

GE2211 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C 3 0 0 3

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – 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 exsitu conservation of biodiversity. Field study of common plants, insects, birds Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. 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 over-utilization of surface and ground water, floods, drought, conflicts over 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. 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. 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 nongovernmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V 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 – role of information technology in environment and human health – Case studies.

TOTAL= 45 PERIODS

TEXT BOOKS:

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.

REFERENCES:

1. R.K. Trivedi, “Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards”, Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, “Environmental Encyclopedia”, Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, “Environmental law”, Prentice hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan, R, “Environmental Studies-From Crisis to Cure”, Oxford University Press (2005)

**UNIT-I
PART A**

1. Define Environment.

The Physical, chemical and biological presence of living and non-living things outside an individual species is called as its environment.

According to ISO 14001, environment can be defined as, “Surroundings in which an organization operates, including air,water,land, natural resources,flora,fauna,humans and inter relation”.

2. What are all the categories of environment?

The main categories of environment are biotic and abiotic environments. The abiotic environment can further be classified into atmosphere (air),lithosphere(soil),and hydrosphere(water). The biotic environment is called as biosphere.

3. Write the components of environment?

1. Air(Atmosphere)

2. Land(Lithosphere)

3. Water(Hydrosphere)

4. Mention any two awareness programme of environmental issues to student?

1. Participating in seminars and courses related to environment issues.
2. Discussion with people about the environmental problems.
5. Define deforestation?

Deforestation refers to the removal of plants in the forest.

6. List the Causes of deforestation?

1. Slash and Burn farming.
2. Commercial agriculture.
3. Cattle ranching and livestock grazing.
4. Mining and petroleum exploration.
5. Infrastructure development.
6. Fuel wood collection.
7. Tree Plantations.
7. Define Surface water.

Precipitation that does not soak into the ground or return to the atmosphere by evaporation or transpiration is called surface water. It forms streams, lakes, wetlands, and artificial reservoirs.

8. What is Groundwater?

The subsurface area where all available soil and rock spaces are filled by water is called the zone of saturation, and the water in these pores is called ground water.

9. What is Rock?

Rock is any material that makes up a large natural, continuous part of the earth's crust. Some kinds of rock, such as limestone (calcium carbonate, or CaCO_3) and quartzite (silicon dioxide or SiO_2), contain only one mineral, but most rocks consist of two or more minerals.

10. Give the classification of Mineral Resources.

Energy resources (coal, oil, natural gas, uranium, and geothermal energy; metallic mineral resources (iron, copper, and aluminium) and nonmetallic minerals resources (salt, gypsum, and clay, sand, phosphates, water, and soil).

11. Classify food production.

There are two types of food production

1. Industrialized Agriculture
2. Subsistence Agriculture

Intensive Agriculture

12. Define Traditional Agriculture.

Traditional Agriculture can be classified as Traditional Subsistence agriculture and Traditional Intensive agriculture.

Traditional Subsistence agriculture produces enough crops or live stock for a farm family's survival and in good years, a surplus to sell or put aside for hard times.

In Traditional Intensive agriculture farmers increase their inputs of human and draft labour, fertilizer, and water to get a higher yield per area of cultivated land to produce enough food.

13. List some of the food resources available in the world.

Major food sources available in the world to cater the human's hunger are 12 types of seeds and grains, 3 root crops, 20 common fruits and vegetables, 6 mammals,

2 domestic fowl, few fishes and other forms of marine life, etc.

14. Classify energy resources?

Available conventional energy sources can be divided into two categories

- 1) Renewable Energy Sources
- 2) Non Renewable Energy Sources

15. Draw the flow chart of petroleum fractionation process.

Fuel gas, Propane Gasoline Kerosene Furnace Diesel Lubricants Asphalt
Butane liquefied gas oil
Heated crude oil

16. Write the advantages and disadvantages of petroleum as a energy resources?

As a source of energy petroleum has many advantages

- 1) It is relatively cheap to extract and transport
- 2) It requires little processing to produce desired products and
- 3) It has relatively high net and useful energy yield.

However it has certain disadvantages also,

- 1) Produces Environmental pollution
- 2) Oil spills, in ocean cause water pollution and is expensive to clean up.

17. Write short notes on petroleum gas.

It is the mixture of three hydrocarbons butane, propane and ethane. The main constituent of petroleum gas is butane. The above gases are in gaseous state in ordinary

pressure but they can be liquefied under high pressure. So it is called as LPG.

(Liquefied petroleum Gas).

A domestic cylinder contains 14 kg of LPG. A strong smelling substance called ethyl mercaptan is added to LPG gas cylinder to help in the detection of gas leakage.

18. What is fission neutrons?

The fission process is accompanied not only by the release of energy also it releases neutrons called as fission neutrons.

19. Name the several types of nuclear reactors.

1. Light water Reactor(LWR)
2. Heavy water Reactor(HWR)
3. Gas Cooled Reactor(GCR)
4. Boiling Water Reactor(BWR)
5. Pressurised Water Reactor(PWR)
6. Liquid Metal Fast Breeder Reactor(LMFBR)

20. List some of the renewable energy sources.

1. Solar energy
2. Wind energy
3. Hydro energy
4. Geo-thermal energy
5. Ocean thermal energy
6. Biogas

21. Write short notes on Tidal energy.

Tides, the alternate rise and fall of sea water possess lot of energy. The identified tidal power potential in India is around 9000 MW. Currently France, Russia,

china and Canada are effectively utilizing the tidal energy to produce 2 to 3% of their energy demand.

