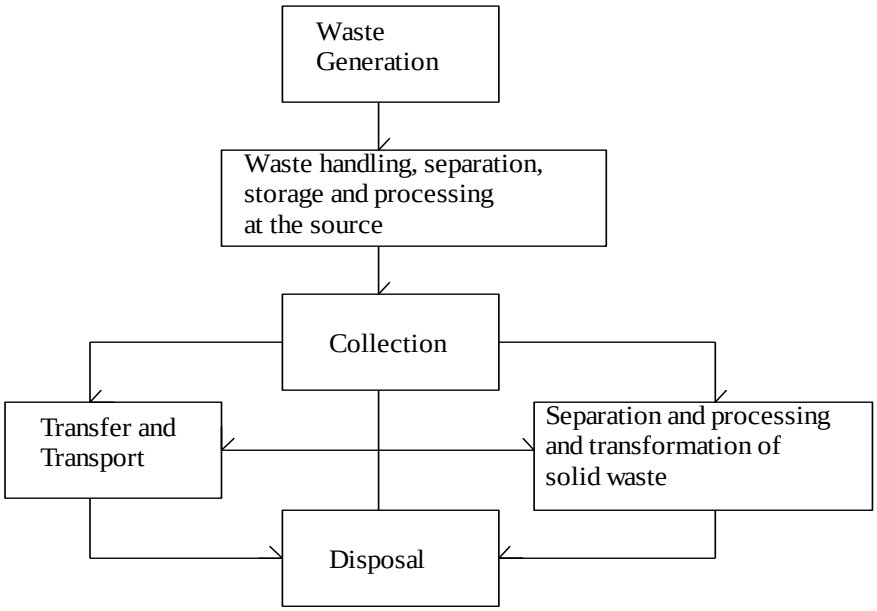
With increasing population and living standards, the quantity and variety of solid waste generated also gets increased by many times. The following is the some of the types of solid wastes and their sources.

| **Source** | **Typical waste generators** | **Types of solid wastes** |
|---|---|---|
| Residential | Single and multifamily | Food wastes, paper, cardboard, consumer electronics, batteries, oil, tires, and household hazardous wastes. |
| Industrial | Light and heavy manufacturing, power and chemical plants. | Housekeeping wastes, packaging, food wastes, construction and demolition materials, ashes.. |
| Commercial | Stores, hotels, restaurants, markets, office buildings, etc. | Paper, cardboard, plastics, wood, food wastes, glass, metals, |
| Medical waste | Hospitals, labs and | Harmful pathogens, bacteria, infected human |

| | | |
|---|---|---|
| | research centers | parts, syringes and blood. |
| Construction and demolition | New construction sites, road repair, renovation sites, demolition of buildings | Wood, steel, concrete, dirt, etc. |
| Municipal services | Street cleaning, landscaping, parks, beaches | Street sweepings; landscape and tree trimmings; general wastes |

In order to minimize the above waste generation, the following methodology is adopted,

**1. Lanfill 2.Composting 3. Incineration**



**Landfilling (80% of municipal waste)**

- Sanitary landfills, typically clay-lined pits with 80cm thickness.
- Required soil type is an impermeable bottom layer (several layers clay, thick plastic, sand)
- Liner collects leachate or rainwater contaminated as it percolates down
- Leachate is monitored and/or collected by wells, pumped and stored in tanks or sent to a treatment plant
- Filled landfills are completely covered by clay, sand, gravel and soil then monitored by wells to detect any leakage into groundwater
- Methane gas produced collected or burned to produce steam/electricity

**Land filling Benefits**

- Reduced odor, rodents and pests.
- Low operating costs, handles large amounts of waste
- Put into operation quickly

Landscaped aesthetically for recreation after use.

**Land filling Disadvantages**

- Traffic, noise, dust
- Emit toxic gases *($H_2S$, methane, organic gases)*
- Contamination of groundwater

**Composting:**

Due to shortage of space for landfill in bigger cities, the biodegradable waste is allowed to degrade or decompose in oxygen rich medium in a pit with 1.5m depth which is covered with clay for about 25cm. To enhance the microbial degradation, microorganisms such as actinomocytes are introduced. A good quality nutrient rich and environmental friendly manure is finally formed which improves the soil conditions and fertility.

**Incineration** (17% is incinerated)

- Trash-to-energy incineration; trash burned as fuel for steam/electricity
- Non-combustible substances have to be separated before the waste is subjected to incineration technique.
- Most incinerators use unprocessed solid waste, and are not efficient in handling batteries and the emission of dioxins, furans are very high in the atmosphere.
- Some use refuse-derived fuel; processed into pellets before combustion
- Only 90% removal of potential air pollutants

**Incineration Benefits**

- Incineration kills germs and reduces amount of solid waste to landfills
- Energy is produced
- Electrostatic precipitators, scrubbers, filters reduce air pollution

**Incineration Disadvantages**

- Pollutants are released to atmosphere
- Ash produced can contain small amounts of toxic heavy metals
- Plastics should not be incinerated, since it will leads to the emission of dioxins and PCB's.

**8. Discuss the causes and control measures of marine pollution. [CO2-L2-DEC 2009, DEC 2008]**

Marine pollution results from the entry of chemicals, particles, industrial, agricultural and residential waste, noise, or the spread of invasive organisms in to the ocean. Most sources of marine pollution are land based. Sometimes it comes from nonpoint sources such as agricultural runoff and windblown debris and dust.

**Causes of marine pollution:**

- Accidental and deliberate discharge of crude oil into the ocean by cargo ships is regarded as one of the prime causes of pollution of the water body.

- Dumping of industrial wastes into ocean is another reason for marine pollution. The wastes often contain toxic materials such as mercury, dioxin, PCBs, PAHs and radioactive materials, which contaminate the water of ocean.
- Deposition of sediments from mining leads to ocean pollution Trash washed into the ocean after heavy rain or floods gives rise to marine debris, which pollutes the water body.
- Dumping of human wastes, plastic and disposal of untreated or partially treated sewage water into the ocean is called 'garbage dumping'. This is one of the leading causes of marine pollution.
- Carbon dioxide, emitted by automobiles, due to the burning of fossil fuels, leads to air pollution. The contaminated air containing carbon dioxide reaches the ocean in the form of acid rain, thereby polluting the water.

**Effects**

- Oil spilling is hazardous for the marine life. It seriously affects the life cycle of coral reefs thriving in the ocean. The oil spilled in the ocean could clog up the gills of fishes, thereby preventing respiration. It affects the process of photosynthesis of marine plants, since it blocks the sunlight.
- Toxic wastes have direct effect on marine life and affect the human beings indirectly. When the harmful toxic wastes are dumped into the ocean, the fishes could consume the poisonous chemicals. When the fish is eaten by humans, this could lead to food poisoning.
- Dumping of garbage into ocean can deplete the oxygen dissolved in water. As a result, the health of marine life is affected seriously. Due to lack of oxygen, the sea animals including whales, seals, herrings, dolphins, penguins and sharks could perish.
- Carbon dioxide is hazardous for marine life including coral reefs and free-swimming algae.
- Plastics dumped into ocean can affect the marine life seriously. Plastic items such as bottles and bags could choke and suffocate the sea animals, as they eat them thinking that they are food. Plastics are known to be a major cause for the death of turtles, as they swallow the floating bags, mistaking them for jelly fish.

- Dumping of industrial wastes such as pesticides, especially DDT, can accumulate in the fatty tissue of animals. This could lead to the failure in the reproductive system of mammals and birds

**Control measures of Marine pollution:**

- ✓ We should avoid direct discharge of toxic pollutants and effluents from industries in to the sea.
- ✓ Run off from non-point sources should be prevented to reach coastal areas.
- ✓ Dumping of toxic, hazardous wastes and sewage sludge should be banned.
- ✓ Developmental activities along coastal line should be minimized.
- ✓ Dumping of nuclear waste and oil ballast should be banned.

**9. Discuss the role of an individual in preventing pollution. [CO2-H2-DEC 2009]**

- ❖ Plant more trees.
- ❖ Help more in pollution prevention than pollution control.
- ❖ Use water, energy and other resources efficiently.
- ❖ Purchase recyclable, recycled and environmentally safe products.
- ❖ Reduce deforestation.
- ❖ Remove NO from motor vehicular exhaust.
- ❖ Use of eco friendly products.
- ❖ Use CFC free refrigirators.
- ❖ Use natural gas than coal.
- ❖ Use machines in well ventilated areas.
- ❖ Use less polluting substances for cleaning agents, paints & other products.
- ❖ Increase use of renewable resources.

- Don't use polystyrene cups that have chloro fluoro carbon (CFC) which destro ozone.
- Use rechargeable batteries which will reduce metal pollution.
- Use organic manure instead of inorganic fertilizers.
- Reduce garbage by recycling & reuse, slow population growth.

## UNIT – III NATURAL RESOURSES

### PART A

**1. What are renewable and non - renewable energy resources? Give examples. [CO3-L1-Dec 09, 11, 12]**

Renewable energy resources are natural resources which can be regenerated continuously and are inexhaustible. They can be used again and again in an endless manner.

**Example:**

**Renewable energy resources:** wood, solar energy, wind energy.

**Non - Renewable energy resources:** coal, petroleum.

**2. Mention the causes of desertification. [CO3-L1-Dec 09]**

1. Deforestation 2. Over grazing
3. Water management 4. Climate change
5. Pollution. 6. Mining and quarrying.

**3. What are the effects of deforestation? [CO3-L1-May 10]**

1. Global warming 2. Loss of genetic diversity
3. Soil erosion 4. Loss of food , 5. Unemployment problem.

**4. What is over grazing? [CO3-L1-May 10]**

Over grazing is a process of, “eating away the forest vegetation without giving it a chance to regenerate”.

**5. What do we meant by “green revolution”? [CO3-L1-May 10]**

Rapid increase in crop production by a combination of increased fertilizer use and the introduction of new higher yielding varieties of grain.

**6. Define Eutrophication. [CO3-L1-Dec 09, 10]**

A large proportion of N and K fertilizers used in crop fields is washed off by the run off water and reaches the water bodies causing over nourishment of the lakes. The process accumulation of nutrients in the water bodies is called eutrophication.

**7. How does land degradation takes places? Write its adverse effects. [CO3-L2-Dec 13]**

It takes places due to, i) Pollution increase ii) Increased urbanization iii) Increased application of fertilizers and pesticides iv) Damage of top soil.

**Effects:**

The soil texture and structure are deteriorated.

▪ Loss of soil fertility, due to loss of invaluable nutrients.

▪ Increase in water logging, salinity, alkalinity and acidity problems.

▪ Loss of economic social and biodiversity.

**8. Write the economic importance of forest. [CO3-L2-Dec 13]**

i) Forests supply wood for fuel and used as raw materials as pulp, paper, board, timber etc.

ii) Forests supply minor products like gum, resins, dyes, etc.

iii) Many plants are utilized in preparing medicines and drugs.

iv) Forest produces many varieties of animal products like honey, ivory, hides etc.

**9. What are the impacts of soil erosion? [CO3-L1-Dec 13]**

▪ Soil fertility is lost because of loss of top soil layer

- Loss of its ability to hold water and sediment.
- Sediment runoff can pollute water and kills aquatic life.

**10. What is meant by desertification? [CO3-L1-Dec 13]**

It is a progressive destruction or degradation of arid or semi arid lands to desert.

**Reasons:** Deforestation, overgrazing, mining and quarrying.

**11. What are the gases responsible for ozone depletion? [CO3-L2-Dec 13]**

- Chloro fluoro carbon (CFC)
- Hydro chloro fluoro carbon (HCFC)
- Bromo Fluoro Carbons (BFC)

**12. What are the ecological benefits of forests? [CO3-L2-June 13]**

- Production of oxygen due to photosynthesis.
- Reducing global warming .
- Soil conservation
- Regulation of hydrological cycle.
- Pollution moderators.

**13. What exactly are fossile fuels and why are they non renewable? [CO3-L2-Dec 12]**

Fossile fuels are the remains of organisms that lived 200-500 million years ago. Today the rate of consumption of fossile fuels is more than the rate of the formation. That is why fossile fuels are consider non renewable.

**14. What are the reason of water logging and their effect? [CO3-L3-Dec 12]**

It is the land where the water stand for most of years. This will causes due to heavy rain, poor drainage and excessive water supply to the crop land.

**Effect:** During this conditions, pore voids in the soil get filled with water and soil air gets deplated. In such a conditions the roots of the plants do not get adequate air for respiration.So the mechanical strength of the soil decreases and crop yield falls.

**15. Define Eutrophication. [CO3-L1-Dec 12]**

A large proportion of N and P fertilizers used in crop fields is washed off by the runoff water and reaches the water bodies causing over nourishments of the lakes. This process is known as Eutrophication.

Due to this lakes get attacked by algal blooms. These use up the nutrient rapidly and grow very fast. Since the life time of the algal species are less they die quickly and pollute the water, which in turn affect the aquatic life.

**16. List the causes of deforestation. [CO3-L2-Dec 10]**

1. Development projects. 2. Mining operation. 3. Fuel requirements.

4. Raw materials for industries. 5. Shifting cultivation. 6. Forest fires.

**17. What are the present food problems of the world? [CO3-L3-Dec 10]**

1. Human population is increasing faster than food production.

2. The agriculture lands have been converted into human settlements.

3. Climate changes, frost, flood or drought may lead to crop failure.

4. Insects, weeds, bacteria, fungi, viruses, parasites, rodents and birds destroy food.

**18. What are the effects of over utilization of ground water? [CO3-L2-Dec 10]**

1. Sinking of overlaying land surface.

2. Decrease of ground water.

3. Lowering of water table.

4. Salt water intrusion into drinking water.

5. Decrease in ground water level causes earthquake, land slides.

6. Reduce water level in streams, lakes, etc.

**19. State the effect of extracting and using mineralresources. [CO3-L2-June 15]**

1. Devegetetion aand defacing of landscape.
2. Ground water contamination.
3. Surface water pollution.
4. Air pollution.
5. Subsidence of land.

**20. Define sustainable forestry. [CO3-L1]**

Sustainable forestory is the optimum use of forest resources, which meet the needs of the present without compromising the ablity of future generations to meet their own needs.

**21. Explain soil leaching and their effects. [CO3-L1]**

The process in which materials in or on the soil gradually dissolve and are carried by water seeping through the soil.

**Effects:** 1. It removes valuable nutrients from the soil.

2. It may carry buried wastes into ground water and contaminates it.

**22. What is meant by soil erosion? [CO3-L1-NOV 2014]**

Soil erosion is the process of removal of superficial layer of the soil from one place to another. Siol erosion also removes the soil components and surface liter.

**23. What is meant by geothermal energy? [CO3-L1]**

The energy harnessed from the high temperature present inside the earth is called geothermal energy.

**Part – B (16 marks)**

**1. Discuss briefly the ill-effects of deforestation. [CO3-L2-DEC 08, 09 12]**

Minimum area required is 33% of total area to maintain ecological balance. But it is only 22% thus over exploitation occurs.

CAUSES:

-Increasing agricultural production.

-Increasing industrial activities.

-Increase in demand of wood resources

Effects or consequences of over exploitation

- Migration of farmers.
- Environmental damage is heavy.
- Tropical forests destroyed at fast rate.
- Countless plant species and animals endangered.
- Marine populations will go into extinction.
- Dumping of wastes into land, water and air has become a severe problem
- **Global warming:** Increase CO2 due to cutting and burning of forest.
- **Loss of genetic diversity:** Destroys the storehouse of genetic diversity on earth.
- **Soil erosion:** 6000 million tons eroded every year in india.
- **Loss of biodiversity:** Food and habitat become extinct.
- **Loss of food grains:** soil erosion leads to loose food grains.
- **Unemployment problems:** forest losses livehood.

**Flood and Landslides**

**2. What are the Causes of Deforestation**? **[CO3-L1-Dec 10]**

- **Development Projects:** Big dams, hydroelectric projects, road construction.
- **Mining operations:** Mica,coal,manganese,limestone
- **Raw materials for industries:** wood
- **Fuel requirements**: both tribal and rural people need of fuel wood

- **Shifting cultivation:** Replacement of natural forest ecosystem
- **Forest fires:** Due to human interruption and ambient temperature

**3) Write briefly on the Hydrological Cycle. [CO3-L2-DEC 07)**

Hydrological cycle

- The flow of water between the atmosphere and earth is called hydrological cycle. It is also called water cycle.
- **Evaporation:**

Heat energy from the sun constantly causes evaporation from all the water surfaces

- **Condensation and precipitation:**

rainfall occurs due to condensation

- **Transpiration and respiration:**

- The water becomes vapour through Transpiration and respiration.
- Root absorbs water and leave it through leaves is known as transpiration.
- Animals and plants , breakdown of sugar to produce energy(respiration).

**4. What are the Consequences of overdrawing of ground water**? **[CO3-L2-June 15]**

Over Utilization of water
(surface & ground water)

- Water is inevitable for life.
- Rapid increase in population and industrial growth increase the demand of water resources.

**Consequences of overdrawing of ground water:**

- Decrease of ground water.

Ground subsidence – sinking of overlaying land surface (aquifer get compacted).

- Lowering of water table.
- Earthquake and landslides.
- Drying up of wells.

Pollution of water (nitrogen percolates rapidly into the ground and pollute the water) nitrate concentration exceeds 45 mgs/lit is unsuitable of infant

**5. What are the problems and benefits of Dams**? **[CO3-L2-Dec 10]**

Dams control flood and store flood water.

- Used for diverting part or water from river into a channel.
- Used mainly for drinking and agricultural purposes.
- Built for generating electricity.
- Used for recreational purposes.

Navigation and fishery can be developed in dam areas

Problem of constructing dams

- **Up stream problems**

1. Displacement of tribal people.
2. Loss of non-forest land, forests, flora and fauna.
3. Landslips, sedimentation and siltation occur.
4. Stagnation , water logging retards plant growth
5. Spread of vector-borne diseases.
6. Reservoir induced seismicity causes earthquakes.
7. Navigation and aquaculture activities can be developed in the dam area

**Down stream problems**

- Water logging and salinity due to over irrigation.
- Reduced water flow and slit deposition in rivers
- Salt water intrusion at river mouth.
- Nutrients get deposited in the reservoir, the fertility of the land along the river gets reduced
- Structural defects the dam may collapse and suddenly destroy many living organisms.

