COMMON MINIMUM STUDY MATERIAL (MSM)

Department of CHEMISTRY

SUBJECT CODE: GE6351
SUBJECT NAME: ENVIRONMENTAL SCIENCE AND ENGINEERING
Regulation: 2013 Year – II & III /
SEMESTER - III & V

ANNA UNIVERSITY, CHENNAI-25
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REGULATION 2013

GE6351 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C3 0 0 3

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 IVSOCIAL 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.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT

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

Text Books:

1.Dr.A.Ravikrishna,"Environmental Science & Engineering" Revised Edition, Sri Krishna Publication 2014

2. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", 2nd edition,Pearson Education, 2004.

3. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006.

Ref. Books:

1. Trivedi.R.K., "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media, 3rd edition, BPI publications, 2010.

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.

Aim and Objective of the Subject

1. To finding and implementing scientific, technological, economic and political solutions to environmental problems.

2. To study the interrelationship between living organism and environment.

3. To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.

4. To study the dynamic processes and understand the features of the earth's interior and surface

5. To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

2. Need and Importance for Study of the Subject

- The study creates awareness among the students to know about various renewable and nonrenewable resources of energy.
- It provides the knowledge about ecological systems and cause and effect relationships.
- It provides necessary information about biodiversity richness and the potential dangers to the species of plants, animals and microorganisms in the environment.

- ❖ The study enables one to understand the causes and consequences due to natural and main induced disasters (flood, earthquake, landslide, cyclones etc.,) and pollutions and measures to minimize the effects.
- ❖ The study exposes the problems of over population, health, hygiene, etc. and the role of technology in eliminating/ minimizing the above factors.
- ❖ The study motivates students to get involved in community action, and to participate in various environmental and management projects.

3. Industry Connectivity and Latest Developments

- ❖ Study of industrial air pollution, water pollution, noise pollution
- ❖ Use of natural resources in effective manner in industries
- ❖ Recent techniques about renewable energy sources
- ❖ Recent waste water treatment methods
- ❖ Role of Information Technology in environmental science.

4. Industrial Visit (Planned if any)

Visiting cement factory- to study the air pollution control equipments.

COURSE PLAN

GE 6351 Environmental Science and Engineering

Lect.No	Unit No	Topics to be covered	Text/ Reference Book	Page No	Week
I-ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY					
1	I	Definition, scope and importance of Risk and hazards	**T1**	**1.1-1.4**	**I**
2		Chemical hazards, Physical hazards, Biological hazards in the environment	**T1**	**1.5-1.7**	
3		Concept of an ecosystem, structure and function of an ecosystem – producers, consumers and decomposers-Oxygen cycle and Nitrogen cycle	**T1**	**1.9-2.8,2.6-2.15**	
4		Energy flow in the ecosystem – ecological succession processes – Introduction, types, characteristic features,	**T1,T3**	**2.16,2.17,76**	
5		Structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).	**R4,T1, T3**	**37-56, 2.19-2.28,85-88**	
6		Introduction to biodiversity-definition: genetic, species and ecosystem diversity-biogeographical classification of India	**T1,T3**	**3.1-3.5,94-96**	
7		Value of biodiversity: consumptive use, productive use- social, ethical, aesthetic and option values	**T1,T3**	**3.6-3.11,96-101**	**II**
8		Biodiversity at global, national and local levels – India as a mega-diversity nation-hot-spots of biodiversity – threats to biodiversity:	**R4,T1, T3**	**69-78,3.11-3.24, 102-104**	
9		habitat loss, poaching of wildlife, man-wildlife conflicts- endangered and endemic	**T1,T3**	**3.24-3.33,**	

		species of India		**105-108**	
10		Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity	**T1,T3**	**3.33-3.40 109-112**	
11		Field study of common plants, insects, birds			
12		Field study of simple ecosystems – pond, river, hill slopes, etc.			
13		Review of I Unit			
II – ENVIRONMENTAL POLLUTION					
14	II	Definition – causes, effects and control measures of: (a) Air pollution (Atmospheric chemistry- Chemical composition of the atmosphere	**R4,T1,T2**	**171-178 4.1-4.10, 367**	**III**
15		Chemical and photochemical reactions in the atmosphere - formation of smog	**T1,T2**	**4.11-4.13, 384**	
16		PAN, acid rain, oxygen and ozone chemistry;- Mitigation procedures	**T1,T2**	**4.13-4.24, 394**	
17		Control of particulate and gaseous emission, Control of SO_2, NO_X, CO and HC)	**T2**	**380,382,385,394**	
18		Water pollution : Physical and chemical properties of terrestrial and marine water and their environmental significance	**T1,T2**	**4.24-4.27, 173**	
19		Water quality parameters- physical, chemical and biological; absorption of heavy metals	**T1,T2**	**4.27-4.37, 185-196**	**IV**
20		Water treatment processes	**T1,T2**	**4.49-4.54, 289**	
21		Soil pollution - soil waste management: causes, effects and control measures of municipal solid wastes – Marine pollution	**T1,R1**	**4.55-4.60,4.71-4.74, 101-5.117**	
22		Noise pollution - Thermal pollution- Nuclear hazards- role of an individual in prevention of	**T1,R1**	**4.76-4.80,4.87-**	**IV**

		pollution		**4.92, 5.122-5.147**	
23		Pollution case studies – Field study of local polluted site – Urban / Rural / Industrial / Agricultural.	R4	601-615	
24		Review of II unit			
III-NATURAL RESOURCES					
25	III	Forest resources: Use and over-exploitation, deforestation, case studies-timber extraction, mining	**R4,T1, T3**	**136-141,5.1-5.13,17-27**	**V**
26		Dams and their effects on forests and tribal people-Water resources: Use and overutilization of surface and ground water, dams-benefits and problems	**R4,T1, T3**	**104-116, 5.13-5.22,28-47**	
27		Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies	**T1,T2**	**5.23-5.31, 97-101**	
28		Food resources: World food problems, changes caused by agriculture and overgrazing- effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies	**T1,T3**	**5.33-5.41, 48-56**	
29		Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources.	**T1,T3**	**5.43-5.64, 57-63**	
30		Energy Conversion processes – Biogas – production and uses, anaerobic digestion; case studies	**T1,T2**	**5.65-5.68, 690-694**	**VI**
31		Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification	**T1,T2**	**5.68-5.76, 64-68**	
32		Role of an individual in conservation of natural resources – Equitable use of	**T1,T3**	**5.76-5.80,**	

		resources for sustainable lifestyles		**69-72**	
33		Introduction to Environmental Biochemistry: Proteins- Biochemical degradation of pollutants, Bioconversion of pollutants	**T1,T2**	**5.80-5.86, 70-74**	
34		Field study of local area to document environmental assets – river / forest / grassland / hill / mountain			
35		Review of III Unit			
IV-SOCIAL ISSUES AND THE ENVIRONMENT					
36		From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting,	**T1,T3**	**6.1-6.10, 210-215**	
37		Watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies	**T1,T3**	**6.11-6.16, 220-238,243**	
38		Role of non-governmental organization environmental ethics: Issues and possible solutions-12 Principles of green chemistry	**T1,T3**	**6.18-6.23, 257-261**	**VII**
39		Nuclear accidents and holocaust, case studies-wasteland reclamation – consumerism and waste products – environment production act – Air act – Water act	**T1,T3**	**6.24-6.38, 243-246**	
40	**IV**	Wildlife protection act – Forest conservation act – The Biomedical Waste (Management and Handling) Rules; 1998 and amendments-scheme of labeling of environmentally friendly products (Ecomark).	**T1,T3**	**6.38-6.46, 239**	
41		Enforcement machinery involved in environmental legislation- central and state pollution control boards	**R3**	**305-316**	**VIII**
42		Disaster management: floods, earthquake, cyclone and landslides- Public awareness.	**T1,T3**	**6.52-6.53,6.5**	