22. Narrate the advantages and disadvantages of the Hydel power.

Hydel power has the following advantages.

1. Clean Source of energy
2. Provides irrigation facilities
3. Provides drinking water to the people living around

It also has some environmental and socio-economic problems like submerged forests

and agricultural land, loss of biodiversity, water logging and silting etc.

23. Define Soil Erosion.

Soil erosion is the movement of soil components, especially surface litter and top soil, from one place to another. The two main movers are flowing water and wind.

24. Write short notes on Desertification.

It is a problem where by the productive potential of arid or semiarid land falls by 10% or more and is caused mostly by human activities.

Desertification is classified into three categories

1. Moderate - Having 10 to 25% drop in productivity
2. Severe - Having 25 to 50% drop in Productivity
3. Very Severe- Having 50% or more, creating huge gullies and sand dunes.

25. List some ways to protect soil.

1. When the buildings are constructed, all the trees shall be saved.
2. Setting a composite bin and it shall be used for producing mulch and soil conditioner for yard and garden planets.
3. Organic methods can be used for growing vegetables.
4. Strictly enforcing laws and policies that minimizes soil erosion, salt buildup and water logging.

26. What is equitable use of resources?

The Equitable use of resources is a concept that deals with the rational use of resources so that a harmony between man's resource requirement and its availability can be established.

UNIT-II PART A

1. Define ecosystem.

Ecosystem has been defined as a system of interaction of organisms with their surroundings. Numerous dynamic interaction are occurring with in an ecosystem and these are complex.

2. List any four characteristics of ecosystem.

- (i). Ecosystem is the major ecological unit
- (ii). It contains both biotic and abiotic components.
- (iii). The boundary of the ecosystem is not rigidly defined and it is flexible.
- (iv). Through the biotic and abiotic components nutrient cycle and energy flow occur.

3. What are the different types of ecosystem

- 1. Natural Ecosystem
- 2. Artificial Ecosystem
- 3. Incomplete Ecosystem
- 4. What are the biotic components of an ecosystem?

- 1. Producers (Autotrophs)
- 2. Consumers (Heterotrophs)
- 3. Decomposers

5. What are the autotrophs?

Producers or Autotrophs are organisms that are capable of making their required food themselves. (Auto =self, troph=feeder). Green plants, grasses, mosses, shrubs, etc., are some of the examples of autotrophic components.

6. Define heterotrophs?

Those organisms which depend on others (Producers-Autotrophs) for their energy requirements are known as Consumers or Heterotrophs. Since the animals are

not having chlorophyll, they are unable to produce their own food.(Hetero=other,troph=feeder).

7. List the abiotic components of an ecosystem.

- 1. Climatic factors-Solar radiation, Temperature, Wind, Water current, rainfall, etc.
- 2. Physical factors-Light, Fire, pressure, etc.,
- 3. Chemical factors – Acidity, Salinity, Inorganic nutrients, etc.,

8. Differentiate between Kinetic energy and Potential energy.

Kinetic energy is the energy possessed by virtue of its motion from one place to another. This is measured by the amount of work done in bringing the body to rest.

9. Define ecological succession.

Ecological succession is defined as the process in which communities of plant and animal species in a particular area are replaced over time by a series of different

and often more complex communities.

10. Define primary succession.

The succession taking place in areas that have not already been occupied by any community is known as primary succession.

11. Define secondary succession.

Development of a new community in an area where the previously existing community was removed and the ecological conditions are favourable is termed as secondary succession.

12. What do you know about autogenic succession and allogenic succession?

Allogenic succession (Allo=outside, genic=related) is the type of development occurred in the ecosystem due to the interaction of external physical forces acting on it.

Autogenic succession (Auto=inside, self propelling) is the type of development occurred in the ecosystem due to the developmental process generated with in the system.

13. What are the characteristics of pioneer species?

1. It has less population.
2. Its nutrient requirement is very less.
3. The rate of growth should be as low as possible.
4. It should be more dynamic to face interspecific and intraspecific competitions.

14. Define seral stage.

Seral stage is defined as the development of secondary community from the pioneers.

Each seral stage appears, grows and finally disappears as the environmental changes

occur. Each seral stage has its particular community called seral community.

15. What are the three theories related to climax communities?

1. Mono climax theory
2. Poly climax theory
3. Climax pattern theory.

16. What do you know about food chain and food web?

A food chain is a picture or model that shows the flow of energy from Autotrophs to a

series of organisms in an environment. The network like interaction of organisms is called

as food web.

17. Name three types of food chains.

- a. Grazing food chain
- b. Detrius or Decomposer food chain
- c. Parasitic food chain

18. Define ecological pyramids.

The representation of amount of energy stored in the bodies of living thing is called as Ecological pyramids.

19. What is a forest?

A forest is a living community of various species of trees and smaller forms of vegetation. This type of biome contains moderate to high average annual rainfall.

20. How can you classify forests?

1. Tropical rain forests
2. Temperate forests
3. Polar (or) Boreal forests

21. What do you know about grasslands?

Grasslands are grassy, windy, partly-dry biome. Almost one- fourth of the Earth's land area is covered by grassland. Any more, the land would become a forest.