Salt water intrusion at river mouth

**6. What are the Environmental effects of extracting and using mineral resources. [CO3-L3-June 15]**

- Environmental concern arises from extraction and processing of the minerals during mining, melting, roasting.
- Mining- Extraction of metals from a mineral deposit.
- Types of mining;

1. Surface mining

2. Underground mining

(i) Open-pit mining (ii) Dredging (iii) Strip mining

**Environmental damage**

- Devegetation and defacing of landscape.
- Ground water contamination.
- Surface water pollution.
- Air pollution.

Subsidence of land

- Rapid depletion of mineral deposits.
- Over exploitation of mineral resources leads to wastage and dissemination of mineral deposits.
- Causes environmental pollution.

Needs heavy energy requirement

**7. List out the Effects of Modern Agriculture. [CO3-L2-June 13]**

- Hybrid seeds of single crop variety, high-tech equipments, lot of fertilizers, pesticides

1. Problems in using Fertilizer:

(a) Micronutrient imbalance.

(b) Blue Baby syndrome(nitrate pollution)

(c) Eutrophication

Fertilizers are chemical nutrients used to increase productivity. They contain macronutrients such as N,P,K. When these are used in excess deficiency of micronutrients in the soil is caused. This will decrease production

Blue Baby syndrome(nitrate pollution

- The nitrates of fertilizers percolate into the soil and contaminate the ground water. The nitrate concentration in the water gets increased.

When the concentration of nitrates exceeds 45 mg/l, it causes blue baby syndrome in children.

**Eutrophication.**

- The excess of fertilizers are washed by water and they accumulate in ponds. This accelerates the excessive growth of water plants and algae. The excessive growths of water plants are called Eutrophication.

**2. Problems in using pesticides**

3. First generation pesticides
4. Second generation pesticides

   (a) Death of non-target organisms

   (b) Producing new pests

   (c) Bio-magnification

   (d) Risk of cancer
5. Desired qualities of an ideal pesticide
6. Kill only target species
7. Biodegradable
8. Not produce toxic pesticide vapour
9. Chlorinated pesticides and organophosphate pesticide hazardous.

**Water logging**

Water logging is the land where water stand for most of the year.

Causes of water logging:1.Excessive water supply to the croplands.

2.Heavy rain

3.Poor drainage.

Remedy: Preventing excessive irrigation,

sub-surface drainage tech and bio-drainage by trees.

- Salinity .The water, not absorbed by the soil, undergo evaporation leaving behind a thin layer of dissolved salts in the top soil. This process of accumulation of salts is called salinity of the soil.
- Problems in salinity: Crop yield decreases.
- Remedy.

1. flushing them out by applying more good quality water to such soils.

Advantages and disadvantages of modern agriculture

- More yield and fast growing because of fertilizers and pesticides invention are the advantages.

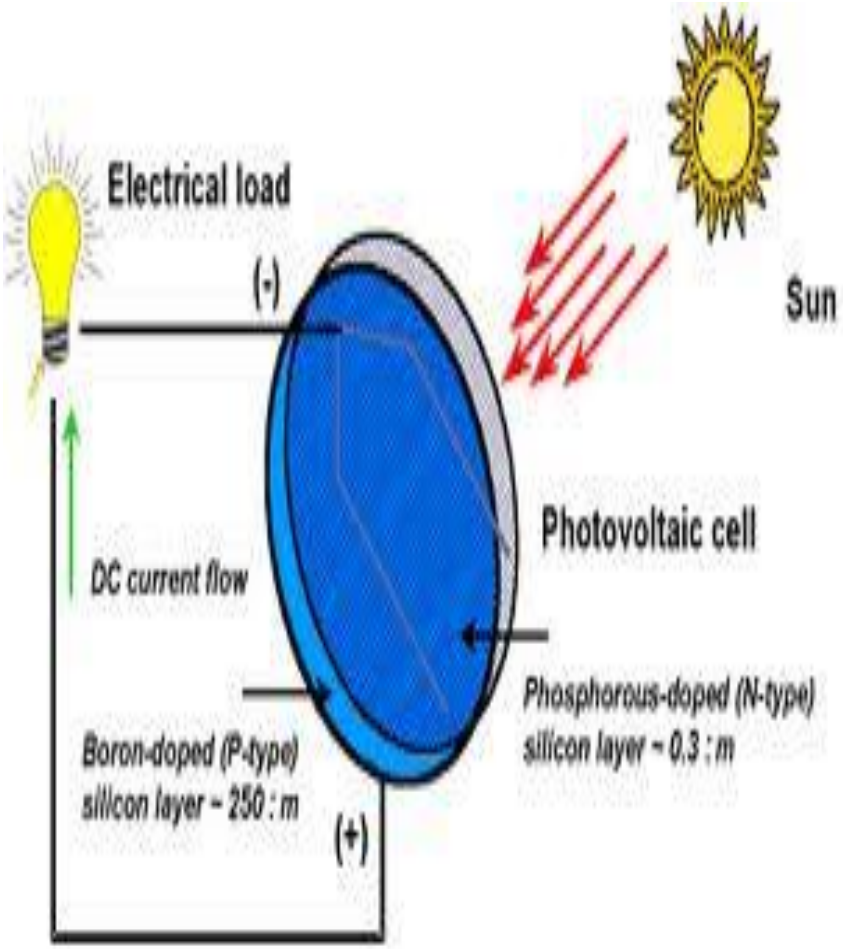
Accumulation of pesticides in product and lack of vitality in product are the main disadvantages.

8. **Discuss the various techniques for harnessing solar energy. [CO3-L2-DEC 09, 11, 12]**

**Solar (or) Photovoltaic (or) PV cells**

It works on the principle of photovoltaic effect. When solar rays falls on two layered semiconductor devices a potential difference between two layers cause flow of

electrons **and** produce electricity. It contains a p type and n type semiconductors in




close contact**.**

**Solar water heater**

It consists of an insulated box painted black provided with a glass lid to receive, store heat. Inside the box is black painted copper coil through which the cold water circulated which takes up the heat and exit as hot water.

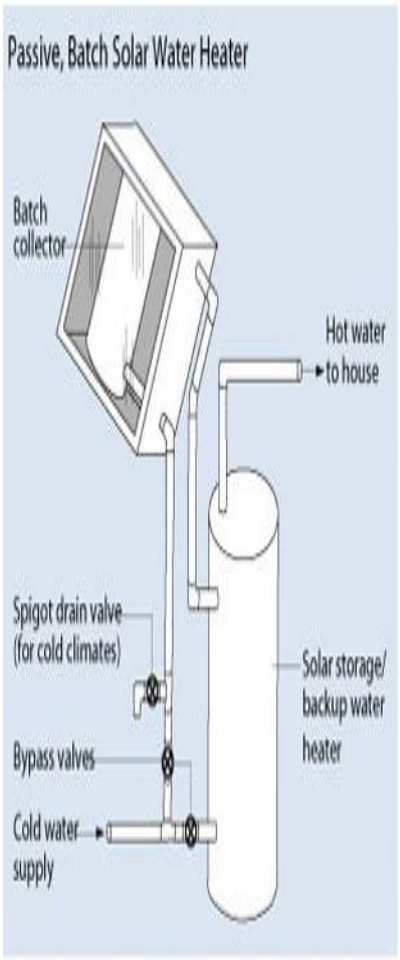
**Applications of solar cells**

- Used for lighting purpose
- Solar water pumps makes use of solar batteries

- Used in calculators watches etc.,
- Non polluting and eco friendly
- Can be used to charge other batteries
- Used to drive vehicles
- Used in space crafts and satellites

**Significance of Solar energy**

- Noise and pollution free
- Require neither fuel nor attention while cooking food
- Used in remote and isolated areas, forests, hilly regions
- Lifetime is long
- Maintenance cost is low




**9. Explain the role of an individual in environment protection. [CO3-L2-DEC 09, June 2013]**

**Role of An Individual In Conservation Of Natural Resources**

**Conservation of energy**

- Switch off lights and other appliances when not in use
- Use solar heater

- Dry clothes in sunlight
- Grows trees near the houses
- Pressure cooker
- Ride a bicycle

**Conservation of water**

- Use minimum water and Check for water leaks in pipes.
- Reuse the soapy water after washing clothes for washing off the courtyards, driveways.
- Use drip irrigation
- Wasted water can be used for watering the plants
- Build rainwater harvesting system

**Conservation of soil**

- Grow different types of plants, herbs, trees and grass
- While constructing the house don’t uproot the trees
- Don’t irrigate the plants using a strong flow of water
- Soil erosion can be prevented by use of sprinkling irrigation
- Use green manure in the garden
- Use mixed cropping

**Conservation of Food resources**

- Eat only minimum amount of food. Avoid overeating
- Don’t waste foods instead give it someone before getting spoiled.
- Cook only required amount of the food.
- Don't cook food unnecessarily**.**

**Conservation of forest**

- Use non-timber products
- Plant more trees and protect them
- Grassing, fishing must be controlled
- Minimize the use of papers and fuel wood
- Avoid construction of dams roads and buildings in forest areas.

**Conservation of Food resources**

- Eat only minimum amount of food. Avoid overeating
- Don’t waste foods instead give it someone before getting spoiled.
- Cook only required amount of the food.
- Don't cook food unnecessarily.
- Don't store large amounts of food grains and protect food grains from damaging insects

**10. Briefly explain about causes of Soil erosion& soil conservation practices**

**Causes of Soil Erosion. [CO3-L2-June 13]**

- Water – Water affects in the form of rain, run off, rapid flow, and wave action.
- Wind- Wind is the climatic agent which carries away the fine particles of soils.
- Biotic agents – Overgrazing, mining and deforestation are the major biotic agents.
- Landslides – Landslides also causes soil erosion.

Construction-Constructions of dams, buildings, roads remove the protective vegetal cover and leads to soil erosion

Harmful effects of soil erosion:

- Soil fertility is lost because of loss of top soil layer**.**

- Loss of its ability to hold water and sediments
- Sediment runoff can pollute water and kill aquatic life.
- Conservational till farming (or) no-till farming: Tilling machine makes slits in the un ploughed soil and injects seeds, fertilizers and water in the slit.

**Contour Farming**: Planting the crops in rows across the contour of gently sloped land. Each row act as small dam to hold soil and slow water runoff

- **Terracing:** Conversion of steep slopes into a series of broad terraces, which run across the contour. This retains water for crops and reduces soil erosion by controlling runoff**.**
- **Alley cropping:** Planting crops in strips or alleys between rows of trees of shrubs**.**
- **Wind Breaks:** Trees are planted in long rows along the boundary of cultivated lands.

**11. List out the Non Renewable Energy Sources. [CO3-L2-June 15]**

- Coal is a solid fuel formed in several stages from buried remains of plants 300 – 400 million years ago.
- Wood → Peat → Lignite → Bituminous coal → Anthracite.

Carbon content of anthracite is 90% with 8700kcal as calorific value. When coal burnt it produces carbon dioxide increasing global temperature. even sulphur and nitrogen oxides where produced resulting in acid rain

**LPG**

LPG is called as liquefied petroleum gas obtained from fractional distillation of petroleum containing lower hydrocarbons which are colorless odourless and highly inflammable. Their leakage can be identified by adding mercaptans which has a sharp odour. It has high calorific value and completely combustible

**Natural gas**

- Natural gas found above the oil in oil well. It is a mixture of 50 – 90 % methane and small amount of other hydrocarbons. It has a calorific value of 12,000 – 14,000 k.cal/$m^3$.
- Dry gas: If the natural gas contains lower hydrocarbons like methane and ethane, it is called dry gas.

Wet gas: If the natural gas contains higher hydrocarbons like propane, butane along with methane, it is called dry gas.

**Nuclear energy**

- Nuclear fission: The process of splitting of heavier nucleus into two or more lighter nuclei with simultaneous liberation of large amount of energy.

$_{92}U^{235} + {}_{0}n^{1} \quad {}_{56}Ba^{140} + {}_{36}Kr^{93} + 3{}_{0}n^{1} +$ energy

Nuclear fusion: The process of combination of lighter nuclei into heavier nuclei, with simultaneous liberation of large amount of energy. $_{1}H^{2} + {}_{1}H^{2} \quad {}_{2}He^{4}$ + Energy

- **Need (or) role of alternate energy sources**:
- Energy sources which have least pollution, safety and security snags are universally available have the best enhance of large scale utilization in future.
- Hydro-electric power generations are expected to upset the ecological balance existing on earth.

Besides space heating, hydel power plants critically pollute the aquatic and terrestrial biota

- Radioactive pollutants released from nuclear power plants are chronically hazardous. The commissioning of boiling water reactors (BWRS) has resulted in the critical accumulation of large number of long lived radio nuclides in water.

The dangerous radio waste cannot be buried in land without the risk of polluting soil underground water. Nor the waste can be dumped into the rivers without poisoning aquatic life and human beings as well

- Bio gas or Gobar gas:

Biogas is a mixture of gases such as methane, carbon dioxide, hydrogen sulphide, etc.,

It contains about 65% of methane gas as a major constituent. Biogas is obtained by the anaerobic fermentation of animal dung or plant wastes in the presence of water

**12. Briefly explain about Wind energy. [CO3-L2-Dec 14]**

- Moving air is called wind. Energy recovered from the force of the wind is called as wind energy.
- The energy possessed by wind is because of its high speed. It is the process of converting the mechanical energy of wind into electrical energy which is done by,
- Wind mills.
- Wind farms.
- Wind rotates the blades of the wind and make it to rotate continously. This rotational motion drives a no of machines like water pump, flour mills and electric generator. Generates about 100 Kw electricity. Several wind mills installed collectvely called as wind farm.

- etc A Farm means Group of Trees, Plants or any other thing which produces some useful product.
- In the same way A Wind Farm means Group of Wind Turbines in a area to produce some useful product.
- There are many advantages of wind farms.

The advantages of wind farms may include agricultural, economical, environmental.

**Advantages of Wind Farms**

- The main advantages may include
- Advantages to Environment,
- Economic Advantages,
- Advantages to Farmers,
- Advantages to Next Generations.
- Other methods adopted for harnessing wind energy are
- Sky sail
- Ladder mill
- Kite ship
- Sky wind power
- Briza technologies
- Sequoia automation

**Significance of wind energy**

- Power generation starts from commissioning
- Made available in off shore, on-shore and remote areas.
- It is recommended to broaden the nation’s energy options for new energy sources
- 4. Doesn't cause air pollution
- 5. Very cheap and renewable.

## UNIT – IV SOCIAL ISSUES AND ENVIRONMENT

### PART - A

1. **Explain sustainable development and unsustainable development. [CO4-L1-DEC 2009, DEC 2008]**

**Sustainable development** means all the natural resources must be available for presentgeneration and future generation also. It is the relationship between human beings and resources they depend on for all their developmental activities.

**Unsustainable development** means degradation of environment due to over utilization and overutilization and over exploitation of natural resources.

2. **Define watershed. [CO4-L1**

Watershed is defined as natural hydrologic entity that cover a specific expense of land surface from which the rainfall runoff flows to a defined drain, channel, stream or river at any particular point.

3. **Define watershed management. [CO4-L1**

The land water flows across or through on its way to a common stream, river, lake, pond or reservoir under the influence of gravity. The management of rainfall and resultant run-off is called watershed management.

4. **Define Environmental ethics. [CO4-L1**

Environmental ethics is the science of human duty towards environment i.e., the moral relationship between humans and environment.

5. **What is meant by Inter-generational and Intra-generational equity? [CO4-L2-JUNE 2010]**

Inter-generational equity states that we should hand over a safe, healthy and resourceful environment to our future generations. Intra-generational equity states that the technological development of rich countries should support the economic growth of poor countries and help in narrowing the wealth gap and lead to sustainability.

6. **What is meant by rainwater harvesting? [CO4-L1-DEC 2008, MAY 2008]**

Collecting rainwater when and where it falls for use during non-monsoon months is called rainwater harvesting.

**7. Write any two methods of rainwater harvesting. [CO4-L1]**

Roof water harvesting, Construction of percolation or recharge well cum bore.

**8. What is meant by water conservation? [CO4-L1-DEC 2009]**

The process of saving water for future utilization. These practices that encourage consumers to reduce the use of water. Since the water is important component to human survival and all other commercial and agricultural activities, it is essential to conserve the water resources.

**9. Define resettlement. [CO4-L1]**

Resettlement is simple relocation or displacement of human population without regard to their individual, community or social needs.

**10. Define rehabilitation. [CO4-L1]**

It involves replacing the lost economic assets, rebuilding the community system that have been weakened by displacement, attending to the psychological trauma of forced alienation from livelihood.

**11. Define wasteland. [CO4-L1]**

It is defined as which is lying uninhabited, uncultivated and left after use or land which is no longer serving any purpose. It is overgrazed pastures and struck and eroded valleys.

**12. Define consumerism. [CO4-L1-NOV 2016]**

An organized movement of citizens and government agencies to improve the rights and power of buyers in relation to sellers.

**13. What are the types of waste land? [CO4-L2]**

*Cultivable wastelands:*These lands are used for cultivation, grazing and other agricultural purposes(Examples: Degraded forest lands, water logged lands, saline lands, gullied lands, etc.,)

*Uncultivable wastelands:*These lands are not used for cultivation, grazing settlement and infrastructuredevelopment. (Examples: Barren lands, hilly slopes, stony or gully land, sandy deserts,etc.,)

**14. What are the causes of wasteland formation? [CO4-L2]**

- ✓ Soil erosion, deforestation, overgrazing, water logging and salinity.
- ✓ Demand for fire wood and excessive pesticide usage.
- ✓ Developmental activities
- ✓ Over exploitation of natural resources
- ✓ Sewage and industrial wastes
- ✓ Mining activities

**15. List out the objectives of wasteland reclamation. [CO4-L2]**

- ✓ Improve physical structure and quality of soil.
- ✓ Prevent soil erosion, flooding and landslides.
- ✓ Avoid over exploitation.
- ✓ Improve availability of good quality water.
- ✓ Conserve biological resources and ecosystem.
- ✓ Provide source of income for rural poor.
- ✓ Supply fuel, fodder, timber for local use.