				9-6.61, 200-206	
43		Review of IV Unit			
V-HUMAN POPULATION AND THE ENVIRONMENT					
44		Population growth, variation among nations – population explosion	**T1,T3**	**7.1-7.11, 266-268**	**IX**
45		Family welfare programme – environment and human health- human rights – value education	**T1,T3**	**7.11-7.24, 277,282**	
46		HIV/AIDS- women and child welfare	**T1,T3**	**7.24-7.32, 278-280,286-287**	
47		Environmental impact analysis (EIA)-	**T1,T2**	**7.32-7.34, 402-406**	**X**
48		GIS-remote sensing	**T1,T2**	**7.36-7.38, 464-465**	
49		Role of information technology in environment and human health- Case studies.	**T1,T3**	**7.34-7.36, 288**	
50		Review of V Unit			

COURSE OUTCOMES:

Upon completion of the course…….

The student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society

UNIT-I ENVIRONMENT, ECOSYSTEM AND BIODIVERSITY

PART-A

1. Define the term producer and consumers. (A.U May 2008) (TNV A.U. Dec 2008)

(i) Producer synthesizes their food themselves through photosynthesis.

(ii) Consumers are organisms which cannot prepare their own food and depends directly or indirectly on the producer.

2. What is ecological succession? Mention their types.

(A.U June 2005)(TCY A.U. Dec 2009)

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

Types: (i) Primary Succession

Hydrosere (b) Xerosere

ii) Secondary Succession

3. What is biodiversity? What is its significance? (A.U.Dec 2005) (A.U. June 2006)

Biodiversity is "the variety and variability among all groups of living organisms ad the ecosystem in which they occur".

Significance:

- ❖ It is very important for human life, as we depend on plants and animals for our food and medicine, etc.
- ❖ It protects the fresh air, clean water and land. Loss of biodiversity has serious economic loss.

4. What are called endangered species? (A.U. Dec 2006)

A species is said to be endangered, when its number has been reduced to critical level unless it is protected and conserved, it is in immediate danger of extinction. Example African elephant, Giant panda, Siberian tiger, Sandal wood tree, peacock.

5. What are biodiversity hot-spot? Give examples.

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

Example: i) East Himalayas ii) Western Ghats.

6. How does the biome differs from an ecosystem?(A.U.Dec 2007)

On earth the many sets of ecosystems which are exposed to same climatic conditions and having dominant species with similar life cycle, climatic adoptions and physical structure. This

set of ecosystem is called biome. Thus the biome is a small ecosystem within an ecosystem.

7. What are the advantages of In-situ and Ex-situ conservation?(Dec 2012)

Advantages of In-situ conservation:

- ❖ The species get adjusted to the natural disasters.
- ❖ It is very cheap and convenient method.

Advantages of Ex-situ conservation:

- ❖ Survival of endangered species increases.
- ❖ In captive breeding, animals are assured food, water, shelter and security.
- ❖ In-situ conservation- Protection of fauna and flora within its natural habitat.

8. Define genetic diversity and species diversity. (Dec2007,2008,2010)

Genetic diversity is the variation of genes within species. ie .,variation of genes within the species eg; rice varieties

Species diversity is the number of different species of living organisms available in an area. Eg; animal species lion, tiger

10. Mention the abiotic components. (May/June 2013,)

Physical and Chemical components such as climatic factors, edaphic factors, geographical factors, energy, nutrients and toxic substances constitute the abiotic structure.

11. Why is India is a mega diversity nation? (Nov/Dec 2009)

India is one among the 12 mega – diversity countries in the world. It has 89,450 animal species accounting for 7.31% of the global faunal species and 47,000 plant species which accounts for 10.8% of the world floral species. The loss of biodiversity or endemism is about 33%.

12. What is ecosystem? (A.U June 2007) (Coim &TNV AU Dec 2009)

A group of organisms interacting among themselves and with environment is known as ecosystem. It is community of different species interacting with one another and with their non-living environment exchange energy and matter.

13. List out the effect of habitat loss on biodiversity? (Dec'13)

i) Deforestation ii) Destruction of wetlands iii) Habitat fragmentation iv) Raw material v) Production of drugs vi) Illegal trade vii) Developmental activities.

14. Give any two examples for physical hazards and chemical hazards?.(May 2016)

i) Noise pollution ii) Radioactive radiation

chemical hazards :

i)CO ii) sulphur di oxide iii) nitrous oxide

15.How is nitrogen fixed in soil?

The symbiotic bacteria called rhizobia with in nodules in their root system roducing nitrogen compounds that help the plant to grow and compete with other plants. When the plant dies ,the fixed nitrogen is released, making it available other plant to fix in the soil.

PART – B & C

1. (a) Discuss in detail about the nitrogen cycle and oxygen cycle. (May 2016)

Nitrogen cycle

Nitrogen is present in the atmosphere as N_2 in large amounts (78%). The nitrogen is present in all nitric components in different forms as food.

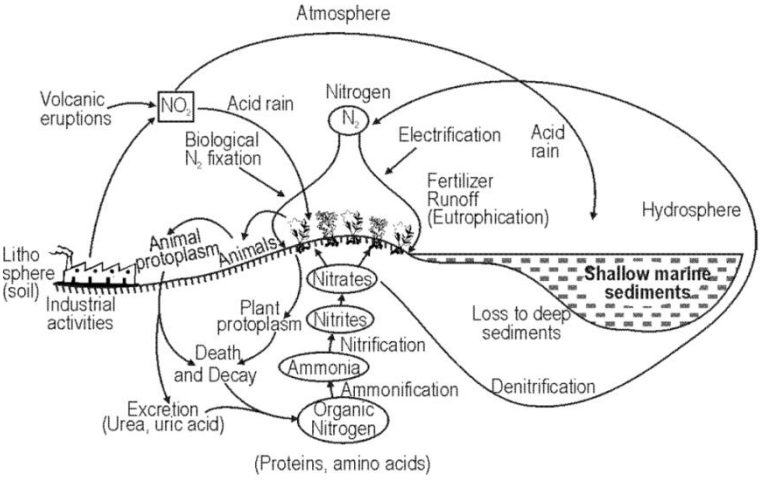
Example: Proteins, Vitamins, Amino acids, etc,.

1 The N_2 from the atmosphere is taken up by the green plants as a raw material for biosynthesis of different foods (amino acids, proteins, Vitamins) and used in metabolism.

2 After death of the plants and animals, the organic nitrogen in dead tissues is decomposed by several

micro organisms into ammonia, nitrates and nitrates, which are again used by the plants.

3 Some bacteria convert nitrates into molecular nitrogen (N_2), which is again released back into atmosphere and the cycle goes on.



Nitrification:

- ❖ The conversion of ammonia into nitrates is termed as nitrification.
- ❖ This is brought about by nitrifying bacteria.