Any less, the land would become a desert. The grasslands mostly separate forests

from deserts. Most of the grasslands are found in the interiors of continents and rain shadows.

22. What are the types of grasslands?

1. Tropical grasslands (Savannah)
2. Temperate grasslands
3. Polar grasslands (Tundra)

23. List the three types of savannahs?

- a. Climatic savannah
- b. Edapic savannah
- c. Derived savannah.

24. What are major human impacts on grasslands?

1. Conversion of grassland to cropland
2. Overgrazing of grassland by farm animals.
3. Damage by oil production, air and water pollution and vehicles movement.

25. How do the desert plants adopt to the climate?

Most of the plants have the ability to lack of rainfall. They have widespread roots which are close to the surface. This enables the roots to absorb water quickly, before it evaporates. Plants like 'Cactus' survives because of their thick waxy layer on

the outside of its stems and leaves. This helps to retain water and protect tissues severe sunlight.

26. What are the different types of desert biome?

1. Hot and dry deserts
2. Semiarid deserts
3. Coastal deserts
4. Cold deserts.

27. Define freshwater.

Freshwater is defined as water with less than 1% salt concentration. Plants and animals live in freshwater are adjusted to its low salt concentration.

28. How can you differentiate ponds and lakes?

Ponds are small fresh water bodies surrounded by land and lakes are large fresh water bodies surrounded by land. Most of the ponds are seasonal and exist for just few months of a years or more.

29. What are the different zones of ponds?

1. Littoral zone,
2. Limnetic zone, and
3. Profundal zone.

30. What are estuaries?

The place where freshwater streams or rivers connect together with the salt water are called estuaries.

31. List the importance of estuaries.

- These are important as nursery sites for many kinds of fish and crustaceans like flounder and shrimp
- Mixing of many pollutants in the ocean is prevented by the action of trapping of sediments which are carried by the river.

32. What are coral reefs?

Corals are animals, which contain algae called zooanthellae and tissues of

animal polyp. A reef is a rocky outcrop rises from the sea floor which is made up of calcareous material, concealed by the coral animals themselves and by red and green

algae. Since reef waters tend to be nutritionally poor, corals obtain the required energy from the photosynthetic algae that live in the reef.

33. What are the three basic forms of coral reef?

1. Fringing reefs
2. Barrier reefs
3. Atolls

34. Define bio diversity.

Biodiversity is defined as 'richness of species (micro- organisms, plants and animals) occurring in a given habitat'. It is the sum of genes, species and ecosystems.

35. What are the three types of biodiversity?

1. Genetic Level or Genetic diversity
2. Species Level or Species diversity
3. Ecosystem Level or Ecosystem diversity.

36. Define genetic diversity.

Genetic diversity is the variation of genes within species. Genes are the basic units of all life on earth. They are responsible for both the similarities and the differences between organisms.

37. Define species diversity.

Species diversity is the number of different species of living things available in an area. Species is a group of plants or animals that are similar and able to breed

and produce viable offspring under natural conditions. This type of diversity is the most common level of diversity.

38. Define ecosystem diversity.

Ecosystem diversity is the variety of ecosystems in a given place. An ecosystem is a community of organisms and their physical environment interacting together. An ecosystem can cover a large area, such as a whole forest, or a small area, such as a pond.

39. What are the two main functions of biodiversity?

- a. It is the source of species on which the human compete depends for food, fiber, shelter, fuel and medicine.
- b. It depends on the biosphere, which in turn leads to the stability in climate, water, soil, air, and the overall health of biosphere.

40. Define biogeography.

The study of the geographical distribution of biological species relating to the geological, evolutionary, climatological, geographical, biological reasons for the distribution is called biogeography.

41. What are the three kinds of deserts in India?

1. The desert of western Rajasthan
2. The desert of Gujarat
3. The high-altitude cold desert of Jammu and Kashmir and Himachal Pradesh.

42. Define biodiversity hotspot.

Biodiversity hotspots are areas:

- Rich in plant and animal species, particularly many endemic species, and
- Under immediate threat from impacts such as land clearing, development pressures, salinity, weeds and feral animals.

43. On what basis a region is designated as hotspot?

The biological basis for hotspot designation is plant diversity.

A region is qualified as hotspot, only if the region supports 1,500 endemic plant species, 0.5% of the global total.

A region is qualified as hotspot, only if the region has lost 70% of its original habitat.

44. List some of the major biodiversity threats.

- _ Habitat destruction
- _ Extension of agriculture
- _ Filling up of wetlands
- _ Conversion of rich bio-diversity site for human settlement and industrial development
- _ Destruction of coastal areas
- _ Uncontrolled commercial exploitation

45. What are the main causes of habitat loss?

- _ Agricultural activities,
- _ Extraction (including mining, fishing logging and harvesting) and
- _ Developmental activities (human settlements, industry and associated infrastructure).

46. Define fragmentation.

Fragmentation is defined as the process of division of a population into number of small and smaller groups. Habitat loss and fragmentation leads to the formation of isolated, small, scattered populations.

47. What do you know about conservation of biodiversity?

'Conservation is defined as the management of human use of the biosphere so that it may yield the greatest sustainable benefit while maintaining its potential to meet the needs and aspirations of future generations'.