**16. List out some of the methods of waste land reclamation (IWLDP). [CO4-L2]**

- ✓ Drainage
- ✓ Leaching
- ✓ Irrigation practices
- ✓ Green manures and bio fertilizers
- ✓ Application of gypsum

- ✓ A forestation programme
- ✓ Social forestry programme

**17. What are the advantages of rain water harvesting? [CO4-L2-MAY 2008, DEC 2008]**

i. The ground water is recharged and its quality is improved.

ii. Surface water quality is also improved due to diversion of rainwater induced run-off

iii. itigating the effects of floods, drought and soil erosion.

iv. Enough water consuming is maintained during summer period.

v. Increasing the availability of water from well.

vi. Rise in the ground water level.

vii. Upgrading the social and environmental status

**18. What is meant by ISO 14000? [CO4-L1-DEC 2008]**

It is an environmental standard which exists to help organizations minimize how their operations negatively affect environment and comply with applicable laws and regulations.

**19. What is the role of Non-government organizations (NGO) [CO4-L1]**

It can help by advising the government about local issues and interacting with the grass root level people. Example: Chipko movement and Narmada Bachaoandolan.

**20. What is meant by CDM? (Clean development mechanism) [CO4-L1]**

It is arrangement under the Kyoto protocol allowing industrialized countries with a greenhouse gas reduction commitment to invest in projects that reduce emissions in developing countries.

**21. What are the methods to create public environmental awareness? [CO4-L2]**

i) Among the students through education

ii) Among the masses through mass media.

**22. What is nuclear holocaust? [CO4-L1-JAN 2009]**

Nuclear holocaust means destruction of biodiversity by nuclear equipments and nuclear bombs. Large level destruction can happen, when a reactor core melts down at nuclear war leads to large number of living beings are totally died.

**23. What is meant by waste land reclamation? [CO4-L1]**

The land which is incapable of rising corps or poor economic value. i.e., the land which is not in use is called as wasteland. It is unproductive, unfit for cultivation and grazing. About 20% of the geographical area of India is wasteland. The main significance of wasteland is the ecological imbalance of an ecosystem of the given area.

**24. What are the objectives of waste land reclamation? [CO4-L2-DEC 2009]**

- ✓ Increasing population and cattle in India will increase the demand for food, land, shelter and other resources.
- ✓ To prevent soil erosion, landslides, flooding and drought
- ✓ To avoid over-exploitation of natural resources
- ✓ To conserve the biological resources and natural ecosystems

**25. List out the rights of sellers. [CO4-L2]**

- ✓ To introduce any product.
- ✓ To charge any price.
- ✓ To spend any amount to improve their product.
- ✓ To use incentives to promote their product.
- ✓ To sell to anyone.

**26. Mention the rights of buyers. [CO4-L2]**

- ✓ To buy or not to buy.
- ✓ To expect a product to be safe.
- ✓ To expect the product to perform as claimed.

- ✓ To demand for low cost.
- ✓ To demand for a good quality.

**27. What information's should a buyer know? [CO4-L2]**

- ✓ Ingredients of the product
- ✓ Manufacturing date and expiry date
- ✓ Whether manufactured against an established law of nature or involved in rights
- ✓ violation
- ✓ Whether it has side effects or not
- ✓ Its pros and cons

**28. Mention some of the objectives of consumerism. [CO4-L2]**

- ✓ Improve the rights and powers of buyers
- ✓ Make the manufacturers liable for life span of product
- ✓ Force the manufacturer for reuse and recycle
- ✓ Items not able to be recycled given back to manufacturer to collect spare parts
- ✓ Reusable bottle like items reduce the cost of production and avoids pollution
- ✓ Active consumerism increases human health and saves resources

**29. What are the different modes by which wastes generated? [CO4-L2]**

- ✓ Agriculture – pesticides, fertilisers, insecticides, husk plant waste
- ✓ Mining – metallurgy, extracted wastes, slag, used catalyst
- ✓ Industries – textiles, drug, tanneries, plastics, rubber
- ✓ Municipality - bio degradable like animal and human waste etc

- ✓ E- wastes – television, computer, mobile phones, electronic devices

**30. Define e – waste. [CO4-L1]**

E – Waste are nothing but the electronic wastes like computers, television, mobile phones etc. They have more than 1000's of chemicals including lead, cadmium, mercury, chromium all enters in to our bio geochemical cycles which causes cancer respiratory problems etc., there by affecting mankind very badly.

**31. What harmful effects do wastes generate? [CO4-L2-MAY 2012]**

Wastes from industries are dangerous to human health they cause skin diseases and respiratory diseases like asthma, bronchitis etc., and even cancer.

Dumped waste degrades the soil and makes unfit fit for irrigation and generates waste land, uncultivable lands.Plastics non bio degradable and even upon incineration gives out harmful; gases.

**32. People over – population is the reason for waste generation – account. [CO4-L3-NOV 2012]**

It occurs when there are more people than the available supply of food and water. Over population causes degradation of resources, poverty and premature death. This situation occurs in less developed countries like India, Indonesia etc., thus in less developed countries per capita consumption of resources and waste generation are less.

**33. Consumption over – population is the reason for waste generation – justify. [CO4-L2-JUN 2013]**

It occurs when there are less people than the available supply of food and water. Due to the luxurious life style per capita consumption is more the generation of waste is also more and greater will be the degradation of environment. This occurs in more developed countries like USA, UK etc.,

**34. What are the requirements of environmental management? [CO4-L1]**

Environmental management requires a strong legal framework in order to protect our valuable environment from the sources which are causing severe environmental pollution.

The major problems around us are,

- ✓ Air and water pollution by industries.
- ✓ Forestry.
- ✓ Land resources.
- ✓ Urbanization.
- ✓ Waste management.

**35. List out the various important protection act. [CO4-L1]**

The government of India and state government have implemented a number of protection act.

- ✓ Water act.
- ✓ Air act.
- ✓ Wildlife act.
- ✓ Forest act.
- ✓ Environment act.

**36. Write a short note on Air act. [CO4-L1]**

This act was promulgated with the decision taken at the United Nations conference on the Human environment held in Stockholm in June 1972 in which India participated, to take appropriate steps for the preservation of the natural resources of the earth which among other things include the preservation of the quality of air and control the air pollution this act was formed.

**37. List out the objectives of Air act. [CO4-L1-NOV 2015]**

- ✓ Prevent control and abatement
- ✓ Maintain the quality of air
- ✓ Establish a board
- ✓ To confer on and assign such boards powers and functions.

- ✓ To frame the conditions relating to specifications of pollution receipt of theapplication.

**38. List out the objectives of Water act. [CO4-L2-NOV 2014]**

- ✓ Prevention and control
- ✓ Restoring wholesomeness of water
- ✓ Establishing central and state boards
- ✓ The assessing authority under act levies and collects cess based on the amount of water consumed by the industries; the rate also determined by the purpose of use.

**39. Mention the important features of Water act. [CO4-L2]**

- ✓ Protect water from pollution.
- ✓ Preserve water quality.
- ✓ Establishment of central and state board.
- ✓ States are empowered to restrain.
- ✓ Any contravention of guidelines would attract penal action including prison.
- ✓ Wildlife protection act

**40. Write a short note on Wildlife protection act. [CO4-L1]**

This act is aimed to protect and preserve wildlife. Wildlife refers to all animals and plants that are not domesticated. India has rich wildlife heritage. It has 350 species of mammals 1200 species of birds and about 20,000 known species of insects. Wildlife is an integral part of our ecology and plays an essential role in its functioning. The wildlife is declining due to human actions hence this act becomes essential.

**41. List out the objectives of Wildlife protection act. [CO4-L2]**

- ✓ Monitor wildlife populations regularly.
- ✓ To formulate management strategies to protect wildlife.

- ✓ Maintain essential ecological processes and life supporting systems.
- ✓ Preserve biodiversity.
- ✓ Ensure a continuous use of species.

**42. List out the objectives of Forest conservation act. [CO4-L2]**

- o To protect and conserve the forest
- o To protect and conserve the animal resources of forest
- o To protect and conserve the plant resource of forest
- o To ensure judicious usage of forest.
- o To protect and conserve the mineral resources of forest.

**43. Write short note on important features of Amendment Act of 1988. [CO4-L1]**

- o Forbidden to assign any forest land by way of lease.
- o Forbidden to assign any forest land to any private person or non-govt body.
- o Forbidden to assign any forest land for reforestation.
- o Clearance of forest land of naturally grown trees for the purpose of reforestation is forbidden.
- o One who violates the law is punishable.

**44. Mention the important features of Forest conservation act. [CO4-L1**

- ✓ The reserved forests shall not be diverted or dereserved without the prior permission of the central government.
- ✓ The land that has been notified as registered for forest may not be used for non-forest purposes.
- ✓ Any illegal non – forest activities within a forest area can be immediatelystopped under act.
- ✓ Environmental protection act

**45. List out the objectives of Environment protection act. [CO4-L2-MAY 2010]**

- Protection and improvement of the environment
- Prevent hazards to all living creatures and property
- Maintain harmonious relationship between humans and their environment
- Safeguards plans and animals in the environment.
- Provides a healthy atmosphere for all living biota.

**46. Mention the important features of Environment protection act. [CO4-L1]**

- ✓ Empowers the GOVT to lay down procedures and safeguards for prevention of accidents
- ✓ Authority to close or prohibit any industry its operation
- ✓ Who violates shall be punishable
- ✓ Violation is continued an additional fine
- ✓ Empowers the officers of CG to inspect the site

**47. Mention the drawbacks of wild life conservation act. [CO4-L1]**

- Ownership certificates for some animal articles often serves as a tool for illegal trading.
- J&K its own WA, hunting and trading of many endangered species prohibited in other states are allowed in J and K.
- Fine of Rs 25,000 or imprisonment for up to 3 years.

**48. List out the various issues on enforcing forest conservation act. [CO4-L1]**

- ✓ Transfers powers from state government to central government
- ✓ Local communities neglected from decision making
- ✓ Tribal people involved in criminal activities
- ✓ Less concentrated on poor people.

**49. What are the drawbacks of pollution related act? [CO4-L1]**

- ✓ Hinders effective implementation of the act in the states.
- ✓ Penalties in the act are very small.
- ✓ A person cannot directly file a petition in the court.
- ✓ Litigation related to environment is expensive.
- ✓ Very expensive to install effluent treatment-plant.

**50. Mention the function of central board in pollution control. [CO4-L1]**

- o Advise central GOVT
- o Plans for prevention and control of pollution
- o Lay down standards
- o Establishes labs for the analysis of air and water samples
- o Technical assistance and guidance to state boards and sponsor

**51. Write the function of state board in pollution control. [CO4-L1]**

- ✓ Right to inspect at all times
- ✓ Encourages research and investigations
- ✓ Educational programme
- ✓ Analyst of board is expected to analyze the sample, submit a report to the board and respective industry
- ✓ Public awareness in environment protection

**52. What are the objectives of public awareness? [CO4-L2-Dec 2009]**

- ✓ Create awareness.
- ✓ Organize meetings, group discussion on development, tree plantation programme.

- ✓ Focus on current environment problems and situations.
- ✓ Train our planners, decision-makers, politicians and administrators.
- ✓ Eliminate poverty by providing employment.
- ✓ Learn to live simple and eco-friendly manner.
- ✓ Write short notes on different methods of creating environmental awareness.
- ✓ Environmental awareness in schools and colleges.
- ✓ Through mass-media.
- ✓ Cinema.
- ✓ Newspapers.
- ✓ Audio- visual media.
- ✓ Voluntary organizations.
- ✓ Traditional techniques.
- ✓ Arranging competitions.
- ✓ Leaders appeal.
- ✓ NGOs.

**53. Define disaster. [CO4-L1]**

It is a geological process and it is defined as an event concentrated in time and space, in which a society or sub-division of society undergoes severe danger and causes loss of its members and physical property.

**54. Define flood. [CO4-L1]**

Whenever the magnitude of water flow exceeds the carrying capacity of the channel within its banks, the excess of water overflows on the surroundings causes floods.

**55. Define Tsunami. [CO4-L1-DEC 2009]**

Tsunami is a Jaoanese means “harbor wave”. „Tsu‟ means “harbor” and „nami‟ means “wave”. A Tsunami is large waves that are generated in a water body when the sea floor is deformed by seismic activity. This activity displaces the overlaying water in the ocean.

**56. How earthquake does occurs? [CO4-L2]**

The earth’s crust has several tectonic plates of solid rock. These plates move slowly along the boundaries. When friction prevents these plates from slipping, stress develops and results in sudden fractures along the fault lines within the plates. This causes earthquakes and the violent vibrations in the earth.

**57. What are landslides? [CO4-L1MAY 2008]**

The movement of earth materials like coherent rock, mud, soil and debris from higher region to lower region due to gravitational pull is called landslides.

## PART-B

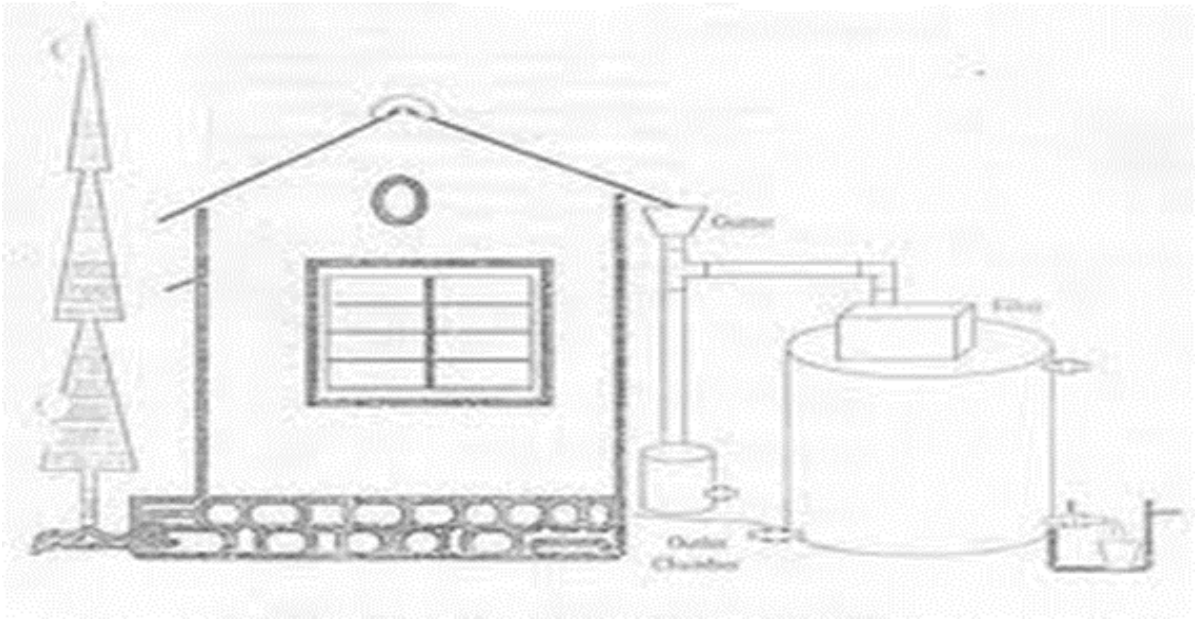
**1. Discuss about rain water harvesting method with a neat diagram. [CO4-L2-JAN 2006, DEC 2008]**

It is the collection and storage of rain from roofs or from a surface catchment for future use. The water is generally stored in rainwater tanks or directed into mechanisms which recharge groundwater. This is appropriate in many parts of the world, such as Western Britain, China, Brazil, Thailand, Sri Lanka, Germany, Australia and India, where there is enough rain for collection and conventional water resources either do not exist or are at risk of being over-used to supply a large population. Rainwater harvesting can provide lifeline water for human consumption, reduce water bills and the need to build reservoirs which may require the use of valuable land.

Traditionally, rainwater harvesting has been practiced in arid and semi-arid areas, and has provided drinking water, domestic water, water for livestock, water for small irrigation and a way to replenish ground water levels

Rainwater harvesting in urban areas can have manifold reasons. To provide supplemental water for the city’s requirement, to increase soil moisture levels for urban

greenery, to increase the ground water table through artificial recharge, to mitigate urban flooding and to improve the quality of groundwater are some of the reasons why rainwater harvesting can be adopted in cities. In urban areas of the developed world, at a household level, harvested rainwater can be used for flushing toilets and washing laundry. Indeed in hard water areas it is superior to mains water for this. It can also be used for showering or bathing. It may require treatment prior to use for drinking.



Types of Systems

There are many types of systems to harvest rainwater. The type used depends on physical and human considerations.

A mechanism can be used to send the initial water flow to waste, usually the first few liters. These are commonly known as ‘first-flush’ diverters, and are used to increase the chance that the large-particle residue that might accumulate on your collection surface is washed away from (and not into) your storage tank. Such a system also compensates for the fact that the initial minutes of a rainfall can include airborne pollutants being washed from the sky, and likewise minimizes contamination of your captured supply. Simple but regular inspection and maintenance of such a device is usually necessary.

1. From the roof tops, bring the rainwater down using closed PVC pipes and direct it to a sump. Include a simple 3-part filtration unit consisting of sand, brick jelly and broken mud bricks.

2. Other types of RWH-collect the ground water and stop their flow at the gate. Put a concrete slab with holes in it, build a 2 feet deep pit, across the full with of the gate. Collect and connect a pipe and flow the water to well or a baby well.

Benefits

1. Rainwater may also be used for groundwater recharge. Where the runoff on the ground is collected and allowed to be absorbed, adding to the groundwater.

2. In India this includes Bawdis and johads, or ponds which collect the run-off from small streams in wide area.

Quality:

As rainwater may be contaminated, it is often not considered suitable for drinking

- ✓ Rainwater harvested from roofs can contain animal and bird fasces, mosses and lichens, windblown dust, particulates from urban pollution, pesticides, and inorganic ions.
- ✓ The water may need to be analyzed properly, and used in a way appropriate to its safety. Harvested rainwater is boiled in parabolic solar cookers before being used for drinking.
- ✓ In general alum and chlorine is added to disinfect water before consumption. Appropriate technology methods such as solar water disinfection, provide low-cost disinfection options for treatment of stored rainwater for drinking.