Example: Nitrobacter, nitrosomonas.

Denitrification:

- ❖ The conversion of nitrates into nitrogen (N_2) is termed as denitrification.

❖ This process is brought about by denitrifying bacteria.

Example: Pseudomonas, fluorescence.

Oxygen Cycle

Oxygen Cycle is the cycle that helps move O_2 throw three main regions of the earth.

1) Atmosphere
2) The biosphere
3) The lithosphere

1. The Atmosphere

i) The region of the gases lies above the earth surface.

ii) It is largest reservoirs of free oxygen on earth

iii) In the atmosphere oxygen is released by the process is called photosynthesis (Convert CO_2 and H_2O in to carbohydrate and O_2

$$6CO_2 + 6H_2O + h\nu \longrightarrow 6O_2 + C_6H_{12}O_6$$

2. The biosphere

i) Biosphere is the sum of all the earth ecosystem.

ii) Main cycles are respiration and photosynthesis

$$6O_2 + C_6H_{12}O_6 \longrightarrow 6CO_2 + 6H_2O + \text{Energy}$$

3. The Lithosphere

i) Largest reservoir of oxygen

ii) Oxygen is present as silicates and oxides.

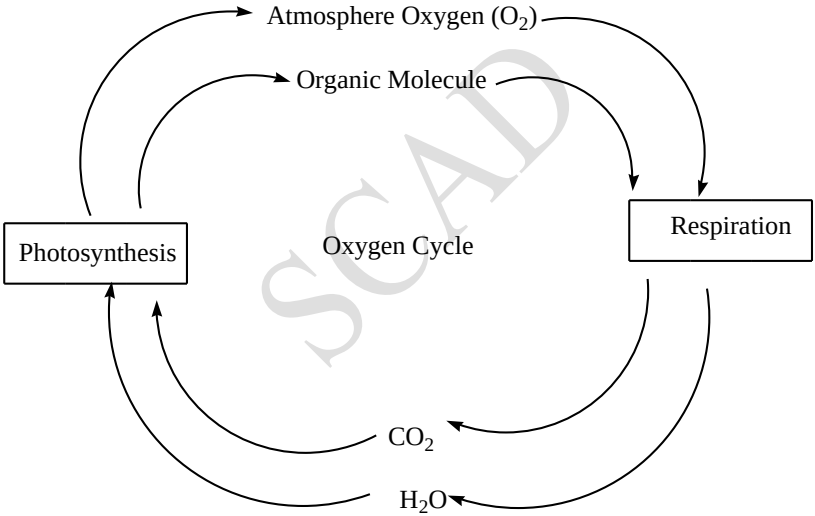
iii) Oxygen contained minerals undergo chemical reaction to produce free oxygen

Respiration

$$6O_2 + C_6H_{12}O_6 \longrightarrow 6CO_2 + 6H_2O + Energy$$

$$6CO_2 + 6H_2O + Energy \longrightarrow 6O_2 + C_6H_{12}O_6$$

Photosynthesis



1.**(b) Explain the characteristic features and structure of aquatic ecosystem.** (8marks)

CONTENTS	POND ECOSYSTEM	LAKE ECOSYSTEM	RIVER ECOSYSTEM	OCEAN ECOSYSTEM
Characters	1) Fresh water	1. Large natural	Running water ecosystem	1) Salt water ecosystem

	ecosystem 2) Occur for temporary seasons	shallow water body 2. Stagnant water body	1) Dissolved oxygen is more 2)Rich nutrients	2) Relatively warm
Abiotic components	Temperature, light, water, organic and inorganic components	Temperature, light, water, organic and inorganic components	Temperature,light, nutrients, pH, organic and inorganic components	Temperature, light, NaCl, K, Ca & Mg salts
Biotic components	**Producers** (a)Phytoplankton: Microscopic aquatic plants Ex: Algae, Volvox & floating plants Eg:Microsphytes, Large floating and submerged plants	**Producers** Submerged, free floating and amphibious plants Eg: Phytoplanktons, algae and flagellates.	**Producers** Phytoplanktons, algae, watergrasses, and amphibious plants.	**Producers** Phytoplanktons and marine plants like sea weeds
	Primary consumers Zooplanktons eg:Protozoa, small fishes and flagellates.	**Primary consumers** Zooplanktons eg:Protozoa, small fishes and flagellates.	**Primary consumers** Water insects and small fishes	**Primary consumers** Crustaceans, molluscus and tiny fish.
	Secondary consumers Water beetles	**Secondary consumers** Water	**Secondary consumers** Small birds	**Secondary consumers** mackerel

	small fish	beetles small fish	and mammals	
	Tertiary consumers Large fish	**Tertiary consumers** Large fish	**Tertiary consumers** Large fish	**Tertiary consumers** Cod, Haddock
	Decomposers Bacteria & fungi	**Decomposers** Bacteria & fungi	**Decomposers** Bacteria & fungi	**Decomposers** Bacteria & fungi

2. (a) Discuss about the threats to biodiversity. (or) Various threats to biodiversity (or) causes for loss of biodiversity

1. Habitat loss:

- The loss of populations of interbreeding organisms is caused by habitat loss.
- Habitat loss threatened a wide range of animals and plants.

Factors influencing habitat loss:

A .Deforestation:

The loss of habitat is mainly caused by deforestation activities. The forest and grasslands are the natural homes of thousands of species, which disintegrate due to loss of their natural habitat.

B. Raw materials:

For the production of hybrid seeds, the wild plants are used as raw materials as a result many plants species become extinct.

C. Production of drugs:

Many pharmaceutical companies collect wild plant for the production of drugs. Therefore several medicinal plant species are on the verge of extinction.

D. Illegal trade:

Illegal trade on wild life also reduces the bio-diversity and leads to habitat loss.

E. Developmental activities

Construction of dams and hydro electric projects.

2. Poaching (hunting) of wild life:

- Poaching means killing of animals or commercial hunting. It leads to loss of animal biodiversity.

Factors Influencing Poaching:

1 Human Population:

- Increased human population in our country has lead to pressure on forest resources which ultimately causes degradation of wild life habitats.

2**. Commercial Activities**:

- Though international ban on trading the products of endangered species smuggling of wild life products continues.

Wile Life Products: Furs, horns tasks live specimens' herbal products.

3. Man- Wild Life Conflicts:

- Man- wild life conflicts arise, when wild life starts causing immense damage and danger to the man.

Examples:

- Very recently, two men were killed by leopards in Powai, Mumbai.

- A total of 14 persons were killed during 19 attacks by the leopards in Sanjay Gandhi national park, Mumbai.

Factors Influencing Man-Animals Conflicts

- Shrinking of forest cover compels wildlife to move outside the forest and attack the fields and humans.
- Human encroachment into the forest area induces a conflict between the man and wildlife
- Garbage near human settlements or food crops near forest areas attracts wild animals.
- Villagers put electrical fence around crops
- Cash compensation paid by government is very less.

Remedial Measures

- Cropping pattern should be changed near the forest borders
- Adequate food and water should be made available for the wild animals within forest zones.
- Solar fences can be increased.
- Developmental projects inside forest should be stopped.

2. (b) Discuss the values of Bio-diversity.

Value of biodiversity

The value of biodiversity in terms of its commercial utility, ecological services, social and aesthetic value is enormous.

i) Consumptive use value: These are direct use values where the biodiversity product can be harvested and consumed directly e.g. fuel, food, drugs, fibre etc.