48. What are the two types of biodiversity conservation?

- a. In-situ conservation and
- b. Ex-situ conservation

49. What do you know about in-situ conservation and ex-situ conservation?

In-situ conservation is defined as the conservation of genetic resources through their maintenance within natural or even human made ecosystems in which they occur.

Ex-situ conservation is defined as the conservation made outside of the habitat of an ecosystem.

UNIT III

PART A

1. Define Air pollution.

Air pollution may be defined as the presence of impurities in excessive quantity and duration to cause adverse effects on plants, animals, human beings and materials.

2. What are the different sources of air pollution?

The two main sources of air pollution are

- a. Natural Sources

b. Man made or anthropogenic sources

Natural sources include dust storms, volcanoes, lightning sea salt, smoke, forest fires, etc. The man made sources are agricultural activities, industrial growth, domestic wastes, automobile exhausts, etc,

3. What do you know about particulate?

In general the term 'particulate' refers to all atmospheric substances that are not gases.

They can be suspended droplets or solid particles or mixtures of the two.

Particulates

can be composed of materials ranging in size from 100µm down to 0.1 µm and less.

The chemical composition of particulate pollutants is very much dependent upon the

origin of the particulate.

4. What are the prime sources of particulate matter?

i. Coal fired power plants

ii. Automobiles

5. Define suspended particulate matter?

Suspended Particulate Matter (SPM) is a complex mixture of small and large particles

with size less than 100µm varying origin and chemical composition.

6. Differentiate between Mist and Fog.

Mist

Mist is made up of liquid droplets generally smaller than 10µm which are formed by condensation in the atmosphere or are released from industrial operations.

Fog

Fog is similar to mist but the droplet size bigger (> 10µm) and water is the liquid.

Fog is sufficiently dense to be incomprehensible vision.

7. What are gaseous pollutants?

These are toxic and poisonous gases such as carbon monoxide, chlorine, ammonia, hydrogen

sulphate, sulphur dioxide, nitrogen oxides and carbon dioxide.

8. What are the major sources of air pollution from automobiles?

The major sources of air pollution from automobiles are

Exhaust pipe -> 70%

Crank case emission -> 20%

Evaporations from fuel tank and Carburettor -> 10%

9. What are effects of air pollution on animals?

Animals take up fluorides of air through plants. Their milk production falls and their teeth

and bones are affected. They are also prone to lead poisoning and paralysis.

10. List some of the effects of air pollution on physical properties of atmosphere.

- Decrease in the visibility
- reduction of Solar radiation
- Effects on weather conditions
- Effects on atmospheric constituents

11. Briefly describe about the impacts of carbon monoxide on human health.

At lower doses, they can impair concentration and neurobehavioral function whereas in

higher doses they can cause heart pain and even death. When inhaled it has the ability to combine with haemoglobin of blood and reduce its ability in transfer of oxygen to the brain, heart, and other important organs. But carboxyaemoglobin contents of blood depend on the CO contents of the air inhaled, time of exposure and the activity of the person inhaling. It is particularly dangerous to babies and people with heart disease.

12. How air pollution can be controlled at source?

- Proper use of the existing equipment
- Change in process
- Modification or Replacement of equipments
- Installation of controlling equipments

13. What are the gaseous control equipments?

- Wet and dry adsorption
- Combustion or Catalytic incineration

14. What are the particulate control equipment?

- Gravitational settling chambers
- Cyclone separators
- Fabric filters (or) Bag filters
- Electrostatic precipitators
- Wet scrubbers (or) Wet collectors

15. What are bag filters?

Bag filters are the woven or non-woven fabrics used to filter the particulate laden gases.

These generally of tubular shape or envelope shape. Its efficiency is about 99% and it can

be used to remove particles small as 0.0mm

16. What are the factors to be considered in selection of type or fabric in fabric filters?

- Temperature of the gas
- Costiveness or abrasiveness of the particles. .

17. Name some of the types of wet scrubbers?

- Spray towers
- Centrifugal scrubbers
- Venturi scrubbers and
- Packed bed columns

18. Define water pollution.

Water pollution is defined as any physical, chemical or biological change in quality of water that has a harmful effect on living organisms or makes the water unsuitable for needs.

19. How can you differentiate point? Source from non-point source of pollution.

Point sources discharge pollutant at a specific place through pipe lines, sewer lines, or ditches into water bodies.

Non point sources discharge pollutants from large and scattered area. These sources

have no specific location.

20. What are the effects of inorganic substances in water?

- Makes the water unfit for drinking and other purposes.
- Corrosion of metals exposed to such waters.
- Causes skin cancers, damages to spinal, CNS, liver and kidneys.
- Reduces crop yield.

21. How do the nutrients from agricultural fields affect the watershed?

Enrichment of nutrients (Eutrophication) from surrounding watershed affects the penetration of light through the water, causing damage to the characteristic of water and aquatic life.

22. Define soil pollution.

Soil pollution is defined as the introduction of substances, biological organisms, or energy into the soil, resulting in a change of the soil quality, which is likely to affect the

normal use of the soil or endangering public health and the living environment.