**2. Write a note on watershed management practice. [CO4-L2-DEC 2008, DEC 2006]**

**Watershed:**

A geographical unit draining at a common point by a system of streams is called watershed. All land everywhere is part of some watershed. Thus watershed is essentially an areas where all the land and water area which contributes run off to a

common point. It is a land area that captures rainfall and conveys the overland flow and run off to an outlet in the main flow channel.

Objectives of watershed management:

1. To control damaging runoff and degradation and thereby conservation of soil and water.

2. To manage and utilize the runoff water for useful purpose.

3. To protect, conserve and improve the land of watershed for more efficient and

sustained production.

4. To protect and enhance the water resource originating in the watershed.

5. To check soil erosion and to reduce the effect of sediment yield on the watershed.

Watershed management practice:

**a. Water harvesting:**

Proper storage of water is done with provision for use in dry seasons in low rainfall areas. It also helps in moderation of floods.

**b.Afforestation and Agroforestry:**

It is an important method to prevent soil erosion and retention of moisture. In hilly regions this will also help in reducing the runoff and loss of fertile soil.

**c. Mechanical measures for reducing soil erosion and runoff losses:**

Methods like terracing, bunding, no-till farming, contour cropping and strip cropping are used to minimize runoff and soil erosion in the slop region. Especially bunding is the best method in reducing runoff, peak discharge and soil loss in hilly region.

**d. Scientific mining and quarrying:**

Contour trenching at an interval of 1 meter on overburden dump, planting some soil binding plants like Ipomoea and Vitex are recommended to reduce the destructive effects of mining.

**e. Public participation:**

Without public including farmers and tribal it is impossible to achieve any success on watershed management. By using mass media and campaign it is possible to create more awareness. By using NGO's also we can increase the success rate of watershed management.

**3. Write short note on national policy on resettlement and rehabilitation for affected families. [CO4-L2-DEC 2009]**

Shifting of people from one location to other and settling them over there for a developmental purpose with a minimum loss is called resettlement and rehabilitation. The people who were shifted from one place to other for this developmental purpose and found affected due to this displacement is called as environmental refugees.

**Rehabilitation issues:**

- ✓ Tribal people affected badly
- ✓ Break up of families
- ✓ Tribal people getting cash compensation not familiar with the market policies and trend
- ✓ Land acquisition laws ignore the communal ownership of property
- ✓ Their cultural activities vanishes
- ✓ Loss of identity and loss of the intimate link between the people and the environment

**Rehabilitation policies:**

- ✓ The extent of damage and suffering should be studied and ascertained before starting the project
- ✓ All those affected should be rehabilitated before the commencement of the project

- ✓ The people rehabilitated on “minimum dislocation basis” by choosing adjacent areas
- ✓ meet the ends of social justice and balanced development

**Tehri dam issues:**

- Tehri dam constructed across rivers Bhaghirathi and Bhilanganga. It submerged nearly 100 villages, including Tehri a historical village 85,600 families were relocated. The region of Tehri becomes vulnerable now to earthquake.

**SardarSarovar dam issues:**

- Sardarsarovar dam build in the Narmada river valley. About 573 villages consisting 10lakh people become homeless and 45,000 hectares of forests and 2, 00, 000 hectares of cultivated lands submerged in Maharashtra.

**4. Write briefly on any two nuclear disasters. [CO4-L2-MAY 2007]**

Nuclear energy when released in to environment it causes serious damage to the living biota and called as nuclear accidents or holocausts.

Nuclear winter: nuclear accident causes combustion of entire thing in that area creating a black soot carried to stratosphere which absorbs the UV radiations and doesn’t allow to pass in to earth thus a cooling effect produced decreasing evaporation of water and a process opposite to global warming occurs.

**Holocaust in Japan:**

In 1945 two nuclear bombs were dropped on Hiroshima and Nagasaki cities in Japan. This holocaust killed about 1, 00,000 people and totally destroyed the city. This explosion emitted powerful neutrons and gamma radiations. The radioactive strontium liberated in the explosion resembles Calcium and has the property of replacing calcium in the bones. As a result large scale bone deformities occurred in the inhabitants of these cities.

**Effects of nuclear radiation.**

- Chemical bonds in DNA will be broken down by radiations which has a prolonged effect for generations
- Low dose radiation cause fatigue, vomiting, loss of hair
- High dose radiation affects bone marrow, blood cells, resistance power decreases
- Very high exposure kills the organism by damaging the cells of brain and heart

**Chernobyl nuclear disaster:**

On April 26th 1986, the world worst nuclear explosion occurred in one of the rectors in Chernobyl power plant in Ukraine. This disaster was caused mainly due to poor reactor design and human error. It killed more than 20,000 people and 3.5 million people have suffered ill because of the accident. Nearly 1,35,000 people had to be evacuated at around it.

**Control measures for nuclear holocausts.**

- Suitable precautions to be taken
- People must be trained to handle the materials
- Constant monitoring of radiation levels is essential
- Regular checks to be carried over by Atomic energy regulatory board

**5. Write notes on wasteland reclamation method. [CO4-L2 -DEC 2006, DEC 2009]**

The land which is not in use is called waste land. The waste land is unproductive, unfit for cultivation, grazing and other economic uses. About 20% of the geographical area of India is waste land.

Type of waste lands

Waste lands can be divided into two types

- ✓ Uncultivable waste lands.

- ✓ Cultivable waste lands.

1. Uncultivable waste lands

These lands cannot he brought under cultivation-Barer rocky areas, hilly slopes, stony or leached arm land (or) sandy deserts. etc.,

2. Cultivable waste lands

These are cultivable but not cultivated for more than five years. Cultivable waste lands are important for agricultural purposes.

Degraded forest lands, Bullied lands, water logged and marsh lands, saline lands, etc..

Causes of waste land formation

- ✓ Due to soil erosion, deforestation, overgrazing, water logging, salinity.
- ✓ The increasing demand for fire wood and excessive use of pesticides.
- ✓ Developmental activities like construction of dams and power projects have caused considerable damage to land due to water logging.
- ✓ Mining activities destroys the forest and cultivable land.

Objectives of wasteland reclamation

- ✓ To improve the physical structure and quality of the soil.
- ✓ To prevent soil erosion, flooding and landslides.
- ✓ To improve the availability of good quality of water for agricultural purposes and industrial operations.
- ✓ To conserve the biological resources and natural ecosystem.

Methods for waste land reclamation

**1. Drainage**

Excess water is removed by artificial drainage. This process is used for water-logged soil reclamation.

**2. Leaching**

Leaching is the process of removal of salt from the salt affected soil by applying excess amount of water. Leaching its done by dividing the field in small plots. In continuous leaching 0.5 to 1.0 cm water is required to remove 90% soluble salts.

**3. Irrigation practices**

High frequency irrigation with controlled amount of water helps to maintain better water availability in the land.

**4. Green - manures and bio fertilizers**

Application of green manure is found to improve the saline soils.

**5. Application of Gypsum and Afforestation:**

Excess of soil salts can be reduced by applying gypsum. Further with the help of afforestation programme 5 million hectares of wasteland is converted in to forest cover National Commission on Agriculture.

**6. Define consumerism, discuss the waste generation and its impact. [CO4-L2-NOV 2013]**

Consumerism corresponds to the consumption of resources by the people in the society. It is an organized movement of citizens and government to improve the rights and power of the buyers. It ensures the quality of the products and safeguards the health of society. In short it assures a quality environment for individuals of a society.

**Rrights of sellers:**

- To introduce any product
- To charge any price
- To spend any amount to improve their product
- To use incentives to promote their product
- To sell to anyone.

**Rights of buyers:**

- To buy or not to buy

- To expect a product to be safe
- To expect the product to perform as claimed
- To demand for low cost
- To demand for a good quality

**Information's a buyer should know:**

- Ingredients of the product
- Manufacturing date and expiry date
- Whether manufactured against an established law of nature or involved in rights
- violation
- Whether it has side effects or not
- Its pros and cons

**Objectives of consumerism:**

- Improve the rights and powers of buyers
- Make the manufacturers liable for life span of product
- Force the manufacturer for reuse and recycle
- Items not able to be recycled given back to manufacturer to collect spare parts
- Reusable bottle like items reduce the cost of production and avoids pollution
- Active consumerism increases human health and saves resources

**Different modes by which wastes generated:**

- Agriculture – pesticides, fertilisers, insecticides, husk plant waste

- Mining – metallurgy, extracted wastes, slag, used catalyst
- Industries – textiles, drug, tanneries, plastics, rubber
- Municipality - bio degradable like animal and human waste etc
- E- wastes – television, computer, mobile phones, electronic devices

**E – waste:**

E – Waste are nothing but the electronic wastes like computers, television, mobile phones etc. They have more than 1000's of chemicals including lead, cadmium, mercury, chromium all enters in to our bio geochemical cycles which causes cancer respiratory problems etc., there by affecting mankind very badly.

**Harmful effects of waste:**

- Waste from industries are dangerous to human health they cause skin diseases and respiratory diseases like asthma, bronchitis etc., and even cancer
- Dumped waste degrade the soil and make unfit fit for irrigation and generates waste land, uncultivable lands
- Plastics non bio degradable and even upon incineration gives out harmful; gases

**People over – population is the reason for waste generation:**

It occurs when there are more people than the available supply of food and water. Over population causes degradation of resources, poverty and premature death. This situation occurs in less developed countries like India, Indonesia etc., thus in less developed countries per capita consumption of resources and waste generation are less.

**Consumption over – population is the reason for waste generation:**

It occurs when there are less people than the available supply of food and water. Due to the luxurious life style per capita consumption is more the generation of waste is also more and greater will be the degradation of environment. This occurs in more developed countries like USA, UK etc.

**7. Explain the Bio medical waste management. [CO4-L2]**

Biomedical waste (management &handling) rule 1998, prescribed by The Ministry of Environment and Forests, Govt of India, came into force on 20th July 1998. This rule applies to those who generate, collect, receive, store, dispose, treat or handle bio medical waste in any manner.Thus bio medical waste should be segregated into containers/bags at the point of generation of waste. Thus Colour Coding & type of containers used for disposal of waste is came into existence which is shown as follows

| **Colour coding** | **Type of container** | **Waste category** | **Treatment options** |
|---|---|---|---|
| Yellow | Plastic bag | ➢ Human anatomical waste<br>➢ Animal waste<br>➢ Microbiology &biotech waste,<br>➢ solid waste | Incineration/deep burial |
| Red | Disinfected container/plastic bag | ➢ Micro&biotech waste<br>➢ Solid waste<br>➢ Solid waste | ➢ Autoclaving<br>➢ Microwaving<br>➢ Chem Rx |
| Black | ➢ Plastic bag | ➢ Discarded medicines<br>➢ Cytotoxic drugs<br>➢ Incineration ash<br>➢ chemicals | ➢ Disposal in secured landfills |

| | | | |
|---|---|---|---|
| Blue/white translucent | ➢ Plastic bag<br>➢ Puncture proof container | ➢ Sharp waste<br>➢ Solid waste | ➢ Autoclaving<br>➢ Microwaving<br>➢ Chem Rx<br>➢ Destruction/ |

**Conclusion**

- ✓ Thus refuse disposal cannot be solved without public education.
- ✓ Individual participation is required.
- ✓ Municipality and government should pay importance to disposal of waste economically.
- ✓ Thus educating and motivating oneself first is important and then preach others about it.
- ✓ Start disposing waste first from within your home, then outside home, then neighborhood, then your street, your area, city and then the nation and the world.
- ✓ Let's make this world a better place to live in.

**8. Discuss the salient features of AIR (prevention and control of pollution) act, 1981. [CO4-L2-JUNE 2005]**

(1) The Central Board may lay down the standards for the quality of air.

(2) The Central Board coordinates and settle disputes between state boards, in addition to providing technical assistance and guidance to State Boards.

(3) The State Boards are empowered to lay down the standards for emissions of air pollutants from industrial units or automobiles or other sources.

(4) The State Boards are to collect and disseminate information related to air pollution and also to function as inspectorates of air pollution.

(5) The State Boards are to examine the manufacturing processes and the control of equipment to verify whether they meet the standards prescribed.

(6) The directions of the Central Board are mandatory on State Boards.

(7) The operation of an industrial unit is prohibited in a heavily polluted areas without the consent of the Central Board.

(8) Violation of law is punishable with imprisonment for a term which may extend to three months or fine up to Rupees ten thousand or both.

This Act applies to all pollution industries. The Air Act, like Water Act, confers wide powers on State Boards to order closure of any industrial unit or stoppage or regulation of supply of water, electricity or other services, if it is highly polluting.

**9. Explain the forest preservation act. [CO4-L2-MAY 2008]**

This act provides conservation of forests and relatedaspects. This act also covers all type of forests including reserved forests, protected forests and any forested land.

This Act is enacted in 1980. It aims at to arrest deforestation.

Important features of Forest Act

(1)The reserved forests shall not be diverted or deserved without the prior permission of the central government.

(2)The land that has been notified or registered or forest land may not be used for non-forest purposes.

(3) Any illegal non-forest activity within a forest areacan be immediately stopped under Act.

Important features of Amendment Act of 1988

(1) Forest departments are forbidden to assign any forest land `by way of lease or otherwise to any private person' or non-government body for afforestation.

(2) Clearance of any forest land of naturally grown trees for the purpose of afforestation is forbidden.

(3) The diversion of forest land for non-forest uses is cognizable offence and anyone who violates the law is punishable.

**10. Write a note on disaster management. [CO4-L2-DEC 2008]**

Disaster is any sudden event of calamity which causes great effect on the human population, plants, animals and property. Disasters are of two types

- ✓ Natural
- ✓ Man made

Natural Disasters

**1. Earthquake**

Sudden tremors of the earth's surface are produced due to movement of tectonic plates under the earth. This displacement of earth's crust releases energy stored within the earth's interior which produces vibratory waves. The intensity of earthquake is measured by Richter scale which ranges from 0 to 9. The point from which the earthquake originates is called as epicenter.

Magnitude of earthquake

Richter scale Effect

Less than 4 insignificant

4-4.9 minor

5-5.9 Damaging

6-6.9 Destructive

7-7.9 Major

More than 8 Devastating

Prevention, Control & Mitigation

(i) Constructing earthquake resistant building in the known earthquake prone zones e.g. wooden houses are preferred in Japan.

(ii) Installation of earthquake study centres studying seismic; activities and analysis of seismic zones.

(iii) There must be insurance policies for earthquake victims to rehabilitate them.

(iv) Creation of special task forces, fully trained and equipped, to manage such calamities within shortest possible time.

**2. Tsunami (Tsu – harbour, nami-wave).**

The impact of earthquake is high at sea area of origin. In this, most serious form of earthquake, giant seismic tidal waves of as high as 100m or more travel at the speed of 1,000 km/hour or faster, away from the epicentre of the earthquake. Tsunamis may also be caused due to underwater volcanic eruptions or seafloor slumping.

Prevention, Control & Mitigation

(i) Planting more trees on the coastal areas.

(ii) Timely warning and speedy evacuation of people.

(iii) Conservation of mangroves in the coastal areas.

(iv) Construction of embankments in inhabitable areas.

(v) Immediate relief and rehabilitation to the affected people.

**3. Drought**

A drought is the drying up condition of the land due to insufficient or absence of rainfall for a long period affecting the vegetation, animal and human life.

Control Measures

(i) Rain water harvesting and canal irrigation.

(ii) Improvement of agricultural practices like dryland forming to conserve water in drought prone areas.

(iii) Stopping paddy cultivation in areas of water scarcity and growing drought resistant variety of crops.

(iv) Promoting social forestry and wasteland reclamation, growing species according to the ecological requirements of the area.

(v) Supplying food, fodder and water to drought-hit people and their rehabilitation with all essential requirements of life.

**4. Flood**

A flood occurs due to continuous heavy rainfall in an area, overflowing of rivers and submerging the surrounding areas damaging life and property.

Control

(i) Various preventive measures are proper embankment of water bodies, building check dams on flood-prone streams, prohibiting cultivation in flood plain of rivers and growing forests and perennial trees, interlinking of river of the country and constructing houses on raised platforms and supported by reinforced stilts.

(ii) Floods can be controlled by collecting data from meteorological department and alerting the people of affecting area.

(iii) Educating the people about the steps to be taken in the event of disaster.

(iv) Hill slopes and catchment areas of rivers must be afforested and reforested.

**5. Cyclones.**

A cyclone is powerful circular or oval swirling storm of high velocity wind in the coastal regions of Indian Ocean.

It is called hurricane in Atlantic Ocean, typhoon in Western Pacific and Willy-willy in sea around Australia.

Control

(i) Afforestation of coastal areas is the best measure.

(ii) Construction ol’dams, embankments, wind breakers etc.

(iii) Conservation of mangrooveS in coastal plains.

(iv) Better forecast, warning systems with the help of remote sensing satellites.

(v) Construction of cyclone proof houses and building in coastal areas.

**6. Landslides.**

Landslide is the sudden down slope movement of a mass of rock or soil due to gravitational pull, generally in the rainy season or due to soil erosion.

Control

(i) Reforestation in the landslide prone areas is the best measure.

(ii) There should be no construction activity in sloppy areas in the hilly region.

(iii) Proper drainage of surface and sub surface water.

(iv) Making concrete support at the base of slope along the road.

(v) Construction of curved stone blocks in the risky areas.

## UNIT-5-HUMAN POPULATION AND THE ENVIRONMENT

## PART-A

1. **Define population. [CO5-L1]**

Population is defined as a group of individuals belonging to the same species, which live in a given area at a given time. All the human beings of the world are connected biologically by the act of marriage and interbreeding. Human population is the most powerful factor in bringing about much change in the environment.

2. **What is meant by population density? [CO5-L1-*Nov/Dec-2011]***

It is expressed as the number of individuals of the population per unit area or per unit volume. This varies in response to changes in the environment and introduction with other living organism.