Food: About 90% of present day food crops have been domesticated from wild tropical plants. A large number of wild animals are also our sources of food.

Drugs and medicines:

i)The wonder drug penicillin used as an antibiotic is derived from a fungus called penicillium.

ii)Likewise, we get Tetracyclin from a bacterium. Quinine, the cure for malaria is obtained from the bark of Cinchona tree, while Digitalin is obtained from foxglove which is an effective cure for heart ailments.

(i) Productive use values:

a. These may include the animal products like tusks of elephants, musk from musk deer, silk from silk-worm, wool from sheep, etc, all of which are traded in the market.

b. Many industries are dependent upon the productive use values of biodiversity

Ex. the paper and pulp industry, plywood industry, railway sleeper industry, silk industry, ivory-works, leather industry, pearl industry etc.

(ii) Social value:

a. Many of the plants are considered holy and sacred in our country like Tulsi, peepal, Mango, and Lotus etc.
b. The leaves, fruits or flowers of these plants are used in worship or the plant itself is worshipped.
c. Many animals like Cow, Snake, and Peacock also have significant place in our psycho-spiritual arena.

(iii) Ethical value:

a. The ethical value means that we may or may not use a species, but knowing the very fact that this species exists in nature gives us pleasure.
b. We are not deriving anything direct from Kangaroo, Zebra or Giraffe, but we all strongly feel that these species should exist in nature.

(iv) Aesthetic value:

a. Ecotourism is estimated to generate about 12 billion dollars of revenue annually.

(v) Option values:

a. There is a possibility that we may have some potential cure for AIDS or cancer with in the depths of a marine ecosystem or a tropical rain forest.

3. Explain the structure and function of Terrestrial ecosystem. (16marks)

Terrestrial Ecosystem

The sum total of abiotic and biotic factors and their interactions of land is called terrestrial ecosystem.

Example: Forest ecosystem, Grassland ecosystem, Desert ecosystem.

1. Forest Ecosystem

Forest is an ecological unit. It is a self-sustaining ecological system. It is made of community of plants and animals. It consists of large trees and thick vegetation. The forest occupies nearly 40% of the world's land area. In India it occupies only 19% of its total land area.

Types of forest ecosystem

i) **Tropical rain forests:**

- ❖ They are found near the equator. They are characterized by high temperature.
- ❖ They have broad leaf trees like teak and sandal and the animals like lion, tiger and monkey.

ii) Tropical deciduous forests:

- ❖ They are found little away from the equator. They are characterized by a warm climate and rain is only during monsoon.
- ❖ They have trees like maple, oak and animals like deer, fox rabbit and rat.

iii) Tropical scrub forests:

- ❖ They are characterized by a dry climate for longer time.
- ❖ They have small deciduous trees and shrubs and animals like deer, fox etc.,

iv) Temperature rain forests:

- ❖ They are found in temperature areas with adequate rainfall.
- ❖ They have coniferous trees like pines, red wood and animals like fox, cats, bear.,

v) Temperature deciduous forests:

- ❖ They are found in areas with moderate temperatures.
- ❖ They have trees like oak, hickory and animals like deer, fox, bear, etc.,

Characteristics of forest ecosystems

- ❖ The forest maintains climate and rainfall.
- ❖ The forest support many wild animals and protect biodiversity.
- ❖ The soil is rich in organic matter and nutrient

Structure of forest ecosystem

Abiotic components	**Biotic components**		
	Producers	**Consumers**	**Decomposers**
1. Organic and inorganic substances present in the soil and atmosphere.	Mainly trees and shrubs living in the ground	**Primary consumers** Depends on producers for their food. Eg: Ants, flies, insects, deer etc., **Secondary consumers**	Micro organisms like bacterial and fungi

2. The climate, temperature, light and rainfall.		Depends on herbivores. Eg: snake, birds, fox **Tertiary consumers** Depends on primary carnivores. Eg: Lion, tiger etc.,	

2. Grassland Ecosystem

- ❖ It is an ecological unit.
- ❖ Grassland is herbaceous vegetation dominated by grasses.
- ❖ It occupies about 20% of earth's surface.

Types of grassland ecosystem

i) Tropical grasslands:

- ❖ They found near the borders of tropical rain forests.
- ❖ They are characterized by high temperature and moderate rainfall.
- ❖ They have shrubs, stunted trees and animals like zebras, giraffes, antelopes, etc.,

ii) Temperature grasslands:

- ❖ They are found in the centers of continents, on flat, sloped hills.
- ❖ They are characterized by cold winters and hot summers.

iii) Polar grasslands:

- ❖ They are found in arctic polar regions.
- ❖ They are characterized by cold and strong winds along with ice and snow.

- ❖ They animals like arctic wolf, weasel etc.,

Characteristics of grassland ecosystem

- ❖ They exist where the rain fall is low or uneven.
- ❖ The soil is very rich in nutrients and organic matter.
- ❖ Since it has tall grass, it is ideal place for grazing animals.

Structure of grassland ecosystem

Abiotic components	Biotic components		
	Producers	Consumers	Decomposers
Nutrients in the soil and aerial environment includes, C, H, N, P, S, CO_2, H_2O, nitrates, etc.,	Mainly grasses, forbs and shrubs	**Primary consumers** Depends on producers for their food. Eg: cows, deer, sheep etc., **Secondary consumers** Depends on herbivores. Eg: snake, birds, lizards, fox, etc., **Tertiary consumers** Depends on primary carnivores. Eg: hawks, eagle, etc.,	Micro organisms like bacteria and fungi

3. Desert Ecosystem

- ❖ Ecosystem of arid and semi-arid region is called desert ecosystem.
- ❖ It is an ecological unit.
- ❖ Plants and animals found therein are also more specialized to grow in that habitat.
- ❖ It occupies about 35% of world's land area.

Types of desert ecosystems

Depending upon the climate conditions deserts can be classified into the following types.

i) Tropical deserts:

- ❖ They are characterized by few species. Windblown and sand dunes are very common.
- ❖ They are found in
  - ➢ Africa – Sahara desert
  - ➢ Rajasthan – Thar desert

ii) Temperature deserts:

- ❖ They are characterized by very hot summer and very cool winter.
- ❖ They are found in
  - ➢ South California – Majave desert
  - ➢ South Africa – Kalahari desert

iii) Cold deserts:

- ❖ They are characterized by cold winters and warm summers.
- ❖ They are found in

  China – Gobi desert, Himalayas - Ladakh desert

Characteristics of desert ecosystem

- ❖ The desert is air dry and hot climate.
- ❖ Annual rainfall is less than 25cm.
- ❖ The soil is very poor in nutrients and organic matter.
- ❖ Vegetation is poor.

Structure of desert ecosystem

Abiotic components	Biotic components		
	Producers	**Consumers**	**Decomposers**
Dry soil with low rain fall and high temperature	Mainly grasses, bushes, shrubs and few trees	**Primary consumers** Depends on producers for their food. Eg: Rabbit, camel, etc., **Secondary consumers** Depends on herbivores. Eg: Reptiles, lizards, etc., **Tertiary consumers** Depends on primary carnivores. Eg: Eagle, agaves, etc.,	Micro organisms like bacteria and fungi

4. (a) Explain about the Hot spots of biodiversity.