23. Define marine pollution.

Marine pollution is defined as "Introduction by man, directly or indirectly, of substances or energy into the marine environment (including estuaries) resulting in such

destructive effects harmful to living resources, hazardous to human health, hindrance to marine

activities including fishing, impairment of quality for use of sea-water, and reduction of amenities."

24. What is the cause of noise pollution?

- o Road traffic noise
- o Air traffic noise
- o Rail traffic noise
- o Domestic noise
- o Industrial noise
- o Incompatible land use

25. How can you define thermal pollution?

Thermal pollution can be defined as 'the excessive raising or lowering of water temperature above or below normal seasonal ranges in streams, lakes, or estuaries or oceans

as the result of discharge of hot or cold effluents into such water'.

26. What are solid wastes?

The wastes generated and discarded from human and animal activities that are normally

solid are called as solid wastes.

27. What are solid wastes known as on-site handling?

The activities involved in handling of solid wastes, at the point of generation, until they

are placed in the containers used for their storage before collection are called as on-site

handling. Handling requires to move the filled containers to the collection point and to return

the empty containers to the generation point for the next collection.

28. What is the purpose of on-site processing?

On-site processing of solid wastes is used to recover the reusable materials from the solid

wastes. This process also helps in reducing the volume of solid wastes or altering the physical

form of the solid wastes.

29. Name any three on-site processing methods.

o Manual sorting

o Compaction

o Incineration

30. What are the types of municipal solid wastes collection system?

• 1. Hauled container

• 2. Stationary container systems

31. Mention the three types of containers used in collection of municipal wastes.

o Tilt frame container

o Hoist truck

o Trash trailer

32. What are the main purposes of processing techniques used in solid waste management?

• To improve the efficiency of solid waste management systems

• To recover the usable materials for reuse.

• To recover conversion products and energy.

33. List out the techniques of processing of solid wastes.

• Compaction (Mechanical volume reduction)

• Incineration (Chemical volume reduction)

• Shredding (Mechanical size reduction)

• Component separation

• Drying and Dewatering (Moisture content reduction).

34. Name some of the mechanical separation methods of solid wastes?

• Air separation

• Magnetic separation

• Screening

35. List out the three types of system used in the collection of wastewater.

o Separation System

o Combined System

o Partially Separate system.

36. What is the main objective of sludge digestion?

The main objective of sludge digestion is to break the organic matter of the sludge into liquid and simple compounds which are stable and unfoul in nature.

37. How can you define hazardous wastes?

Wastes that create danger to the living community, immediately or over a period of time, are called as hazardous wastes.

38. Define half-life period.

The half-life of a radioactive substance is defined as the time taken for decaying of half of the material present.

39. What are biomedical wastes?

Biomedical wastes are defined as any solid, semi solid or liquid waste including its

containers and any intermediate product which are generated during diagnosis, treatment or immunization of human being/ animals or in production and testing of biological parts.

40. Can you list out some of the benefits of pollution prevention?

- o Minimizes health risks.

- o Reduces the production of pollutants to a minimum or eliminates them.

- o Accelerates the reduction or elimination of pollutants.

- o Helps avoid transferring pollutants from one medium to another, thereby preventing diffusion in the environment.

- o Helps promote a more effective use of energy, materials and resources.

41. Define tsunami.

A tsunami (pronounced tsoo- nah-mee) is a wave train, or series of waves, generated

in a body of water by an impulsive disturbance that vertically displaces the water.

UNIT IV

PART A

1. State the declaration about the sustainable development.

The Rio declaration states that, "human beings are at the center or concern for sustainable development. They are entitled to a health and productive life in harmony with the nature. Every generation should leave air, water and soil resources without any pollution as pure as it came to the Earth."

2. Define sustainable development.

Sustainable Development is defined as, 'the development to meet the needs of the present without compromising the ability of future generations to meet their own needs.'

3. What are the three important components of sustainable development?

The three important components of sustainable development are

- i. Economic development (like industrial development, creating job opportunities, utilization of natural resources for developing the quality of life)

- ii. Community development (providing food, shelter, cloth, education, and other essentials for the human beings).

- iii. Environmental protection (providing clear air, water and environment for the present and future generations and utilization of resources in a sustainable manner).

4. Define sustainable development indicators?

Sustainable development Indicators (SDI) are various statistical values that collectively measure the capacity to meet present and future needs. SDI will provide

information crucial to decisions on national policy and to the general public.

5. What are the uses of sustainable development indicators?

The indicators are used by decision makers and the policy makers at all levels in order

to monitor the progress towards attaining sustainable development. These are also used to increase focus on the sustainable development.

6. Define sustainability.

Sustainability can be defined as the ability of a society or ecosystem to continue functioning into the indefinite future without being forced into decline through complete loss of its strength or overloading of key resources on which that system depends.

7. Define resistance stability and resilience stability.

Resistance stability is the ability of a system to remain stable in the face of stresses and Resilience stability of the system to recover from the disturbance occurred due to the activities happened.

8. List some of the characteristics of a sustainable society.

i. All the material processes will be designed to be of cyclic nature.

ii. There will not be any waste material or pollution of air, water, land and environment.

iii. The output from one system will be used as input to other systems.

iv. Only renewable energy will be used in the society, either directly or in the forms of hydro-power, wind power solar power and biomass.

v. The human population will be either stable stable in size or gradually Declining.