3. **What are the parameters affecting population size. [CO5-L1-*Nov/Dec-2010]***

Changes in population size are governed by 4 parameters. They are,

**Birth rate or Natality-** It is the number of live births per 1,000 people in a population in a given year.

**Death rate or Mortality-** It is the number of live deaths per 1,000 people in a population in a given year.

**Immigration-** It denotes the arrival of individuals from neighboring population.

**Emigration-** It denotes the dispersal of individuals from the original population to new areas.

4. **What was the general trend of the population growth? [CO5-L1]**

The rapid growth of the global's population for the past 100 years results from the difference between the rate of birth and death. In 1880, the global population was about 1 billion people. It took about 130 years (1930) to reach 2 billion people. But the population reached to 4 billion within 45 years (in 1975). Now we have already crossed 6 billion and may have to reach about 10 billion by 2050 as per the World Bank calculations.

5. **What do you mean by population dynamics and demography?**

**POPULATION DYNAMICS-** In studying populations, we are concerned not only with their size, but with the way in which populations change over time. The study of population change is known as population dynamics.

**DEMOGRAPHY-** The statistical study of human populations is called demography. Demographers take into account the age distribution and sex ratio of human populations, as well as their size, in order to make future predictions about population growth.

6. **List out the causes of rapid population growth. [CO5-L1]**

The rapid population growth is due to decrease in death rate and increase in birth rate.

i) The availability of antibiotics and immunization.

ii) Increased food production clean water and air decrease the famine related deaths and infant mortality.

iii) In agricultural based countries, children are required to help parents in the fields that are why population increases in the developing countries.

7. **List out the characteristics of population growth. [CO5-L1]**

i) Exponential growth

ii) Doubling time

iii) Infant mortality rate

iv) Total fertility rates

v) Replacement level

vi) Male-female ratio

vii) Demographic transition

8. **What is exponential growth of population? [CO5-L1]**

Now population growth occurs exponentially like 10, $10^2$, $10^3$, $10^4$ etc., which shows the dramatic increase in global population in the past 160 years. In the exponential growth pattern, two individuals become four, four individuals become eight; eight individuals become sixteen; sixteen individuals become thirty two and so on.

**2 ⟶ 4 ⟶ 8 ⟶ 16 ⟶ 32 ⟶ 64**

9. **What is meant by doubling time in population growth? [CO5-L1-*Nov/Dec-2011, May/June-2009]***

It is the time required for a population to double its size at a constant annual rate. It is calculated as follows.

$T_d$ (Doubling Time) = 70 / r

Where r = annual growth rate. If a nation has 2% annual growth its population will double in next 35 years. At the time of independence, India's population were 45 crore. The population was 90 crore in the year 2000. Therefore, one doubling time for India is about 50 years.

**11. Write a note on infant mortality rate and total fertility rate. [CO5-L1]**

**INFANT MORTALITY RATE**: It is the percentage of infants died out of those born in one year. Even though this rate has decreased in the last 50 years, the pattern differs widely in developing and developed country.

**TOTAL FERTILITY RATE:** It is the average number of children delivered by a woman in her lifetime is called TFR. The TFR value varies from 2 in developed countries to 4.7 in developing countries.

***12.*** **Write about the environmental issues of population growth? [CO5-L1-*Nov/Dec-2011]***

i) Increasing demands for food and natural resources.

ii) Inadequate housing and health services.

iii) Loss of agricultural lands.

iv) Unemployment and socio-political unrest.

v) Environmental pollution.

**13. Classify variation of population based on age structure. [CO5-L1]**

The different age groups of a population can be represented in the form of a graph called age pyramid. The age pyramid is also called population pyramid. The structure of population can be classified into three classes

i) Pre-productive population (0-14 years).

ii) Reproductive Population (15-44 years).

iii) Post reproductive population (above 45 years).

**14. List out the importance of age pyramids. [CO5-L1]**

i) It gives the percentage of different age groups in a country.

ii) It gives the age and sex of a population.

iii) It shows the pattern of growth of a population.

iv) It shows the growth variation of different countries.

v) It shows that there are more females than males in the older age groups, due to female are longer life expectancy.

vi) It functions as a blue print for showing population dynamics.

***15.*** **What is meant by population explosion? [CO5-L1-*June-2013, Nov/Dec-2012, 2011,2010]***

The enormous increase in population, due to low death rate (mortality) and high birth rate (Natality), is termed as population explosion. The human population is not increasing at a uniform rate in all parts of the world. During population explosion the population increases in an alarming rate, the population grows vigorously.

***16.*** **Define population equilibrium and population equation. [CO5-L1-*Dec-2009]***

**POPULATION EQUILIBRIUM-** A state of balance between birth rate and death rate in a population is known as population equilibrium.

**POPULATION EQUATION-** $P_{t+1}=P_t+ (B-D) + (I-E)$

Where $P_t$ and $P_{t+1}$=sizes of population in an area at two different points in time t and t+1

B=Birth rate, D= Death rate, I=Immigration, E= Emigration

**17. What are the consequences of population growth on the food and water resources? [CO5-L2]**

i) In china about 80 million are now malnourished and hungry.

ii) As the world population expands, the food problems will become increasingly severe, conceivably with the numbers of malnourished reaching 3 billion.

iii) Reports from the FAO of the UN, numerous other international organizations, and scientific research also confirm the existence of this serious food problem.

iv) Competition for water resources among individuals, regions, and countries is already occurring with the current world population.

v) In china where more than 300 cities already are short of water, these shortages are intensifying.

***18.*** **Mention the causes of population explosion. [CO5-L1-*Nov/Dec-2009]***

Invention of modern medical facilities reduces the death rate (mortality) and increases the birth rate (Natality), which leads to population explosion.

i) Increase of life expectancy is another important reason for the population explosion.

**Example:** In 1950, the average life expectancy of the human being was 40 years but now it is 61 years.

ii) Illiteracy is one of the reasons for the population explosion.

iii) Lengthening of age, suitable climate, and increase in fertility.

**19. What is Human Development Index and population momentum? [CO5-L2-*April/May-2011]***

**HUMAN DEVELOPMENT INDEX**- Human Development Index is a comparative measure of life expectancy, literacy, education, and standards of living for countries worldwide. It is uses to distinguish whether the country is a developed, a developing or an under-developed country.

**POPULATION MOMENTUM-**It refers to population growth at the national level, which would occur even if levels of child bearing immediately declined to replacement level (or) a continuation of population growth for several generations after the population has achieved the ability to replace itself.

***20.* What are the effects of population explosion? [CO5-L1-*Nov/Dec-2009]***

i) Renewable resources are under threat, environmental degradation.

ii) It increases disease, poverty, economic inequality, communal war.

iii) Overcrowding of cities leads to development of slums.

iv) Lack of basic amenities, scarcity of water, lack of sanitation.

v) Unemployment and low living standard of people.

vi) Remedy-immediately reduce fertility rate through birth control programs.

**21. Give reasons for high fertility in India. [CO5-L1]**

i) India has 168 million eligible couples, of which just 44% are currently effectively protected.

ii) Urgent steps are currently required to make contraception more widely available, accessible and affordable.

iii) Increase in food production and distribution.

iv) Inventions in medical technologies (vaccines and antibiotics), along with gain in education and standard of living have lowered the death rate.

**22. What are the main objectives of family welfare programme? [CO5-L2-*Nov/Dec-2011, May/June-2009]***

i) Reduce infant mortality rate to below 30 per 1000 infants.

ii) Achieve 100% registration of births, deaths, marriage and pregnancy.

iii) Encourage late marriages and later child-bearing.

iv) Making family planning available to all men & women, who wanted to choose the number of children and spacing of birth.

v) Constrain the spread of AIDS/HIV.

**23. What is meant by population stabilization ratio? [CO5-L1]**

The ratio is derived by dividing the crude birth rate by crude death rate.

i) **Developed countries-** The stabilization ratio of the developed countries is 1, which is more or less stabilized, inducing zero population growth.

ii) **Developing countries-**The stabilization ratio of the developing countries is nearing 3, which is expected to lower down by 2025.

iii) Stabilization in developing countries is possible only through various family welfare programmes.

**24. What does a family planning programme provide? [CO5-L1]**

Family planning provides educational and clinical services that help couples to choose how many children to have? And when to have them? Such programs vary from culture to culture, but it provides information on birth spacing. Birth

control and health care for pregnant women and infants. It also has reduced the number of legal and illegal abortions per year and decreased the risk of death from pregnancy.

**25. What are the objectives of family planning activities? [CO5-L1]**

i) The famous Red Triangle symbol was introduced to create awareness, on family planning.

ii) "We two, we have two"-former slogan.

iii) "We two, we have one"-later slogan.

iv) "We two, why we need another"-present slogan.

v) Abortion is legalized.

vi) The age of marriage is raised.

**26. How to control fertility by temporary methods? [CO5-L1]**

i) **Condoms**- Condoms are used by males to prevent sperms.

ii) **Copper Ts**- Copper Ts small objects and can be placed by a doctor in the uterus so that the ovum cannot be implanted, even if fertilized. They do not disturb any functions in the woman's life.

iii) Oral contraceptive pills and injectable drugs are available that prevent sperms from fertilizing the ovum.

***27.* What are the modern methods of family planning? [CO5-L1-*Nov/Dec-2009]***

i) **Permanent method:** It is done by a minor surgery.

ii) **Tubectomy-** It is female sterilization done by tying the tubes that carry the ovum to the uterus.

iii) **Vasectomy-** It is male sterilization done by tying the tubes that carry the sperm.

Both are very simple procedures, done under local anesthesia, which are painless and patients have no post-operative problems.

**28. What are the measures adopted by the government to control population growth? [CO5-L1]**

i) The age of marriage is raised from 15 to 19 for girls and from 18 to 21 for boys. It reduces the reproductive periods of people for decreasing birth rate.

ii) Education on population is arranged for all people.

iii) Women's education is arranged via adult education to create awareness about population growth and available measures to control it.

iv) Awareness is created among people through TV, radio, posters, NGO's and voluntary health workers.

v) All methods of contraception are promoted through primary health centres.

vi) All sections of society are made to involve in the population control programmes.

**29. Write about family planning programmes of India. [CO5-L1]**

i) Family welfare programme is the modern name for family planning programme.

ii) India is the first country to take up family planning at national level. India launched the national family welfare programme in 1951 under five year plan.

iii) A central information, education and communication bureau (IEC) was constituted at the national level by the family welfare department and information and the ministry of health and family welfare. It introduced the famous red triangle symbol, nirodh, TV programmes, documentary films, radio programmes and newspaper articles for family planning.

**30. What is the need for family welfare programmes? [CO5-L1]**

i) To check population explosion.

ii) To have a limited family.

iii) To reduce the birth rate.

iv) To limit the number of pregnancies.

v) To reduce infant mortality.

vi) To reduce mortality rate.

vii) For the health of the mother.

viii)To have a healthy family.

**31. Write a note on environmental degradation due to population explosion. [CO5-L1]**

i) Environmental degradation is caused by dramatic increase in the world population and population densities in different parts of the world.

ii) 15% of the world population controls 85% of the natural resources.

iii) This leads to more exploitation of natural resources.

iv) People living in urban areas produce little food but consume more natural resources and generate more wastes, polluting the environment.

v) The environment is polluted due to man-made activities.

**32. Write about physical hazards and health effects of environment and human health. [CO5-L1]**

**Radioactive radiation-** affects cells in the body and the function of glands and organs, suffer from cancer.

**UV radiations**- skin cancer.

**Global warming-** temperature increases causes famine ,mortality.

**Noise-** painful and irreparable damage to human ear.

**33. Write about chemical hazards and health effects of environment and human health. [CO5-L1]**

A large number of chemicals are introduced in the environment by anthropogenic activities.

**Combustion of fossil fuels:** astma, bronchitics,and other lung disease

**Industrial effluent:** kill cells and causes cancer and death

**Heavy metals:** contaminate water, cause ill effects.

**Chloro fluro carbon:** damage $O_3$, allows more UV rays, cause skin cancer

**34. Mention the preventive measures to live a healthy lifestyle. [CO5-L1]**

i) Always wash hands before sitting for food.

ii) Cut short and clean your nails systematically.

iii) Drinking chemically treated and filtered water.

iv) Eat food always while it is in hot condition.

v) Wash fruits and vegetables before consumption.

vi) Avoid plastic and aluminum containers.

vii) Do simple exercises daily for proper blood circulation in the body.

**35. Write a note on NIMBY SYNDROME. [CO5-L1]**

NIMBY means Not In My Back Yard.

It describes the opposition of residents to the nearby location of something they consider undesirable, even if it is clearly a benefit for many.

**Examples**- An incinerator, an ethanol plant, a nuclear power plant, a prison.

An Airport is a typical example of a NIMBY complex. It benefits a city economically, but no-one wants it near them because of the noise pollution and traffic it generates.

**36. How do you control environmental health hazards? [CO5-L1]**

i) Integrated approaches must be encouraged in working places.

ii) Safer substitutes must be developed.

iii) Physical conditions of the working environment such as temperature, humidity, noise, light, radiation etc. must be suitably adjusted to reduce the particle emission.

iv) The Factories Act, 1948 should strictly be followed while inspecting the factories.

v) The habitat should be improved to reduce diseases due to environmental pollutants.

**37. Write about Human Rights. [CO5-L1]**

Human rights are the fundamental rights, which are possessed by all human beings irrespective of their caste, nationality, sex and language. These rights cannot be taken away by any legislature or any government act. As natural rights they are seen as belonging to men and women by their nature. The aim of our government is to ensure happiness to all the citizens with equal rights, opportunities and comforts. Every citizen must enjoy certain rights and also has certain duties towards the country.

***38.* What is the Universal Declaration of Human Rights? [CO5-L1-*Nov/Dec-2010]***

Universal Declaration of Human Rights (UNDHR) by the UNO was established in 1948. Some of them globally accepted are as follows:

i) Human right to freedom

ii) Human right to property

iii) Human right to freedom of religion

iv) Human right to culture and education

v) Human right to constitutional remedies

vi) Human right to equality

**39. Write about Human Right to freedom. [CO5-L1]**

i) Every citizen has the freedom to express his views freely.

ii) Citizens can assemble at any place to express their views.

iii) They have freedom to form unions or associations.

iv) They have freedom to build their houses wherever they like.

v) They have full right to start any profession.

**40. What is education? [CO5-L1]**

Education is nothing but learning, through which knowledge about the particular thing can be acquired. With the help of our knowledge and experience, we can identify our values to understand ourselves and our relationship with others and their environment. Education is of two types, namely formal education and value education. Formal education is materialistic. Value education imparts social, moral, cultural, spiritual and human values.

**41. Mention the types of education. [CO5-L1]**

**Formal education-** All learning process in formal education is self-related. All people will read, write, will get good jobs and tackle any problems only with the help of formal education.

**Value education-**It is an instrument used to analyze our behavior and provides proper direction to our youths. It teaches them the distinction between right and wrong, to be compassionate, helpful, loving generous and tolerant. So that, a youth can moves toward the sustainable future.

**42. Give a note on value based environmental education. [CO5-L1]**

i) It provides knowledge about the principle of ecology, fundamentals of the environment and biodiversity.

ii) It creates a sense of duty to care for the natural resources and to manage them in a sustainable way.

iii) When environment gets degraded it affects our health, well-being and our future.

iv) So, it is important to know all about the environment and also have a right to a safe and clean environment.

**43. What are the objectives of value education? [CO5-L1-JUNE 2013]**

i) To improve the integral growth of human being.

ii) To create attitudes and improvement towards sustainable lifestyle.

iii) Increase awareness about our national history, our cultural heritage, constitutional rights, national integration, community development and environment.

iv) To create and develop awareness about the values and their significance and role.

v) To understand about our natural environment in which how land, air and water are interlinked.

**44. Write about the concept of value education. [CO5-L1-*May/June-2014]***

The following is the concepts of values in environmental education.

i) Why and how can we use less resources and energy?

ii) Why do we need to keep our surroundings clean?

iii) Why should we use less fertilizers and pesticides in farms?

iv) Why it is important for us to save water and keep our water sources clean?

v) Separate our garbage into degradable and non-degradable types before disposal.

**45. What are the methods of imparting value education? [CO5-L1]**

i) **Telling-**It is a process of developing values to enable a pupil to have a clear picture of a value-laden situation by means of his own narration of the situation.

ii) **Modeling-**It is a method in which a certain individual perceived as ideal values is presented to the learners as a model.

iii) **Role playing-** Acting out the true feelings of the actors by taking the role of another person.

iv) **Problem solving-** It is a method wherein a dilemma is presented to the learners asking them what decisions they are going to take.

v) **Studying biographies of great men**- This method makes use of the great men as the subject matter for trying to elicit their good deeds.

**46. Write about universal and cultural values. [CO5-L1]**

**Universal values-** Universal values tell us about the importance of the human conditions. These values are reflected in life, joy, compassion, tolerance, service, truth.

**Cultural values-** Cultural values vary with respect to time and place. These values are concerned with right and wrong, good and bad, true and false and behavior of human beings. It is reflected in language, aesthetics, education, law, economics, and philosophy.

**47. Write a short note on HIV/AIDS. [CO5-L1]**

AIDS is Acquired Immuno Deficiency Syndrome. It is a viral disease, contagious disease, sexually transmitted disease. As it is received from an infected person, it is said to be acquired.AIDS is caused by the infection of an RNA virus on lymphocytes. As a result the activity of T-helper cells depressed. This leads to the suppression of the immune system. Hence, the name Immuno Deficiency. AIDS was first discovered in America in 1981. Now this disease is found in all countries.

**48. Write about the origin of HIV/AIDS. [CO5-L1]**

- **Through African Monkey**-Most of the evidences have suggested that the AIDS has spread from Africa. It has believed that the HIV has transferred to humans from African monkey or chimpanzees.
- **Through Vaccine Programmes**

a) HIV has spread in Africa through HIV contaminated polio vaccine, prepared from monkey's kidney.

b) It had spread through hepatitis-B viral vaccine in Los Angeles & New York.

c) It had also spread through small pox vaccine programme of Africa.