Hot spots of biodiversity

- Areas, which exhibit high species richness as well as high species endemism, are termed as hot spots of biodiversity.
- There are 25 such hot spots of biodiversity on a global level out of which two are present in India, namely the Eastern Himalayas and Western Ghats.
- These hot spots covering less than 2% of the world's land are found to have about 50% of the terrestrial biodiversity.
- About 40% of terrestrial plants and 25% of vertebrate species are endemic and found in these hotspots.

- ♠ After the tropical rain forests, the second highest number of endemic plant species is found in the Mediterranean (Mittermeier).
- ♠ Earlier 12 hot spots were identified on a global level.
- ♠ Later Myers et al (2000) recognized 25 hot spots.
- ♠ Two of these hotspots lie in India extending into neighboring countries namely, Indo-Burma region (covering Eastern Himalayas) and Western Ghats – Sri Lanka region.

a) Eastern Himalayas:

a. They display an ultra-varied topography that fosters species diversity and endemism.

b. Certain species like Sapria himalayana, a parasitic angiosperm was sighted only twice in this region in the last 70 years.

c. Out of the world's recorded flora 30% are endemic to India of which 35,000 are in the Himalayas.

(b) Western Ghats:

a. It extends along a 17,000 Km^2 strip of forests in Maharashtra, Karnataka, Tamil Nadu and Kerala and has 40% of the total endemic plant species.

b. 62% amphibians and 50% lizards are endemic to Western Ghats.

c. The major centers of diversity are Agastyamalai Hills and Silent Valley- the New Amambalam Reserve Basin.

d. It is reported that only 6.8% of the original forests are existing today while the rest has been deforested or degraded.

4. (b) Explain about the ecological succession and their types.

Ecological Succession

Ecological succession is defined as an orderly process of changes in the community structure and function with time mediated through modifications in the physical environment and ultimately culminating in a stabilized ecosystem known as climax.

(i) Hydrarch or Hydrosere: Starting in watery area like pond, swamp, bog

(ii) Mesarch: starting in an area of adequate moisture.

(iii) Xerarch or Xerosere: Starting in a dry area with little moisture. They can be of the following types:

Lithosere	:	starting on a bare rock
Psammosere	:	starting on sand
Halosere	:	starting on saline soil

Process of Succession

The process of succession takes place in a systematic order of sequential steps as follows:

i. **Nudation**: It is the development of a bare area, without any life form. The bare area may be caused due to several anthropogenic activities.
ii. **Invasion:** It is the successful establishment of one or more species on a bare area through dispersal or migration, followed by ecesis or establishment.
iii. **Competition and coaction**: As the number of individuals grows there is competition, for space, water and nutrition. They influence each other in a number of ways, known as coaction.
iv. **Reaction** : The living organisms have a strong influence on the environment which is modified to a large extent and this is known as reaction.
v. **Stabilization** : The succession ultimately culminates in a more or less stable community called climax which is in equilibrium with the environment

5. Explain about the Conservation of biodiversity.

Conservation of biodiversity

Biodiversity is one of the important tools, for sustainable development. The enormous value of biodiversity due to their

commercial, medical, genetic, aesthetic and ecological importance emphasizes the need to conserve biodiversity.

Types of biodiversity:

a) In-situ conservation (within habitat)
b) Ex-situ conservation (outside habitat)

a) In-situ conservation:

- In-situ conservation involves protection of fauna and flora within its natural habitat, where the species normally occurs is called in-situ conservation.
- The natural habitats or ecosystems maintained under in-situ conservation are called "**protected areas".**

Important in-situ conservation

Biosphere reserves, national parks, wildlife sanctuaries etc.,

Methods of in-situ conservation:

1. Biosphere reserves:

Biosphere reserves cover large area, more than 5000 sq.km. It is used to protect species for long time. Ex: Nandadevi nilgiri

Role of Biosphere Reserves:

- It gives long-term survival of evolving ecosystem.
- It protects endangered species.
- It protects maximum number of species and communities.
- It serves as site of recreation and tourism.
- It is also useful for educational and research purposes.

- ❖ It remains and functions as an open system and changes in land use are not allowed.

Restriction: No tourism and explosive activities are permitted in the biosphere reserves.

2. National Park:

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 sq. kms. Within the biosphere reserves, one or more national parks are also exists.

Ex: Kaziranga national park

Role of a National Park

It is used for enjoyment through tourism, without affecting the environment. It is used to protect, propagate and develop the wildlife.

3. Wildlife sanctuaries:

A wildlife sanctuary is an area, which is reserved for the conservation of animals only. At present, there are 492 wildlife sanctuaries in our country.

Role of Wildlife Sanctuaries

- ❖ It protects animals only.
- ❖ It allows the operations such as harvesting of timber, collection of forest products; private ownership rights and forestry operations provided it does not affect the animals adversely.
- ❖ Ex: Mudumalai

4. Gene sanctuary:

- ❖ A gene sanctuary is an area, where the plants are conserved.
- ❖ Ex: two sanctuaries in north India meant for citrus Pitcher plant

1. **Special Projects:**

   For certain animals in India

   Ex: Gir lion project

Advantages of In-Situ Conservation:

- ❖ It is very cheap and convenient method.
- ❖ The species gets adjusted to the natural disasters like drought, floods, and forest fires.

Disadvantages of In-Situ conservation:

- ❖ A large surface area of the earth is required to preserve the biodiversity.
- ❖ Maintenance of the habitats is not proper, due to shortage of staff and pollution.

b) Ex-situ conservation

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

Role of ex-situ conservation:

i) It involves maintenance and breeding of endangered plant and animal species under controlled conditions.

ii) It identifies those species which are at more risk of extinction.

iii) It prefers the species, which are more important to man in near future among the endangered species.

Important Ex-situ conservation

Botanical gardens, seed banks, microbial culture collections, tissue and cell cultures, museums, zoological gardens.

Methods of ex-situ conservation

The following important gene bank (or) seed bank facilities are used in Ex-situ conservation.

1. National Bureau of plant Genetic Resources (NBPGR). It is located in New Delhi. It uses cryo preservation techniques to preserve agricultural and horticultural crops.
2. National Bureau of Animal genetic Resources (NBAGR). It is located at Karnal, Haryana. It preserves the semen of domesticated bovine animals.
3. National facility for plant Tissue culture Repository (NFPTCR). It develops the facility for conservation of varieties of crop plants or trees by tissue culture. This facility has been created within the NBPGR.

Advantages of Ex-situ conservation:

- Survival of endangered species is increasing due to special care and attention.
- In captive breeding, animals are assured food, water, shelter and also security and hence longer life span.

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

Disadvantages of Ex-situ conservation:

- It is expensive method.
- The freedom of wildlife is lost.
- The animals cannot survive in natural environment.
- It can be adopted only for few selected species.

6. Justify India to be a Mega biodiversity nation with required data.

- **India as a mega diversity nation**
- India is one among the12 mega-diversity countries in the world.It has 89,450 animal species accounting for 7.31% of the global faunal species and 47,000 plant species which accounts for 10.8% of the world floral species.The loss of biodiversity or endemim is about 33%.