9. Define urbanisation .

Urbanisation is defined as 'the process movement of human population from rural areas to urban areas in search in search of better economic interests with better education, communication, health, civic facilities and other day to day needs.'

10. What are problems or discomforts faced by rural people?

. Lack of modernization of agricultural sector:

. Lack of job opportunities;

. Poor life style;

. Poor health facilities;

. Poor education facilities;

. Poor transportation facilities;

. Poor availability of energy.

11. What are the uses of energy in an urban areas?

Energy is used in an urban area for the following.

(a) For industrial activities

(b) For transportation

(c) For water apply

(d) For building & commercial use

(e) For cleaning of pollutants

(f) For essential services.

12. Define water conservation. Also indicate some of the water conservation techniques.

The production, development and efficient management of water resources for beneficial use is called as water conservation. The following are some of the techniques for water conservation.

Rain water harvesting

Watershed management

Construction of storage reservoirs

Reuse of industrial wastewater

Better agricultural practices

13. What do you know about watershed?

A watershed is defined as the geographic area from which water in a particular stream, lake or estuary originates. It includes entire area of land that drains into the water body. It is separate from other system by high points in the area such as hills or slopes.

14. What is watershed management ?

Watershed management is a process aimed at protecting and restoring the habitat and water resources of a watershed, incorporating the needs of multiple stakeholders.

15. What are the impacts of human activities on watershed?

- (a) Alteration of water course
- (b) Addition of pollution sources
- (c) Urbanisation
- (d) Securing of channels.

16. What are the two important principles of watershed management?

The two important principles of watershed management are:

- 1) To preserve the environment, and
- 2) To use the most cost-effective means to achieve this goal.

17. Name some of the factors causing relocation of people.

- (a) Development activities
- (b) Natural and man-made disasters
- (c) Conservation initiatives.

18. Define resettlement and rehabilitation.

Resettlement is defined as the process of simple relocation or displacement of human population without considering their individual, community or societal needs.

Rehabilitation is defined as the process of replacing the lost economic assets, rebuilding the community system that have been weakened by displacement, attending to the psychological trauma of forced separation from livelihood.

19. How do you define term 'Environmental Ethics'?

Environment Ethics is the branch of ethics which is analyzing about human use or Earth's limited resources.

20. What are the factors that influence climate change on the earth?

Climate change on the earth is influenced by the following factors.

Variations in the Earth's orbital characteristics.

Atmospheric carbon dioxide variations.

Volcanic eruptions

Variations in solar output.

21. List out any four effects of climate change.

Mean sea level is increased on an average of around 1.8mm per year.

Many ecosystems of the world have to adapt to the rapid change in global temperature.

The rate of species extinction will be increased.

Human agriculture, forestry, water resources and health will be affected.

22. Define Global warming.

Global warming is defined as the increase in temperature of the earth, which causes more changes in climate.

23. How can global warming be controlled?

- i. Reduction in consumption of fossil fuel such as coal and petroleum.
- ii. Use of biogas plants.
- iii. Use of nuclear power plants.
- iv. Increasing forest cover.
- v. Use of unleaded petrol in automobiles.
- vi. Installation of pollution controlling devices in automobiles and industries.

24. What are the two principal acids present in acid rain?

Sulphuric acid (H_2SO_4) and Nitric acid (HNO_3).

25. Define wet deposition and dry deposition. Is there any difference in damage due to

these two types of deposition.

Wet deposition refers to acidic rain, fog, and snow. As this acidic water flows over and through the ground, it affects plants and animals in many ways. Dry deposition refers to acidic gases and particles. About half of the acidity in the atmosphere falls back to earth through dry deposition. Both wet and dry deposition can cause the same damage.

26. List any four impacts of acid rain.

1. Both dry and wet deposition of sulphur dioxide significantly increases the rate of corrosion of lime stone, sand and marble.
2. Forest tree population is affected by acid rain.
3. Acid rain in combination with ozone may damage the waxy coating on leaves and needles. This may weaken or damage them and provide opportunities for disease to enter the tree.
4. Acid rain may change the characteristics of soil and eventually pollute the streams and lakes.

27. How can we minimize the formation of acid rain?

1. By reducing pollution from industries,
2. By using other sources of energy, and
3. By using cleaner automobiles.
- 4.

28. Define ozone.

Ozone is an odorless, colorless gas composed of three atoms of oxygen (O_3).

29. Name any three most important types of CFC which are responsible for ozone depletion.

- a. Trichlorofluoromethane, $CFCl_3$ (called as CFC-11)
- b. Dichlorodifluoromethane, CF_2Cl_2 (CFC-12)
- c. 1, 1, 2 Trichlorotrifluoroethane, $CF_2ClCFCl_2$ (CFC-113)

30. Define ozone depletion potential.

The ozone depletion potential (ODP) of a compound is defined as the measure of its ability to destroy the stratospheric ozone.

31. What do you know about Dobson unit?

Dobson Unit (DU) is the scale for measuring the amount of ozone occupying a column overhead.

One Dobson unit (1DU) is defined as 0.01mm at 00C and 1 atmospheric pressure.

32. What are the harmful effects of ozone layer depletion on human beings?

- i. Reddening of skin in sun shine (Sun burn)
- ii. Skin Cancer
- iii. Reduction in body's immunity to disease
- iv. Eye disorders like Cataracts and Blindness

33. Define waste land.

Waste lands are defined as the lands which are unstable in ecologically and topographically with complete loss or its fertility status. In these types of lands the toxicity for the growth of crops or trees are developed due to environmental or anthropogenic problems.