**49. What are the factors influencing modes of transmission of HIV? [CO5-L1]**

i) HIV from infected person can pass to a normal person through blood contact, generally during unprotected sex with infected person.

ii) Using needles or syringes, contaminated with small quantities of blood from HIV positive person, also transmit HIV to others.

iii) It can also pass from infected mothers to their babies during pregnancy, delivery or breast feeding.

iv) Blood transfusion from the infected person, at the time of accidents or pregnancy also results in HIV/AIDS.

**50. Write about the functions of HIV in human body. [CO5-L2]**

AIDS itself does not kill humans. The death occurs due to the attack by diseases because of the weakening of immune system. WBC responsible in the formation of antibodies, are called T-helper cells.T-helper cells are the key infection fighters in the immune system. The HIV enters into the human body and destroys the T-cells; as a result various types of infection diseases occur. Even cancer can easily develop in the HIV infected persons.

**51. What are the major and minor symptoms of HIV/AIDS? [CO5-L2]**

**MAJOR SYMPTOMS OF HIV/AIDS**

i) Fever for more than a month.

ii) Diarrhea for more than 1 month.

iii) Cough and TB for more than 6 months.

iv) Fall of hairs from the head.

v) 10% of body weight gets reduced within a short period.

**MINOR SYMPTOMS OF HIV/AIDS**

i) Persistant cough for more than 1 month.

ii) General skin disease.

iii) Viral infection.

iv) Fungus infection in mouth and throat.

v) Frequent fever, headache, and fatigue.

***52.* Write about the preventive measures of HIV/AIDS. [CO5-L1-*Nov/Dec-2009]***

i) **Education**- health education enables people to avoid indiscriminate sex and encourages the use of condoms.

ii) **Prevention of blood borne HIV transmission**-Blood should be screened for HIV before transmission and strict sterilization practices should be followed.

iii) **Primary health care**- AIDS awareness programme should be encouraged. Voluntary health agencies should participate in large.

iv) **Counselling services**-it should be provided either in person or through telephone.

v) **Drug treatment**- Testing HIV positive does not mean the end. Seeking early medical care and staying active are very vital in managing HIV.

**53. Enumerate the effects of AIDS. [CO5-L2]**

i) Large number of death occurs, which affects environment and natural resources.

ii) Due to large number of deaths, there is loss of labour and level of production decreases.

iii) More water is required for maintaining hygiene in AIDS affected locality.

iv) The people affected by HIV, cannot perform work well due to lack of energy and frequent fever and sweating.

v) The disease producing germs of various types freely enter the body and cause a variety of diseases.

**54. Give a note on diagnosis of HIV/AIDS. [CO5-L2]**

AIDS is diagnosed by two methods:

- ELISA- Enzyme Linked Immuno Sorbent Assay
- Western Blotting

**ELISA-**ELISA is a technique to identify AIDS patients when HIV is present in a man, his blood will contain antibodies against HIV. ELISA identifies these antibodies.

When HIV antibodies are present, the patient is called HIV positive. When HIV antibodies are absent, the patient is HIV negative.

**WESTERN BLOTTING-**Western blotting is a confirmation test for HIV. It detects the HIV antibody of the AIDS patient. It costs only about Rs.500/-. In this method, the proteins of HIV are separated by gel electrophoresis.

**55. What is the need of women welfare?**

i) Generally women suffer gender discrimination and devaluation at home, at work place, in matrimony, in public life and power.

ii) High number of cases of dowry deaths, rape, domestic violence, criminal offences and mental torture to women.

iii) Human rights of women are violated in the male dominated society.

iv) Generally in policy making and decision making process, women are neglected.

**56. What are the objectives of women welfare? [CO5-L2]**

i) To provide education.

ii) To impart vocational training.

iii) To generate awareness about the environment.

iv) To improve the employment opportunities.

v) To aware problems of population.

vi) To restore the dignity, status. Equality and respect for women.

**57. What are the various schemes of various organizations towards women welfare? [CO5-L2]**

i) The National Network for Women and Mining (NNWM)-it is fighting for a “gender audit” of India’s mining companies.

ii) United Nations Decade for Women- It witnessed inclusion of several women welfare related issues on international agenda.

iii) International Convention on the Elimination of all forms of Discrimination Against Women (CEDAW).

iv) Non-Government Organizations (NGO's) as Mahila Mandals.

v) Ministry for Women and Child Development.

**58. Give reasons for child labours. [CO5-L2-*May/June-2014]***

Children occupy nearly 40% of total population. They are the assets of the society.

20 million children in our country are estimated to be working as child labours in hazardous industries like match industry, fire work industry, pottery industry.

i) **Poverty**- Poverty is the main reason to force these children to work in unhealthy conditions.

ii) **Want of money**- Parents require money for their family, so they are in a position to send their children for work.

**59. What are the various schemes organized towards child welfare. [CO5-L2]**

i) **UN Conventions on Rights of Child (or) International Law**-It formulated a set of international standards and measures to promote and protect the well-being of children to our society.

ii) **World summit on children**-It had focused agenda for the well-being of the children.

iii) **Ministry of Human Resource Development (MHRI)-**It concentrates on child's health, education, nutrition, clean and safe drinking water, sanitation and environment.

***60.* What do you meant by EIA? [CO5-L1-*Nov/Dec-2006, Apr/May-2016]***

It is defined as a formal process of predicting the environmental consequences of any developmental projects.

i) It is used to identify the environmental, social and economic impacts of the project prior to decision making.

ii) It foresees the problems at an early stage.

iii) The development of any project such as, industries, construction of dams, laying of roads, construction of bridges etc. needs EIA.

iv) The EIA is conducted by Environmental consultants.

v) The EIA is recorded as an environment statement or report.

***61.* What are the objectives of EIA? [CO5-L2-*May/June-2014]***

The EIA is carried out in two stages. Namely

i) Preliminary Assessment- It is carried out during planning.

ii) Detailed assessment- It is carried on completion of the project.

**OBJECTIVES OF EIA:**

i) To identify the main issues and problem of the parties.

ii) To identify who is the party.

iii) To identify what are the problems of the parties.

iv) To identify why the problems are arise.

**62. List out the benefits of EIA. [CO5-L1]**

i) It provides the basis for better decision making in the procurement of their projects.

ii) Cost and time of the project is reduced.

iii) It promotes grater interaction between the developer and planning and approval authorities.

iv) Performance of the project is improved.

v) Waste treatment and cleaning expenses are minimized.

vi) Usages of resources are decreased.

vii) Biodiversity is maintained and human health is improved.

**63. What is the role of IT in environment protection? [CO5-L1]**

Information technology plays a vital role in the field of environmental education. The broadcasting of information through satellites and computers is called information technology. Information technology helps to study environmental issues using computer, internet and the satellites. IT helps people to monitor the environmental problems in the following ways. It has number of data bases for environment. Some of the databases are the following.

- GIS-Geographical Information System
- GRID-Global Resource Information Database
- NEDS-National Emission Data System
- ENVIS-Environmental Information System.

**PART-B**

1. **Explain the impacts of population growth on environmental issues. [CO5-L2-** ***May-2007, Nov/Dec-2008, Dec-2009]***

   - ❖ The rapid population growth is due to decrease in death rate and increase in birth rate.
   - ❖ The availability of antibiotics and immunization.
   - ❖ Increased food production clean water and air decreases the famine related deaths and infant mortality.
   - ❖ In agricultural based countries, children are required to help parents in the fields that are why population increases in the developing countries.

**CHARACTERISTICS OF POPULATION GROWTH**

**EXPONENTIAL GROWTH OF POPULATION-** In the exponential growth pattern, two individuals become four, four individuals become eight; eight individuals become sixteen; sixteen individuals become thirty two and so on.

**2** → **4** → **8** → **16** → **32** → **64** → so on

Figure: Exponential growth of population

**DOUBLING TIME IN POPULATION GROWTH-** It is the time required for a population to double its size at a constant annual rate. It is calculated as follows.

$T_d$ (Doubling Time) = 70 / r

Where r = annual growth rate. If a nation has 2% annual growth its population will double in next 35 years.

**INFANT MORTALITY RATE**: It is the percentage of infants died out of those born in one year. Even though this rate has decreased in the last 50 years, the pattern differs widely in developing and developed country.

**TOTAL FERTILITY RATE:** It is the average number of children delivered by a woman in her life time is called TFR. The TFR value varies from 2 in developed countries to 4.7 in developing countries.

**REPLACEMENT LEVEL IS HIGH IN DEVELOPING COUNTRIES** -Two parents bearing two children will be replaced by their off spring. Due to infant mortality this replacement level is changed. But, due to high infant mortality the replacement level is generally high in developing countries.

**MALE-FEMALE RATIO**-The ratio of boys and girls should be fairly balanced in a society to flourish. But the ratio has been upset in many countries including China and India the ratio of girls and boys is 100:140.

**DEMOGRAPHIC TRANSITION**-Population growth is generally related to economic development. The death rates and birth rates fall due to improved living conditions. This results in low population growth. This phenomenon is referred to as demographic transition.

**ENVIRONMENTAL ISSUES OF POPULATION GROWTH**

- Increasing demands for food and natural resources.
- Inadequate housing and health services.
- Loss of agricultural lands.

- ❖ Unemployment and socio-political unrest.
- ❖ Environmental pollution.

2. **Discuss the population growth variation among nation. [CO5-L2-*May/June-2011, Nov/Dec-2011, Nov/Dec-2010* ]**

The different age groups of a population can be represented in the form of a graph called age pyramid. The structure of population can be classified into three classes

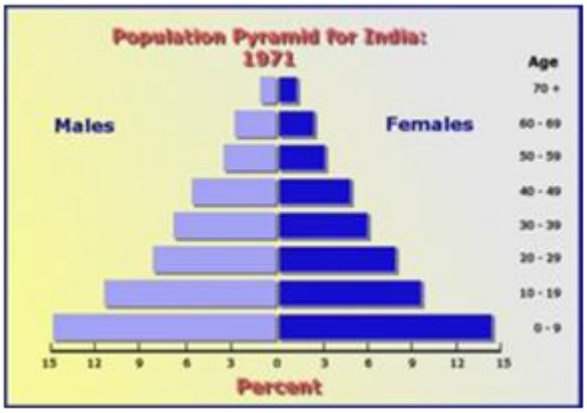
i) Pre-productive population (0-14 years).

ii) Reproductive Population (15-44 years).

**iii)** Post reproductive population (above 45 years).

**PYRAMID SHAPED VARIATION OF POPULATION**

The pre-productive age group population ( 0-14 years) is more, indicated at the base of pyramid, and post reproductive age group population (above 45 years) is less, indicated at the top of pyramid. The large number of young age people will soon enter into reproductive age group population (15- 44 years), which increases the population growth. But the less number of old age people indicates less loss of population due to death.



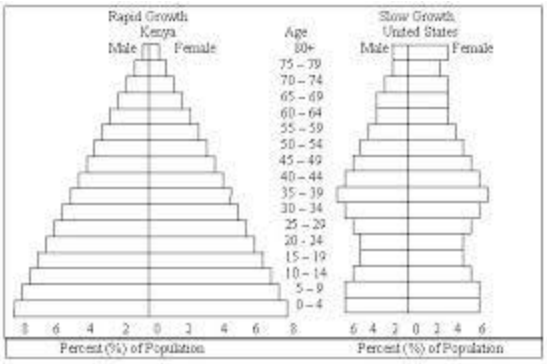

**Example:** India, Bangladesh, Ethiopia, Nigeria.

**BELL SHAPED VARIATION OF POPULATION**

The pre- productive are group population (0-14 years) and reproductive age group population (15-44 years) are more or less equal. So the people entering into the

reproductive age group will not change the population, and thus the population growth is stable. When the pyramid is bell shaped, the population is stable. Such a population remains stable.

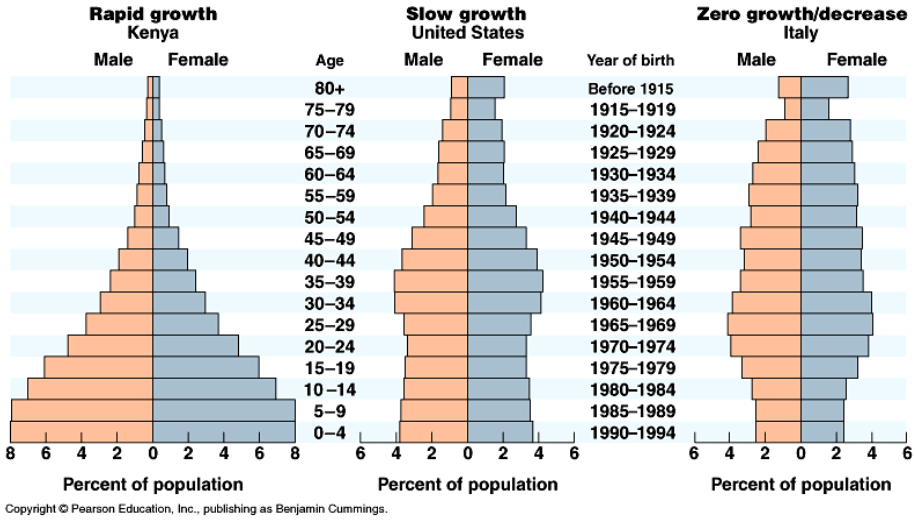
Example: France, USA, UK, Canada, etc.




## URN SHAPED VARIATION OF POPULATION

The pre- productive are group population (0-14 years) is smaller than the reproductive age group population (15-44). When young people are lesser than the reproductive age group the pyramid is urn shaped. It results in a decline of the population. In the next 10 years, the number of people in the reproductive age group is less than the before, resulting in a decrease of population growth.

**Example**: Germany, Italy, Sweden, Japan.



3. **Define population explosion. Explain the environmental and social impacts of growing population. [CO5-L2-*June-2013, Nov/Dec-2011]***

**POPULATION EXPLOSION**- The enormous increase in population, due to low death rate (mortality) and high birth rate (Natality), is termed as population explosion. The human population is not increasing at a uniform rate in all parts of the world. It results in higher population density and rapid deterioration of natural resources available in a country.

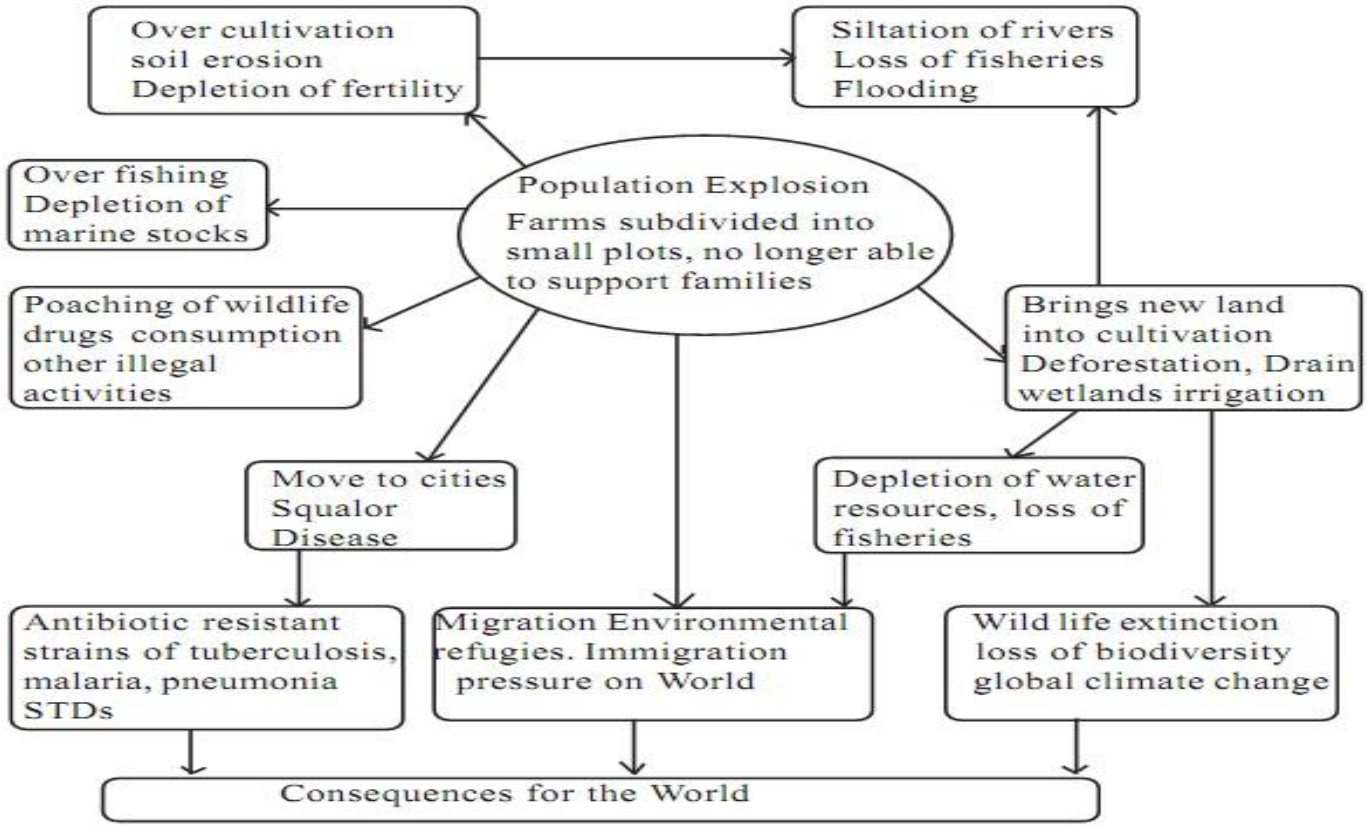
**CAUSES OF POPULATION EXPLOSION**

- Invention of modern medical facilities reduces the death rate (mortality) and increases the birth rate (Natality), which leads to population explosion.
- Increase of life expectancy is another important reason for the population explosion.
- Illiteracy is one of the reasons for the population explosion.
- Lengthening of age, suitable climate, and increase in fertility.

**POVERTY LEADS TO POPULATION EXPLOSION-** Infant mortality is one of the most tragic indicators of poverty. There are still 34 developing countries where more than 1 in 10 children die before he or she reaches the age of five.