Plants	Number	Animals	Number
Fungi	23,000	Mollusca	5042
Bacteria	850	Amphibia	2546
Algae	2500	Birds	1228

-
- Endemic species

- The species which are confined to a particular area are called endemic species. Our country has a rich endemic flora and fauna. About 33% of the flowering plants,53% of fresh water fishes,60% amphibians,36% reptiles and 10% mammalian are endemic species.
-
- 1. Plant Diversity
- Nearly5000 flowering plants and 166 crop plant species have their origin in India.
- 2. Marine diversity
- More than 340 coral species of the world are found here.
- Several species of mangrove plants and sea grasses are also found in our country.
-
- 3. Agro-biodiversity
- There are 167 crop species and wild relativies. India is considered to be the centre of origin of 30,000 to 50,000 varieties of rice, mango, turmeric, ginger, sugarcane,etc.
- 4. Animal biodiversity
- There are 75,000animal species including5, 000insects.
- India is a home to about nearly 2, 00,000 living organisms.

Unit II

ENVIRONMENTAL POLLUTION

PART-A

1. Define photochemical smog. (A.U. Dec 2006)

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

2. Differentiate between primary and secondary air pollutants with examples.

Primary Pollutants

These are emitted directly in the atmosphere in harmful form Example**:** CO, NO, SO_2

Secondary pollutants

Some of the primary pollutants react with one another or with basic components of air to

form new pollutants. $NO/NO_2 \rightarrow HNO_3/NO_3$

3. What is meant by BOD and COD? (TCY A.U. Dec 2008)

BOD is the amount of oxygen required for the biological decomposition of organic

matter present in the water.

COD is the amount of oxygen required for chemical oxidation of organic matter using

some oxidizing agents like $K_2Cr_2O_7$ and $KMnO_4$.

4. What are the causes of air pollution? (Coim A.U. Dec 2009)

i) Incomplete burning of fossil fuels, liberate CO, NO_2, etc.,

ii) Coal burning in power plant liberates SO_2.

iii) Paint, smelters, lead manufacture liberate Pb.

iv) Agriculture, decay of plants, liberates hydrocarbon

5. What are the causes and effects of ozone layer depletion?

Causes:

i) Chloro Fluoro carbon (CFC)

ii) Hydro Chloro Fluoro Carbon(HCFC),

iii) Bromo Fluoro Carbon(BFC)

Effects:

i) Affects the aquatic forms.

ii) Increases the average temperature of the earth.

iii) Degrades paints, plastics and other polymeric materials.

iv) UV rays destroy the melamine pigment in human body.

6. When does a sound causes noise pollutions? or what is Noise pollution?

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 hears. If the intensity of the sound exceeds 1 db, noise pollution occurs.

The unwanted, unpleasant or disagreeable sound that causes discomfort for all living being is called noise pollution.

7. What is acid rain? What is acid precipitation? (TNV AU Dec 2008) (AU Dec 2009)

- The presence of excessive acids in rain water is known as acid rain.
- It includes acid rain, acid fog, acid snow and other form of precipitation that is more acidic than normal.
- The presence of SO_2 and NO_2 gases in the atmosphere decreases the pH of the water during the rainfall. This type of precipitation of water is called acid deposition or acid precipitation.

$$SOx + H_2O \rightarrow H_2SO_4$$
$$NOx + H_2O \rightarrow HNO_3$$

8. State the role and responsibility of an individual of the prevention of pollution?

i) Plant more trees

ii) Help more in pollution prevention than pollution control

iii) Use water, energy and other resources efficiently

iv) Purchase recyclable, recycled and environmentally safe products

v) Use CFC free refrigerators vi) Use natural gas than coal vii) Reduce deforestation

9. Differentiate between Mist and Fog. (May'2010)

Mist is made up of liquid droplets generally smaller than 10um which are formed by condensation in the atmosphere or are released from industrial operations. Fog is similar to mist but the droplet size bigger (>10u) and water is the liquid. Fog is sufficiently dense to incomprehensible vision.

10. What is marine pollution? (Nov'14)

The discharge of waste substances into the sea resulting in harm to living resources hazards to human health hindrance to fishery and impairment of quality for use of sea water.

11. What are the objectives of wastewater treatment?
(Nov'09, Nov'13)

i) To convert harmful compounds into harmless compounds.
ii) To eliminate the offensive smell
iii) To remove the solid content of the sewage.
iv) To destroy the disease producing micro organisms.

12. What is PAN?

PAN is peroxy acetyl nitrates formed by the photochemical reaction between hydrocarbons, nitrogen oxides and light.

13. Mention the measures to control thermal pollution caused by industries.

Steps to control thermal pollution caused by industries.

i) Cooling towers
ii) Cooling ponds
iii) Spray ponds
iv) Artificial lakes

14. What are the four water quality parameters and their importance.

i) pH

ii) Dissolved oxygen

iii) Total dissolved solids

iv) Colour, odour, taste.

PART B & C

1. Explain the various methods of controlling air pollution. (Or) Discuss the major air pollutants and their impact.

AIR POLLUTION

Definition:

- The presence of one or more contaminants like dust, smoke, mist, and odour in the atmosphere which are injurious to human beings, plants and animals is called air pollution.

Sources of air pollution:

Carbon monoxide:

- Cigarette smoking, incomplete burning of fossil fuels, Motor vehicle exhaust.ss

Nitrogen dioxide:

- Fossil fuels burning in motor vehicles and power industrial plants.

Sulphur dioxide:

- Coal burning in the power plants and industrial processes.

Suspended particulate matter:

- Coal burning in the power plants and industrial plants burning agricultural waste, unpaved roads, construction of buildings etc.

Effects of air pollution:

Carbon monoxide:

- It increases global temperature.

- ❖ It causes coma, irreversible brain cell damage and death in human beings.

Nitrogen dioxide:

- ❖ Lung irritation and damage.
- ❖ Acid deposition damages plants and trees and it corrodes the metal.

Sulphur dioxide:

- ❖ Breathing problems for healthy people.
- ❖ Reduce visibility, acid deposition can damage trees, soils, plants and the aquatic life.

Suspended Particulate matter:

- ❖ Nose and throat irritation, lung damage, asthma etc.

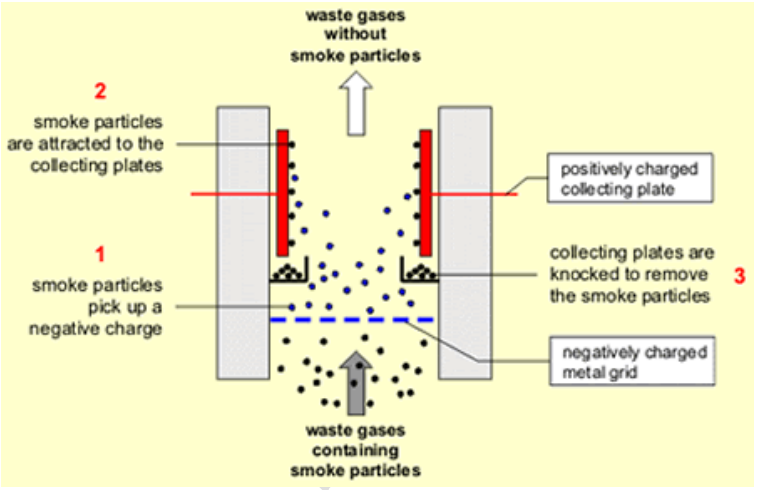
Control measures of air pollution:

- ❖ Use only unleaded petrol.
- ❖ Use biodiesel, biofuels etc.,
- ❖ Use of catalytic converters to help control the emissions of Carbon monoxide and hydrocarbons.
- ❖ To use mechanical devices like Electrostatic precipitator, Baghouse filter, Cyclone separator, wet scrubber etc.