34 What are the causes for formation of waste land?

1. Deforestation
2. Desertification
3. Soil loss and
4. Industrial pollution

35. What is the need for waste land reclamation?

Population of the world is increasing at an alarming rate. This increases demand for food and demand of land for shelter and other resources. The available land area

should be properly utilized for making food for increasing population of the world.

UNIT V PART A

1.How the population problem in India is analysed?

India's population problem may be viewed from three aspects

- (1) The absolute size of population
- (2) The rate of growth of the population
- (3) The age structure of the population.

2. What is population explosion?

Population explosion means the rapid population growth which is unexpected and unimaginable. The graph of recent population growth is referred to as a 'J' curve as it

follows the shape of that letter, starting out low and skyrocketing straight up.

3. List the effect of population explosion.

Enormous increase in population results in

1. Increased consumption of resources available in the environment and depletion of

the same quickly.

2. Due to over –consumption of natural resources, the environment gets deteriorated and polluted.
3. There will be desertification, deforestation, soilerosion, loss of fertility and poor productivity.
4. Mass poverty, poor per-capital availability of food for consumption and prevalence of disease on large scale.
5. Rapid urbanization resulting in growth of slums in cities and towns.
6. Inefficient management and ineffective control at all levels leading to poor quality of life.

4. What is health?

Health is considered as a quality of life that enables the individual to live most and serve best.

5. Define wellness.

Wellness is a state of optional well being. Wellness emphasizes each individual's responsibility for making decisions that will lead not only to the prevention for disease but to the promotion of a high level of health.

6. Name some health related fitness components.

1. Muscular strength and endurance
2. Flexibility
3. Body composition
- 4 Cardio-vascular endurance

7. Define Demography.

It refers to the science of dealing with the study of size, composition and territorial distribution of population; it includes study of natality, fertility, mortality, migration, and social mobility.

8. What is vital statistics?

Vital statistics are referred to systematically collected and compiled data relating to vital events of life such as birth, death, marriage, divorce, adoption, etc. Vital statistics

are an indication of the given situation and help us in answering many health-related queries.

9. Name the fundamental rights of an Indian citizen.

1. Right to equality
2. Right to freedom of Speech and Activity
3. Right against Exploitation
4. Right to Freedom of Religion
5. Cultural and Educational Rights
6. Right to Constitutional Remedies.

10. Write short notes on common property resources.

Our environment has a major component that does not belong to individuals. There are several commonly owned resources that all of us use as a community. The water

that nature recycles, the air that we all breathe, the forests and grasslands which maintain our climate and soil, are all common property resources.

11. What is HIV and AIDS?

HIV stands for Human Immuno-deficiency Virus and is a virus that can damage the body's defence system so that it cannot fight off certain infections.

AIDS stands for (Acquired Immuno Deficiency Syndrome). An HIV infected person receives a diagnosis of AIDS after developing one of the AIDS indicator illness, A positive HIV test result does not mean that person has AIDS. A diagnosis of AIDS is made by a physician using certain clinical criteria (Eg: AIDS indicator illnesses).

12. What is opportunistic infection?

Infection with HIV can weaken the immune system to the point that it has difficulty fighting off certain infections. These types of infections are known as "opportunistic infections" because they take the opportunity to weaken the immune system which causes illness of the body.

13. List the means of HIV transmission.

There are four main ways in which HIV can be passed on:

1. By having vaginal, anal or oral sex without a condom with someone who has HIV.

2. By using needles, syringes or other drug-injecting equipment that is infected with HIV.

3. From a woman with HIV to her baby (before or during birth) and by Breast feeding.

4. By receiving infected blood, blood products or donated organs as part of medical treatment.

14. Name some tests available to find HIV infection.

In addition to the EIA or ELISA and Western blot, other tests now available include:

_ Radio Immuno Precipitation Assay (RIPA)

_ Dot -blot immuno binding assay

_ Immuno fluorescence assay

_ Nucleic acid testing

_ Polymerase Chain Reaction (PCR)

15. List the special features of Comprehensive programme on women and child welfare.

1. Personality

2. Reduction of Deprivation

3. Co-ordinational Effectivity

4. Maternity and Motherhood

16. What is information?

The term "information" has been defined by Eliahu Hoffinan as: "an aggregate (Collection and accumulation) of statements, or facts or figures which are conceptually by

way of reasoning, logic, ideas, or any other mental "mode operation" interrelated/connected.

17. Name Some applications of IT in health.

Apart from helping in the administration of hospitals, IT is playing a key role in the health industry. On the, medical care, the IT has varied applications right from the diagnosis,

where there are latest tools like CT scans, Ultrasound Sonography etc. Which use It as their basis for diagnosis of ailments. Most of the ICU's (Intensive Care Units) are now using computers to monitor the progress and condition of the patient, undergoing treatments. Apart from this, with help of IT, expert opinions from doctors away from the place can be sought with help of IT tools like video conferencing etc. Apart from this can be used in the analysis and research on various potential medicines /drugs to be used in medical treatments.