**EFFECTS OF POPULATION EXPLOSION**

- Renewable resources are under threat, environmental degradation.
- It increases disease, poverty, economic inequality, communal war.
- Overcrowding of cities leads to development of slums.
- Lack of basic amenities, scarcity of water, lack of sanitation.
- Unemployment and low living standard of people.
- Remedy-immediately reduce fertility rate through birth control programs.




4. **List the reasons for high population growth in India. [CO5-L1-*Nov/Dec-2010]***

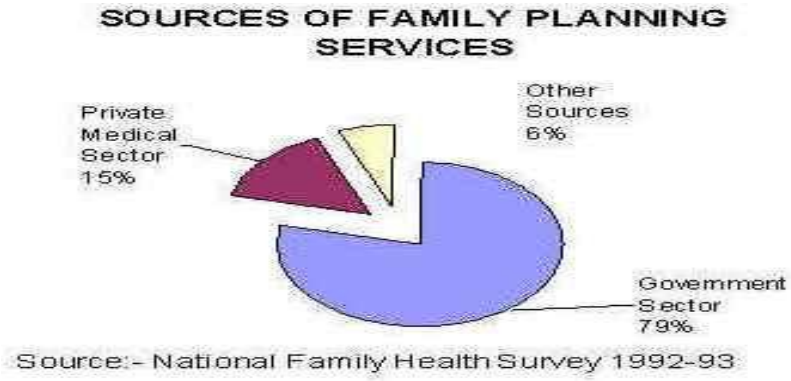
India has 168 million eligible couples, of which just 44% are currently effectively protected.

- Urgent steps are currently required to make contraception more widely available, accessible and affordable.
- Increase in food production and distribution.
- Inventions in medical technologies (vaccines and antibiotics), along with gain in education and standard of living have lowered the death rate.

- Around 74% of the population lives in rural area, in about 5.5 lakh villages, many with poor communication and transport.
- Reproductive health and basic health infrastructure and services often do not reach the villages and accordingly vast number of people cannot avail of these services.
- High wanted fertility due to the high infant mortality rate (estimated contribution 20%).

5. **Discuss the development and implementation of family welfare programme in India. [CO5-L2-*May/June-2014, May/June-2011, Nov/Dec-2010, Nov/Dec-2009]***

**FAMILY PLANNING PROGRAMME PROVIDES-** Family planning provides educational and clinical services that help couples to choose how many children to have? And when to have them? Such programs vary from culture to culture, but it provides information on birth spacing.




**OBJECTIVES OF FAMILY WELFARE PROGRAMME**

- Reduce infant mortality rate to below 30 per 1000 infants.
- Achieve 100% registration of births, deaths, marriage and pregnancy.
- Encourage late marriages and later child-bearing.
- Making family planning available to all men & women, who wanted to choose the number of children and spacing of birth.
- Constrain the spread of aids/HIV.

- Promote vigorously the small family norms.
- Making school education up to age 14 free and compulsory.

**OBJECTIVES OF FAMILY PLANNING ACTIVITIES**

- The famous Red Triangle symbol was introduced to create awareness, on family planning.
- “We two, we have two”-former slogan.
- “We two, we have one”-later slogan.
- “We two, why we need another”-present slogan.
- Documentary films were shown to villagers.
- Tubectomy is done for women.
- Vasectomy is done for men.
- Abortion is legalized.
- The age of marriage is raised.

**FERTILITY CONTROL TEMPORARY METHODS**

**Condoms**- Condoms are used by males to prevent sperms.

**Copper Ts**- Copper Ts small objects and can be placed by a doctor in the uterus so that the ovum cannot be implanted, even if fertilized. They do not disturb any functions in the woman’s life.

Oral contraceptive pills and injectable drugs are available that prevent sperms from fertilizing the ovum.

**MODERN METHODS OF FAMILY PLANNING**

**Traditional method:** It includes some traditions like, taboos, and folk medicine.

**Modern method- permanent method:** It is done by a minor surgery.

**Tubectomy-** It is female sterilization done by tying the tubes that carry the ovum to the uterus.

**Vasectomy-** It is male sterilization done by tying the tubes that carry the sperm.

Both are very simple procedures, done under local anesthesia, which are painless and patients have no post-operative problems.

## MEASURES ADOPTED BY THE GOVERNMENT TO CONTROL POPULATION GROWTH

- The age of marriage is raised from 15 to 19 for girls and from 18 to 21 for boys. It reduces the reproductive periods of people for decreasing birth rate.
- Education on population is arranged for all people.
- Women's education is arranged via adult education to create awareness about population growth and available measures to control it.
- Awareness is created among people through TV, radio, posters, NGO's and voluntary health workers.
- All methods of contraception are promoted through primary health centres.
- All sections of society are made to involve in the population control programmes.

## FAMILY PROGRAMMES OF INDIA

- Family welfare programme is the modern name for family planning programme.
- India is the first country to take up family planning at national level. India launched the national family welfare programme in 1951 under five year plan.
- A central information, education and communication bureau (IEC) was constituted at the national level by the family welfare department and information and the ministry of health and family welfare. It introduced the

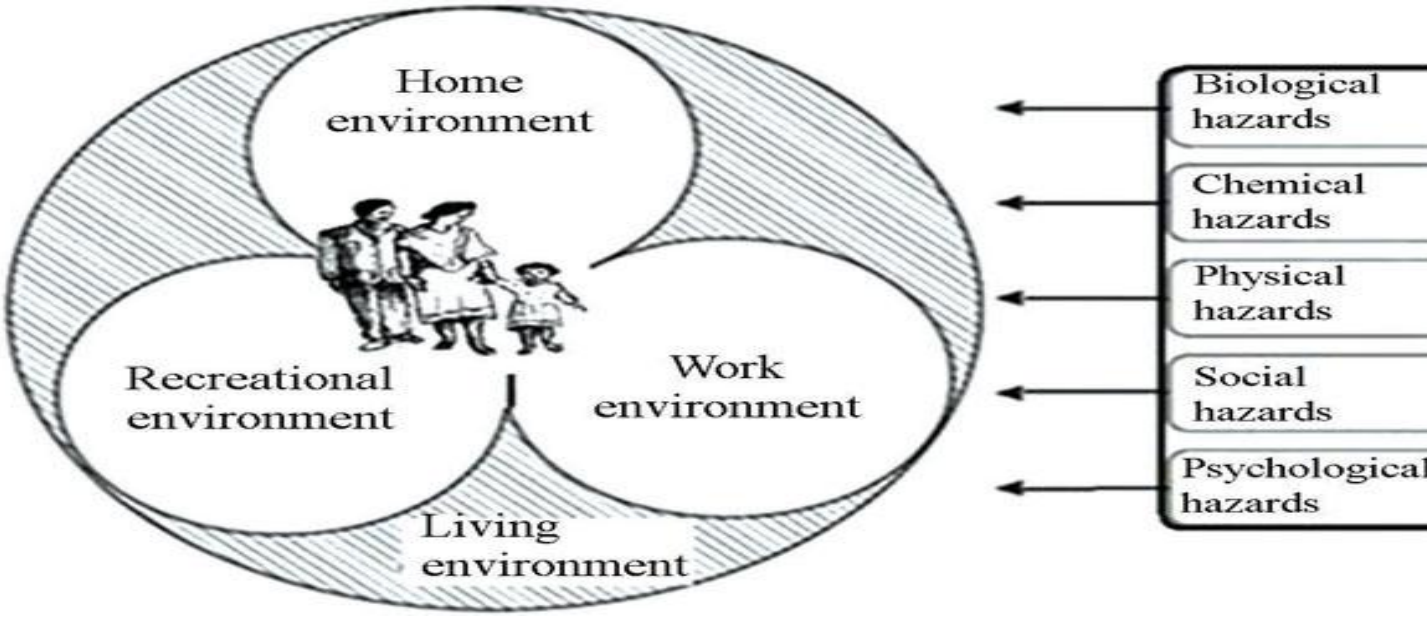
famous red triangle symbol, nirodh, TV programmes, documentary films, radio programmes and newspaper articles for family planning.

**NEED FOR FAMILY WELFARE PROGRAMMES**

- To check population explosion.
- To have a limited family.
- To reduce the birth rate.
- To increase protection against conception.
- To limit the number of pregnancies.
- To reduce infant mortality.
- To reduce mortality rate.
- For the health of the mother.
- To have a healthy family.

6. **Discuss the influence of environmental parameters on human health. [CO5-L2]**

Human health is directly related to the environment to which the people get constantly exposed. Human health and the environment are two inseparable entities. If one gets disturbed other will be automatically disturbed.




**FACTORS INFLUENCING HUMAN HEALTH**- If the environment is pure and clean, the people living there are safe and healthier. If the environment is not clean the people being exposed to it will suffer many health problems. The environment affects human health in two ways- 1.Impacts of pollutants on man, 2. Impacts of quality of working environment on man.

Human health is influenced by

(i) Nutritional factors

(ii) Biological factors

(iii) Chemical factors

(iv) Psychological factors

**ENVIRONMENTAL DEGRADATION DUE TO POPULATION EXPLOSION**

- Environmental degradation is caused by dramatic increase in the world population and population densities in different parts of the world.
- 15% of the world population controls 85% of the natural resources.
- This leads to more exploitation of natural resources.

- People living in urban areas produce little food but consume more natural resources and generate more wastes, polluting the environment.
- The environment is polluted due to man-made activities.

**PREVENTIVE MEASURES TO LIVE HEALTHY LIFESTYLE**

- Always wash hands before sitting for food.
- Cut short and clean your nails systematically.
- Maintaining the skin, teeth, hair of our body.
- Drinking chemically treated and filtered water.
- Eat food always while it is in hot condition.
- Wash fruits and vegetables before consumption.
- Avoid plastic and aluminum containers.
- Do simple exercises daily for proper blood circulation in the body.

**CONTROL OF ENVIRONMENTAL HEALTH HAZARDS**

- Integrated approaches must be encouraged in working places.
- Safer substitutes must be developed.
- Physical conditions of the working environment such as temperature, humidity, noise, light, radiation etc. must be suitably adjusted to reduce the particle emission.
- The Factories Act, 1948 should strictly be followed while inspecting the factories.
- The habitat should be improved to reduce diseases due to environmental pollutants.

7. **What are human rights? Discuss the salient features of the universal declaration of human rights by UNO. [CO5-L2-M*ay/June-2011, Nov/Dec-2011]***


**UNIVERSAL DECLARATION OF HUMAN RIGHTS-** Universal Declaration of Human Rights (UNDHR) by the UNO was established in 1948. Some of them globally accepted are as follows:

- Human right to freedom
- Human right to property
- Human right to freedom of religion
- Human right to culture and education
- Human right to constitutional remedies
- Human right to equality
- Human right against exploitation
- Human right to food and environment
- Human right to good health

**HUMAN RIGHT TO FREEDOM**

- Every citizen has the freedom to express his views freely.
- Citizens can assemble at any place to express their views.
- They have freedom to form unions or associations.
- They have freedom to build their houses wherever they like.
- They have full right to start any profession.

**HUMAN RIGHT TO PROPERTY -**Every human being has the right to earn property.

**HUMAN RIGHT TO FREEDOM OF RELIGION-** Every citizen has the freedom to choose their religion according to his wishes. All religions are equal before the law.

**HUMAN RIGHT TO CULTURE AND EDUCATION-** All the citizens have equal rights both in culture and education. The minority communities like Christians, Muslims have their own rights to conserve the culture, language, and to establish educational institutions of their own choice.

**HUMAN RIGHT TO CONSTITUTIONAL REMEDIES**- If a citizen is denied any of these fundamental rights; he or she can go to the court for protection. The court has the power to protect the basic rights of the citizens.

**HUMAN RIGHT TO EQUALITY**- All citizens are equal before the law. There is no discrimination on grounds of religion, caste, sex or place of birth. All are given equal opportunity for employment.

**HUMAN RIGHT AGAINST EXPLOITATION**-Children should not be employed as labours. Every citizen has the right to fight against exploitation.

**HUMAN RIGHT TO FOOD AND ENVIRONMENT**- All human beings have the right to get sufficient healthy food, safe drinking water and healthy environment.

**HUMAN RIGHT TO GOOD HEALTH**- All human being has the right to have very good physical and mental health.

8. **Discuss the constitutional provisions in India for environmental protection. [CO5-L2- *June-2013]***

**INDIAN CONSTITUTION-** Indian constitution provides for civil, social, cultural, educational and political rights including the right to judicial enforceability.

**Article-14**: It provides for equality before law.

**Article-15**: It prohibits discrimination on the grounds of race, religion, caste, sex or place of birth.

**Article-16**: It provides for equal opportunity for all citizens in matters related to employment.

**Article-19**: It provides freedom for speech and expression, forming associations and unions and so on. **Article-20**: It provides for protection from conviction except in accordance with the law of the land.

**Article-22**: It lays down the rights of a person in custody.

**Article-23**: It prohibits traffic in human beings and all other forms of forced labour.

**Article-24**: It prohibits the explosion of labour children.

**Article-25**: It guarantees freedom to profess, practice and propagate a religion of one's choice.

**Article-26:** It authorizes the right to establish and maintain charitable and religious institutions.

**Article-27:** It prohibits compulsion to pay and tax meant instruction in educational institution.

**Article-28:** It guarantees the secular character of instruction in educational institution etc.,

**Article-29**: It guarantees to the minorities the right to conserve their language etc.,

**Article-30:** It guarantees the right of linguistic minority and religious to establish educational institutions.

9. **Explain the objectives and elements of value education. [CO5-L2-*Nov/Dec-2011, Nov/Dec-2010 Nov/Dec-2009]***

**EDUCATION-** Education is nothing but learning, through which knowledge about the particular thing can be acquired. With the help of our knowledge and experience, we can identify our values to understand ourselves and our relationship with others and their environment. Education is of two types, namely formal education and value education. Formal education is materialistic. Value education imparts social, moral, cultural, spiritual and human values.

**TYPES OF EDUCATION**

**Formal education-** All learning process in formal education is self-related. All people will read, write, will get good jobs and tackle any problems only with the help of formal education.

**Value education-**It is an instrument used to analyze our behavior and provide proper direction to our youths. It teaches them the distinction between right and wrong, to be compassionate, helpful, loving generous and tolerant. So that an youth can move toward the sustainable future.


**VALUE BASED ENVIRONMENTAL EDUCATION**

- It provides knowledge about the principle of ecology, fundamentals of environment and biodiversity.
- It creates a sense of duty to care for the natural resources and to manage them in a sustainable way.
- When environment gets degraded it affects our health, well-being and our future.
- So, it is important to know all about the environment and also have a right to safe and clean environment.

**OBJECTIVES OF VALUE EDUCATION**

- To improve the integral growth of human being.
- To create attitudes and improvement towards sustainable lifestyle.
- Increase awareness about our national history, our cultural heritage, constitutional rights, national integration, community development and environment.
- To create and develop awareness about the values and their significance and role.
- To understand about our natural environment in which how land, air and water are interlinked.
- To know about living and non-living organisms and their interaction with environment.

**CONCEPT OF VALUE EDUCATION-** The following is the concepts of values in environmental education.

- Why and how can we use less resources and energy?
- Why do we need to keep our surroundings clean?
- Why should we use less fertilizers and pesticides in farms?
- Why it is important for us to save water and keep our water sources clean?
- Separate our garbage into degradable and non-degradable types before disposal.

**METHODS OF IMPARTING VALUE EDUCATION**

- **Telling-**It is a process of developing values to enable a pupil to have a clear picture of a value-laden situation by means of his own narration of the situation.
- **Modeling-**It is a method in which a certain individual perceived as ideal values is presented to the learners as a model.
- **Role playing-** Acting out the true feelings of the actors by taking the role of another person.

- **Problem solving-** It is a method wherein a dilemma is presented to the learners asking them what decisions they are going to take.
- **Studying biographies of great men**- This method makes use of the great men as the subject matter for trying to elicit their good deeds.

**TYPES OF VALUES**

**Universal values-** Universal values tell us about the importance of the human conditions. These values are reflected in life, joy, compassion, tolerance, service, truth.

**Cultural values-** Cultural values vary with respect to time and place. These values are concerned with right and wrong, good and bad, true and false and behavior of human beings. It is reflected in language, aesthetics, education, law, economics, and philosophy.

**Individual values-** Individual values are our personal principles and the result of individual personality and experiences. Parents and teachers are the main key to shape our individual values. It is reflected in individual goals, relationships, and commitments etc.,

**Spritual values-** Spiritual values promote conservationism and transform our consumeristic approach. It is reflected in self-restraint, self-discipline, contentment, reduction of wants, etc.,

**Global Values-** Global values stress the concept, that the human civilization is a part of the planet and similarly nature and natural phenomena over the earth are interconnected and inter-linked with special bonds of harmony.

10. **What is AIDS? Discuss briefly on the transmission of HIV and how it can be prevented? [CO5-L3-*May/June-2014, May/ June-2013, Nov/Dec-2012, Nov/Dec-2010, Nov/Dec-2009]***

**General HIV Statistics for Year end 2011**

| | |
|---|---|
| 8 million people have access to anti retrovirals | Increase of 20% since 2010 |
| 2.5 million newly infected with HIV | Reduction of 20% since 2001<br>Only 187 755 related deaths |
| 330 000 kids newly infected | Reduction of 24% since 2009 |
| 1.7 million died from AIDS related causes | Reduction of 24% since 2005 |
| 4.4 million died from AIDS | Since it was discovered 31 years ago |

**HIV/AIDS**

AIDS is Acquired Immuno Deficiency Syndrome. It is a viral disease, contagious disease, sexually transmitted disease.

**ORIGIN OF HIV/AIDS**

**Through African Monkey**-Most of the evidences have suggested that the AIDS has spread from Africa. It has believed that the HIV has transferred to humans from African monkey or chimpanzees.

**Through Vaccine Programmes**

HIV has spread in Africa through HIV contaminated polio vaccine, prepared from monkey's kidney.

It had spread through hepatitis-B viral vaccine in Los Angeles & New York.

It had also spread through small pox vaccine programme of Africa.