1. Electrostatic precipitator:

- An **electrostatic precipitator** (**ESP**), or **electrostatic air cleaner** is a particulate_collection device that removes particles from a flowing gas (such as air) using the force of an induced electrostatic charge.

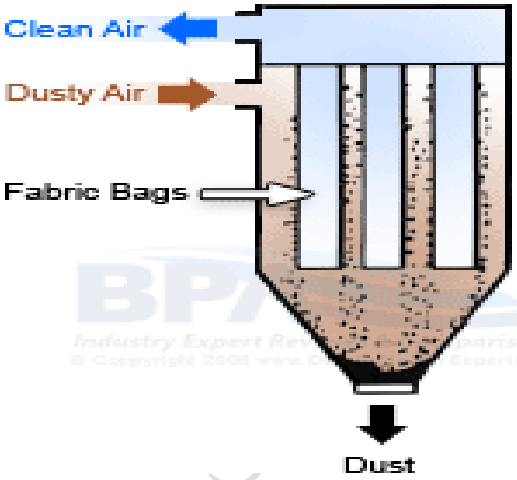
- Electrostatic precipitators are highly efficient filtration devices that minimally impede the flow of gases through the device, and can easily remove fine particulate matter such as dust and smoke from the air stream.



2. Baghouse filters :

- ❖ One of the most efficient devices for removing suspended particulates is an assembly of fabric filter bags, commonly called a baghouse.
- ❖ A typical baghouse comprises an array of long, narrow bags—each about 25 cm (10 inches) in diameter—that are suspended upside down in a large enclosure.

- Dust-laden gases enter the baghouse and pass through fabric bags that act as filters.
- The bags can be of woven or felted cotton, synthetic, or glass-fiber material in either a tube or envelope shape.



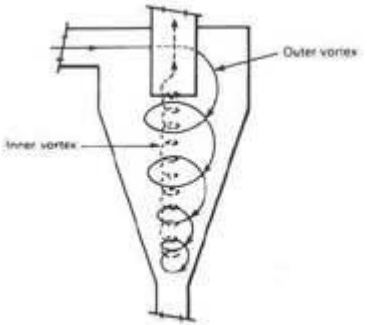
3. Cyclonic separators:

- Centrifugal collectors use cyclonic action to separate dust particles from the gas stream.
- In a typical cyclone, the dust gas stream enters at an angle and is spun rapidly.
- The centrifugal force created by the circular flow throws the dust particles toward the wall of the cyclone.
- After striking the wall, these particles fall into a hopper located underneath.

The most common types of centrifugal, or inertial, collectors in use today are:

Single-cyclone separators:

- ❖ They create a dual vortex to separate coarse from fine dust.
- ❖ The main vortex spirals downward and carries most of the coarser dust particles.
- ❖ The inner vortex created near the bottom of the cyclone, spirals upward and carries finer dust particles.



Cyclone

Multiple-cyclone separators:

- ❖ Multiple-cyclone separators consist of a number of small-diameter cyclones, operating in parallel and having a common gas inlet and outlet, as shown in the figure.
- ❖ Multiple-cyclone separators operate on the same principle as cyclones—creating a main downward vortex and an ascending inner vortex.

- ❖ Multiple-cyclone separators dust collectors are found in all types of power and industrial applications, including pulp and paper plants, cement plants, steel mills, petroleum coke plants, metallurgical plants, saw mills

4. Wet scrubber:

- The term **wet scrubber** describes a variety of devices that remove pollutants from a furnace flue gas or from other gas streams.
- In a wet scrubber, the polluted gas stream is brought into contact with the scrubbing liquid, by spraying it with the liquid, by forcing it through a pool of liquid, or by some other contact method, so as to remove the pollutants.
- The design of wet scrubbers or any air pollution control device depends on the industrial process conditions and the nature of the air pollutants involved.

2. Explain the causes, effects and control measure of water pollution (or) Explain the various sources, effects and methods of control of water pollution. (16marks)

The alternation in physical, chemical and biological characteristics of water which may cause harmful effects on humans and aquatic life.

Sources of water pollution:

1. Inorganic Chemicals:

Ex: Water soluble inorganic chemicals.

Human sources (causes):

- Surface runoff, industrial effluents and household cleansers.

2. Organic Chemicals:

Ex: Oil, Gasoline, plastics, pesticides, cleaning solvents, detergents.

Human sources (causes):

- Industrial effluents, household cleansers, surface runoff from forms.

3. Sediment:

Ex: Soil, silt, etc.

Human sources (causes):

- Soil erosion

4. Radioactive Materials:

Ex: Radioactive isotopes of iodine, radon, uranium, cesium and thorium.

Human sources (causes):

- Nuclear power plants, mining and processing or uranium and other ores, nuclear weapons production and natural sources

Point and Non –Point Sources of water pollution:

Point sources:

- Discharged pollutants at specific locations through pipes, ditches.

Ex: Factories, Sewage treatment plants, abandoned underground mines and oil tankers.

Non-Point sources:

- Land areas that pollute water by runoff, subsurface flow or depletion from the atmosphere.

Ex: Acid deposition and runoff of chemicals in to surface water.

Effects of water pollution

1. Inorganic Chemicals:

- Can make fresh water unusable for drinking or irrigation.
- Causes skin cancers and neck damage.
- Damage the nervous system, liver and kidneys.

2. Organic Chemicals:

- Causing nervous system damage and some cancers.
- Harm fish and wild life.
- Drinking water with excessive levels of nitrates lower the oxygen carrying capacity of the blood and can kill urban children and infants.

3. Sediment:

- Can reduce photosynthesis and cloud water.
- Carry pesticides, bacteria and other harmful substances.

4. Radioactive Materials:

- Genetic mutations, birth defects and certain cancers.

Control Measures of water Pollution:

- The administration of water pollution control should be in the hands of Govt.
- Scientific techniques should be adopted in catchment area.
- Industrial plants should be based on recycling operations.
- Possible reuse and recycle of treated sewage effluents.

Control methods of water pollution:

- The alternation in physical, chemical and biological characteristics of water which may cause harmful effects on humans and aquatic life.

Waste water (or) Sewage Treatment:

- To convert harmful to harmless compounds.
- To eliminate the offensive smell.
- To remove the solid content of sewage.
- To destroy the disease producing microorganism.

Treatment process:

Preliminary treatment:

Coarse solids and suspended impurities can be removed by passing it through bar and mesh screens.

1. Primary treatment

In this treatment , greater portion of the suspended inorganic and organic solids are removed from the liquid sewage by settling. In order to facilitate quick settling coagulants like alum, ferrous sulphate are added.