18. List the applications of IT in environment.

- a. Remote Sensing
- b. Geographic Information System (GIS)
- c. Global Positioning System (GPS)
- d. Meteorology

UNIT I PART B

1. Explain about the importance of environmental study.
Any 16 points with explanation
2. Explain about the ways to create public awareness in environmental issues.
16 points with explanation
3. Discuss about over-exploitation of forests.
 - i. Causes
 - ii. Consequences
 - iii. A case study
4. Explain briefly about the conventional energy sources.
 - i. Coal
 - ii. Oil or Petroleum
 - iii. Natural gas
 - iv. Nuclear energy
5. What are the role of individual in conservation of natural resources and sustainability?
 - i. Conserve water
 - ii. Conserve energy
 - iii. Protect the soil
 - iv. Promote sustainable agriculture

UNIT II PART B

1. Explain about population characteristics and population explosion.
 - i. Definitions on Exponential growth, doubling time, Total fertility rates, Infant mortality rate, replacement level, age structure
 - ii. Pyramids
 - iii. Indian scenario on population explosion
 - iv. Views on population growth
2. Write notes on human rights.
 - i. Human rights conferences

- ii. Human rights in India
- iii. Rights and duties of a citizen
- iv. Draft declaration of human rights and environment
- 3. Write notes on value education.
 - i. Definition
 - ii. Necessity
 - iii. Value education in the context of environment
 - iv. Principles
- 4. Explain about women and child welfare.
 - i. Women welfare
 - ii. Child welfare
- 5. Explain about role of Information Technology in Environment and human health.
 - i. Information
 - ii. Need for computerization
 - iii. Role of IT
 - iv. Application of IT in environment
 - v. Application of IT in health
 - vi. Application of IT in environment and health

UNIT III PART B

- 1. What do you know about 'sustainable development'? What are the important components of sustainable development?
 - i. Definition
 - ii. Aspects
 - iii. Measures
 - iv. 3 R concept
 - v. Carrying capacity
- 2. What do you know about 'water conservation'? Mention some of the techniques of water conservation.
 - i. Decreasing run-off losses
 - ii. Reducing evaporation losses
 - iii. Storing water in soil
 - iv. Reducing irrigation losses
 - v. Re-use of water
 - vi. Preventing wastage of water
 - vii. Increasing block pricing
- 3. Write a brief note on the problems and concerns about resettlement and rehabilitation of people.
 - i. Problems and concerns
 - ii. Case study
 - iii. Rehabilitation issues
 - iv. Rehabilitation policies
- 4. What are the impacts of acid rain on the environment?
Any 16 points with explanation
- 5. What do you know about 'Ozone' and 'Ozone layer depletion'?
 - i. Definition
 - ii. Equations with explanation

- iii. Factors affecting depletion
- iv. Effects of depletion

UNIT IV PART B

1. What are the different sources and types of air pollutants?
 - i. Natural Sources
 - ii. Man made or anthropogenic sources
2. How do you control air pollution?
 - i. Dilution
 - ii. Control at source
3. What do you know about soil pollution? What are the different sources of soil pollution?
Definition
Sources
 - Urban wastes
 - Industrial wastes
 - Agricultural
 - Soil conditioners
 - Farm house wastes
 - Radioactive wastes
 - Biological agents
4. What are the different sources of marine pollution?
 - i. Land based sources
 - ii. Air based sources
 - iii. Maritime transportation
 - iv. Dumping of wastes
 - v. Offshore production
5. What are the causes of noise pollution?
 - i. Road traffic noise
 - ii. Air traffic noise
 - iii. Rail traffic noise
 - iv. Domestic noise
 - v. Industrial noise
 - vi. Incompatible land use noise
6. Explain clearly about the stages of solid waste management.
Generation
 - i. Online handling and processing
 - ii. Collection and Transportation
 - iii. Processing
 - iv. Disposal
7. What are the important stages of hazardous waste management?
 - i. Storage
 - ii. Collection and transportation
 - iii. Treatment
 - iv. Disposal

UNIT V PART B

1. Explain briefly about the characteristic of ecosystems.
Any 10 points with explanation
2. How can you classify the ecosystems?
 - i. Natural ecosystem
 - ii. Artificial ecosystem
 - iii. Incomplete ecosystem
3. Discuss about the structural and functional components of an ecosystem.
 - i. Structural Components
 1. Biotic structure
 2. Abiotic structure
 - ii. Functional components
 1. Food chain, food web, trophic structure
 - iii. Energy Flow
 - iv. Cycling of nutrients
 - v. Primary and secondary production
 - vi. Ecosystem development and regulation
4. With a neat sketch explain about the energy and nutrient flow through an ecosystem.
 - i. Energy flow laws
 - ii. Model
 - iii. Nutrient cycling
 1. Nitrogen cycle
 2. Carbon cycle
 3. Phosphorus cycle
 4. Hydrological cycle
5. Explain about the different types of biodiversity.
 - i. Genetic diversity
 - ii. Species diversity
 - iii. Ecosystem diversity
6. Discuss regarding biogeographical classification of India.
India's major biogeographic habitats
7. Classify and explain about the value of biodiversity.
 - i. Consumptive use value
 - ii. Productive use value
 - iii. Social value
 - iv. Ethical value
 - v. Aesthetic value
 - vi. Option values
 - vii. Ecosystem service value