**WORLD SCENARIO OF AIDS-** AIDS was first observed in America during 1983, then in western Europe. Now AIDS has a world-wide distribution. AIDS originated in Africa.

- The green peas monkey is the reservoir of AIDS virus.
- The Africans had the habit of rubbing the blood of this monkey on their body during pregnancy celebration. So the african ladies acquired the HIV.
- In 2004 the number of people infected with AIDS was 39.4 million; in 2007 it was 33.2, in 2009 the AIDS population decreased to 30.8 million. In 2010 it was 34million.

- South Africa was the most affected country and it ranked first in having higher AIDS cases in the world.

## FACTORS INFLUENCING MODES OF TRANSMISSION OF HIV

- HIV from infected person can pass to a normal person through blood contact, generally during unprotected sex with infected person.
- Using needles or syringes, contaminated with small quantities of blood from HIV positive person, also transmit HIV to others.
- It can also pass from infected mothers to their babies during pregnancy, delivery or breast feeding.
- Blood transfusion from the infected person, at the time of accidents or pregnancy also results in HIV/AIDS.

## WOMEN AFFECTED BY HIV/AIDS

- Women are more vulnerable to HIV. Biologically the male to female transmission of HIV is 2 to 4 time more efficient than female to male transmission.
- Women around 18-20 years are at more risk, since their cervical tissue is more vulnerable to invading HIV.
- Since the majority of HIV infections occur in women of child bearing age, transmission of HIV to their new born babies happen easily.

## MAJOR SYMPTOMS OF HIV/AIDS

- Fever for more than a month.
- Diarrhea for more than 1 month.
- Cough and TB for more than 6 months.
- Fall of hairs from the head.
- 10% of body weight gets reduced within a short period.

## MINOR SYMPTOMS OF HIV/AIDS

- Persistant cough for more than 1 month.
- General skin disease.
- Viral infection.
- Fungus infection in mouth and throat.
- Frequent fever, headache, and fatigue.

## PREVENTIVE MEASURES OF HIV/AIDS

- **Education**- health education enables people to avoid indiscriminate sex and encourages the use of condoms.
- **Prevention of blood borne HIV transmission**-Blood should be screened for HIV before transmission and strict sterilization practices should be followed.
- **Primary health care**- AIDS awareness programme should be encouraged. Voluntary health agencies should participate in large.
- **Counselling services**-it should be provided either in person or through telephone.
- **Drug treatment**- Testing HIV positive does not mean the end. Seeking early medical care and staying active are very vital in managing HIV.

## EFFECTS OF AIDS

- Large number of death occurs, which affects environment and natural resources.
- Due to large number of deaths, there is loss of labour and level of production decreases.
- More water is required for maintaining hygiene in AIDS affected locality.
- The people affected by HIV, cannot perform work well due to lack of energy and frequent fever and sweating.

- The disease producing germs of various types freely enter the body and cause a variety of diseases.

**DIAGNOSIS OF HIV/AIDS-** AIDS is diagnosed by two methods:

**ELISA-**ELISA (Enzyme Linked Immuno Sorbent Assay) is a technique to identify AIDS patients when HIV is present in a man, his blood will contain antibodies against HIV. ELISA identifies these antibodies. When HIV antibodies are present, the patient is called HIV positive. When HIV antibodies are absent, the patient is HIV negative.

**WESTERN BLOTTING-**Western blotting is a confirmation test for HIV. It detects the HIV antibody of the AIDS patient. It costs only about Rs.500/-. In this method, the proteins of HIV are separated by gel electrophoresis.

11. **Give a brief account on various issues and measures of women and child welfare in India. [CO5-L2-*May/June-2014, May/June-2011, Nov/Dec-2011, Nov/Dec-2010, May/June-2009]***

**NEED OF WOMEN WELFARE**

- Generally women suffer gender discrimination and devaluation at home, at work place, in matrimony, in public life and power.
- High number of cases of dowry deaths, rape, domestic violence, criminal offences and mental torture to women.
- Human rights of women are violated in the male dominated society.
- Generally in policy making and decision making process, women are neglected.

**OBJECTIVES OF WOMEN WELFARE**

- To provide education.
- To impart vocational training.
- To generate awareness about the environment.
- To improve the employment opportunities.

- To aware problems of population.
- To restore the dignity, status. Equality and respect for women.

**WOMEN AFFECTED BY ENVIRONMENTAL DEGRADATION**

The development work not only affects the natural environment but also affects the traditional, social, cultural and family life of women.

**Example-1**-After losing the forest cover and getting rehabilitated from their native places, men usually migrate to towns for some job while the women are left behind to look after family.

**Example-2** Mining projects play havoc with the life of rural women.

Men can still work in the mines or migrate to towns for same job after getting compensation from the government. The displaced women are the worst affected as they do not get any compensation and depend on the men wages.

**PRESENT STATUS OF WOMEN**

- Equal rights in education.
- Women are given 33% reservations.
- Female infanticide is abolished.
- Eve-teasing was reduced through Eve-Teasing Preventing Act.
- Harassing and torturing forb dowry were considerably reduced through Dowry Prohibition Act of 1961.
- The women are well organized through Self-Help Group, they get attractive financial assistance.

**VARIOUS ORGANIZATIONS TOWARDS WOMEN WELFARE**

- The National Network for Women and Mining (NNWM)-it is fighting for a “gender audit” of India’s mining companies.
- United Nations Decade for Women- It witnessed inclusion of several women welfare related issues on international agenda.

- International Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW).
- Non-Government Organizations (NGO's) as Mahila Mandals.
- Ministry for Women and Child Development.

**NEED OF CHILD WELFARE**

Children occupy nearly 40% of total population. They are the assets of the society.

20 million children in our country are estimated to be working as child labours in hazardous industries like match industry, fire work industry, pottery industry.

**REASONS FOR CHILD LABOURS**

Poverty- poverty is the main reason to force these children to work in unhealthy conditions.

Want of money- parents require money for their family, so they are in a position to send their children for work.

**VARIOUS SCHEMES ORGANIZED TOWARDS CHILD WELFARE**

- UN Conventions on Rights of Child (or) International Law-it formulated a set of international standards and measures to promote and protect the well-being of children to our society.
- World summit on children-It had focused agenda for the well-being of the children.
- Ministry of Human Resource Development (MHRI)-It concentrates on child's health, education, nutrition, clean and safe drinking water, sanitation and environment.

**ENVIRONMENTAL DEGRADATION AFFECTS CHILD WELFARE**

Children are most affected due to environmental pollution.

Water borne dieses are the biggest threat to children. Around 6 million children are affected by this disease in India. Even the child growing in the mother's womb, gets affected by environmental toxins.

12. **Explain the role of information technology in environment management with the help of case studies**. **[CO5-L3-*June-2013, Nov/Dec-2012, Nov/Dec-2011, Nov/Dec-2010, May/June-2009]***

Information technology plays a vital role in the field of environmental education. Information technology helps to study environmental issues using computer, internet and the satellites. IT helps people to monitor the environmental problems in the following ways.

- GIS-Geographical Information System
- GRID-Global Resource Information Database
- NEDS-National Emission Data System
- ENVIS-Environmental Information System

**REMOTE SENSING HELPS TO IMPROVE OUR ENVIRONMENT AND HEALTH**

- Remote sensing is a technique of gathering information about any location through images received from satellite.
- The satellite images are useful in planning, coordinating and implementation of strategies for environment.
- Any force field like acoustic, gravity, magnetic, electromagnetic, etc., could be used for remote sensing.

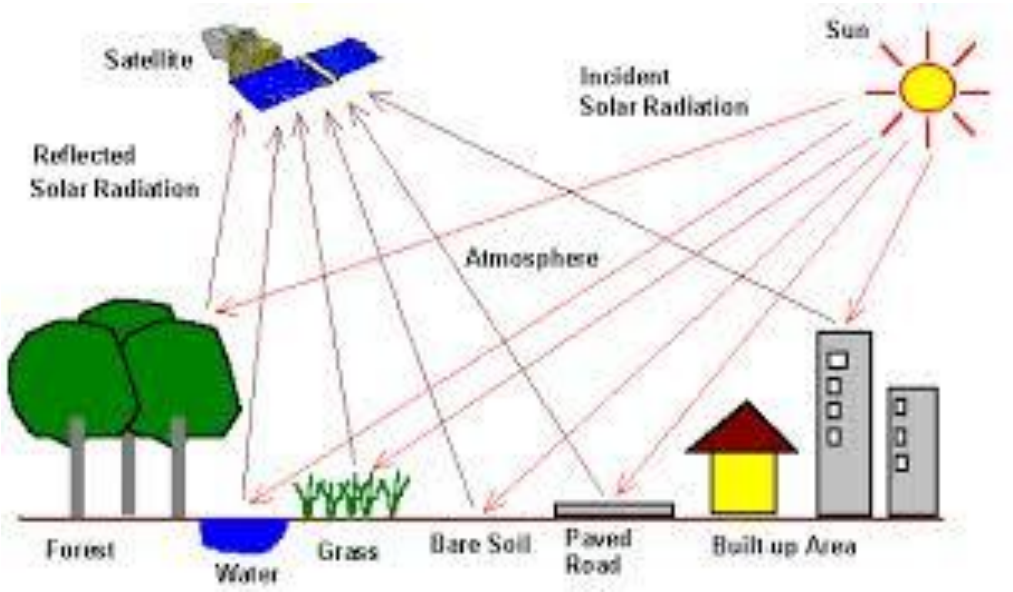
**REMOTE SENSING SYSTEM FOR RESOURCE MANAGEMENT**

- Remote sensing data (image) have been used to derive thematic information on various natural resources and environment.
- The type and level of information extracted depends on the expertise of the analyst and what he is looking in the data.

- Example: the remote sensing image of land can be used to derive information of vegetative cover, water bodies, land use, pattern, geological features, soil etc.,

**APPLICATIONS OF REMOTE SENSING**

- In agriculture-remote sensing can provide valuable information for land and water management.
- In forestry- sustainable forest management requires reliable information on the type, density and extent of forest cover wood volume and density etc., remote sensing provides all such information clearly.




**ROLE OF DATABASE IN ENVIRONMENT PROTECTION-**Database is the collection of inter-related data on various subjects.

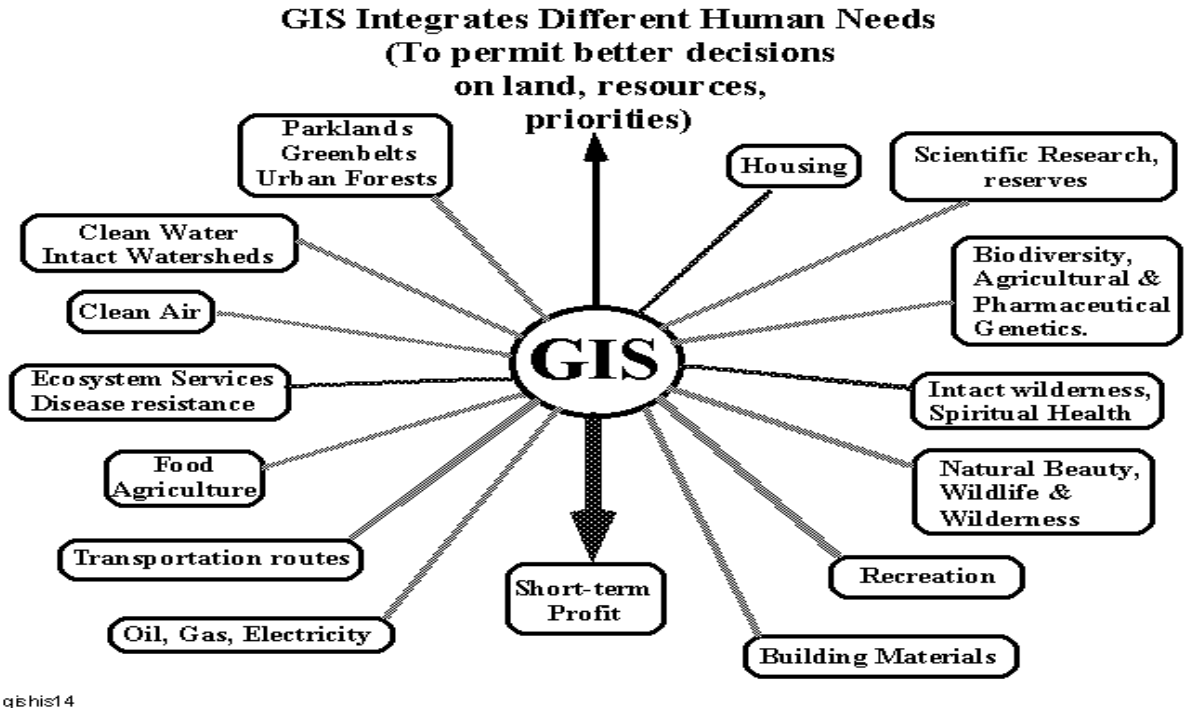
- Database is available for diseases like HIV/AIDS, malaria, fluorosis etc.,
- They are compiling a database on various biotic communities.

**APPLICATIONS OF DATABASE-**

- The science using information technology to study environmental problems is called environmental informatics.
- National Management Information System (NMIS) - they compiled a database on R & D projects along with information about scientists and personnel involved.
- Environmental information System (ENVIS) - It functions in 25 centers all over the country. They generate a network of database in areas like pollution control, clean technologies, remote sensing, biodiversity, environmental management. Desertification etc.,

**GIS AND ITS APPLICATIONS-** GIS is technique of superimposing various thematic maps using digital data on a large number of inter-related aspects.

- GIS uses geographic database for constructing maps, locating natural resources. Demographic analysis, locating polluted zones, generating databases.
- GIS along with GPS (Global Positioning Systems) may be used for tracking of vehicles on route, locating retail outlets, optimize distribution routes, finding short route.
- GIS can be used to check unplanned growth and related environmental problems.




**WORLD WIDE WEB AND ITS APPLICATIONS -** More current data is available on World Wide Web.

**Important on-line learning center:**

1. www.mhne.com/environmental science.
2. Multimedia Digital Content manager (DCM) in the form of CD-ROM

**Application:**

- These on-line learning centres provide the current and relevant information on, principles, problems, queries, application of environmental science.
- It has digital files of photos, power- plant lecture presentations animations web-exercises and quiz. These are useful to both students and teachers of environmental studies.

13. **Explain the role of information technology in human health with the help of case studies. [CO5-L2-*June-2013, Nov/Dec-2012, Nov/Dec-2011, Nov/Dec-2010, May/June-2009]***

**ROLE OF IT IN HUMAN HEALTH SERVICES**

- With the help of IT packages, the data regarding birth and death rates, immunization and sanitation are maintained more quickly.
- It helps the doctors to monitor the health of the people effectively.
- The information regarding the outbreak of epidemic diseases can be conveyed very easily.
- On-line help of expert doctors can be consulted to provide better treatment and services to the patient.
- With a central control system the hospital can run effectively.
- Drugs and its replacement can be administered efficiently.
- Bioinformatics- it is the application of information technology on molecular biology of man and animals.
- Health information technology (HIT) - it is the management of health information using computerized system.
- E-medicine- acquiring prescription of medicine through e-mail is called E-medicine.
- Computer assisted surgery and robotics- surgery is carried out with the help of computer and robots. Robot equipped with artificial intelligence can hear, see, and respond to their environment and help to perform certain operations.
- Telepresence surgery- it is surgery in distance. The doctor looks at the image of the patient in the computer and directs the robot at a distant site to perform surgery.

**CASE STUDIES ON ROLE OF IT IN HUMAN HEALTH PROTECTION:**

**Health Service of New South Wales-** A new IT package was introduced in those health centres to streamline the various operations of the hospitals and help in providing better services to the people.

**National Institute of Occupational Health-** The National Institute of Occupational Health, developed by the Indian government, provides computerized information on occupational health i.e., the health aspects of people working in various hazardous and non-hazardous industries, safety measures, etc.,

14. **Explain the scope, benefits and key elements of EIA. [CO5-L2-*Nov/Dec-2006]***

EIA is defined as a formal process of predicting the environmental consequences of any developmental projects.

- It is used to identify the environmental, social and economic impacts of the project prior to decision making.
- It foresees the problems at an early stage.
- The development of any project such as, industries, construction of dams, laying of roads, construction of bridges etc. needs EIA.
- The EIA is recorded as an environment statement or report.

**TYPES OF EIA-** The following environmental impact assessments are made when a project is implemented.

- Ecological impact assessment
- Climate impact assessment
- Environmental impact assessment
- Health impact assessment
- Social impact assessment
- Technology assessment

**OBJECTIVES OF EIA:**

The EIA is carried out in two stages. Namely

- Preliminary Assessment- It is carried out during planning.
- Detailed assessment- It is carried on completion of the project.
- To identify the main issues and problem of the parties.
- To identify who is the party.
- To identify what are the problems of the parties.
- To identify why the problems are arise.

**BENEFITS OF EIA**

- It provides the basis for better decision making in the procurement of their projects.
- Cost and time of the project is reduced.
- It promotes grater interaction between the developer and planning and approval authorities.
- Waste treatment and cleaning expenses are minimized.
- Usages of resources are decreased.
- Biodiversity is maintained and human health is improved

**STAGES OF EIA**

- **Scoping**- It is used to identify the key issues of the concern in the planning process at an early stage.
- **Screening**-It is used to decide whether an EIA is required or not based on the information collected.
- **Identifying and evaluating alternatives**-It involves knowing alternative sites and alternative techniques and their impacts.
- **Mitigating measures dealing with uncertainty**- It reviews the action taken to prevent (or) minimize the adverse effects of a project.

- **Environmental statements**-This is the final stage of the EIA process. It reports the findings of the EIA.

**PARTICIPANTS TO ENVIRONMENTAL ASSESSMENT PROCESS**

- **The developer**-responsible for initiating and undertaking an environmental assessment process.
- **The planning authority**- The public body with responsibility for considering the environmental effects of a planning application.
- **The secretary of state**- Involved in the environmental assessment decision making process in specific situations.
- **The public**- May become involved in environment assessment in publically sensitive projects, where they may raise issues and objections with the planning authority.