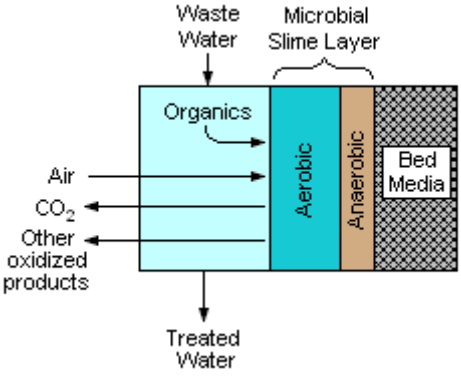
2. Secondary or biological treatment:

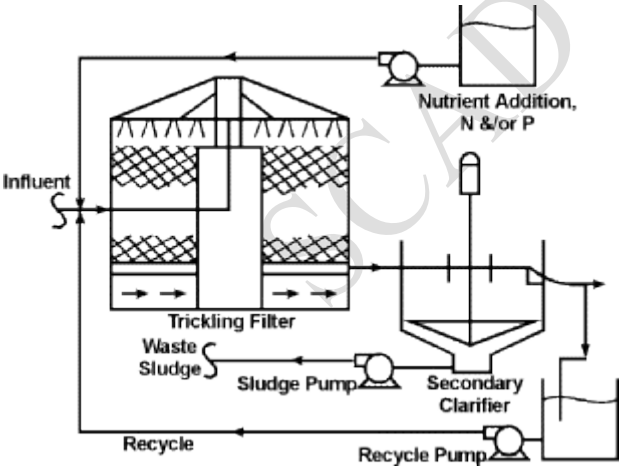
- Biodegradable organic impurities impurities are removed by aerobic bacteria.

This is done by

A. Trickling filter process

- A trickling filter consists of a fixed bed of rocks, coke, gravel, slag, ceramic, or plastic media over which sewage or other wastewater flows downward and causes a layer of microbial slime (bio film) to grow, covering the bed of media.
- Aerobic conditions are maintained by splashing, diffusion, and either by forced air flowing through the bed or natural convection of air if the filter medium is porous.

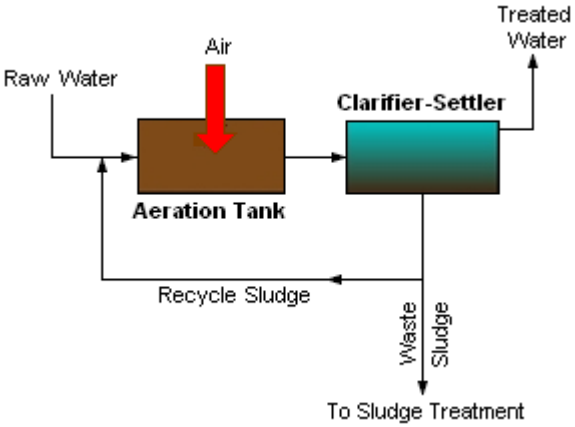




- The removal of pollutants from the wastewater stream involves both absorption and adsorption of organic compounds by the layer of microbial bio film.
- The filter media is typically chosen to provide a very high surface area to volume.

- Typical materials are often porous and have considerable internal surface area in addition to the external surface of the medium.
- Passage of the wastewater over the media furnishes dissolved air, the oxygen which the slime layer requires for the biochemical oxidation of the organic compounds and releases carbon dioxide gas, water and other oxidized end products.
- As the bio film layer thickens, it eventually sloughs off into the treated effluent and subsequently forms part of the secondary sludge.

B. Activated sludge process



- The process involves air or oxygen being introduced into a mixture of primary treated or screened sewage or

industrial wastewater (called wastewater from now on) combined with organisms to develop a biological floc which reduces the organic content of the sewage.

Activated sludge process involves:

- wastewater aeration in the presence of a microbial suspension,
- solid-liquid separation following aeration,
- discharge of clarified effluent,
- wasting of excess biomass,
- Return of remaining biomass to the aeration tank.
- 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.
- Part of organic matter is synthesized into new cells and part is oxidized to CO_2 and water to derive energy.
- 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.
- A part of this settled biomass, described as activated sludge is returned to the aeration tank and the remaining forms waste or excess sludge.

3. Tertiary treatment Or Disinfection:

- The purpose of disinfection in the treatment of waste water is to substantially reduce the number of microorganisms in the water to be discharged back into the environment for the later use of drinking, bathing, irrigation, etc.
- The effectiveness of disinfection depends on the quality of the water being treated (e.g., cloudiness, pH, etc.), the type of disinfection being used, the disinfectant dosage (concentration and time), and other environmental variables.
- Cloudy water will be treated less successfully, since solid matter can shield organisms, especially from ultraviolet light or if contact times are low.
- Generally, short contact times, low doses and high flows all militate against effective disinfection.
- Common methods of disinfection include ozone, chlorine, ultraviolet light, or sodium hypochlorite.

3. (a) Discuss the sources, effects and control of Noise pollution (or) Explain the concept of source, path receiver in the control of noise pollution.
(8marks)

Definition:

- Noise pollution is defined as, "the unwanted, unpleasant or disagreeable sound that causes discomfort for all living beings."

Unit of Noise (Decibel):

- The sound intensity is measured in decibel (dB), which is one tenth of the longest unit Bel.
- One dB is equal to the faintest sound, a human ear can hear.

Noise Level:

- Normal conversation sound ranges from 35 dB to 60dB. Noise above 140 dB becomes painful.

Types and sources of Noise:

- Industrial noise
- Transport noise
- Neighbourhood noise

Industrial noise:

- Highly intense sound or noise pollution is caused by many machines.
- There exists a long list of sources of noise pollution including different machines of numerous factories, industries and mills.
- Industrial noise, from mechanical saws and pneumatic dill is unbearable.

Example:

- In the steel industry the workers are exposed to 112 dB for eight hours and suffer from the occupation pollution.

Transport noise:

- It mainly includes road traffic noise, rail traffic noise and aircraft noise.
- Particularly the diesel engine vehicle has increased enormously in recent years.
- According to the experts, the noise level in most of the residential areas in metropolitan cities is already hovering on the border line because of vehicular noise pollution.
- A survey conducted in metropolitan cities has shown that noise level in Delhi, Bombay and Calcutta is as high as 90dB.

Neighborhood noise:

This type of noise includes disturbance from household gadgets and community. Common noise makers are musical instruments, TV, VCR, radios, transistors, telephones and loudspeakers etc.,

Effects of noise pollution:

- Noise pollution affects human health, comfort and efficiency.
- It causes contraction of blood vessels, makes the skin pale, and leads to excessive secretion of adrenalin hormone into blood stream which is responsible for high blood pressure.

- It causes muscles to contract leading to nervous breakdown, tension etc.,
- These adverse reactions are coupled with a change in hormone content of blood, which in turn increase the rate of heart beat.
- It affects health efficiency and behavior.
- It may cause damage to heart, brain and liver.
- When exposed to very loud and sudden noise acute damage occurs to the ear drum.
- In addition to serious loss of hearing due to excessive noise, impulsive noise also causes psychological and pathological disorders.
- Ultrasonic sound can affect the digestive, respiratory, cardio vascular systems.
- Brain is also affected by loud and sudden noise as that of jet and aero plane noise etc.,
- Blood also thickened by excessive noises.
- Impairment of night vision and decrease in the rate of colour perception are some of its severe effects.

Control measures of noise pollution:

1. **Source control:**

   This may include source modification such as acoustic treatment to machine surface, design changes.

2. **Transmission path intervention**:

This may include containing the source inside a sound insulating enclosure, construction of a noise barrier.

3. **Receptor control:**
   This includes protection of the receiver by altering the work schedule or provision of personal protection devices such as ear plugs for operating noisy machinery.
4. **Oiling:**
   Proper oiling will reduce the noise from the machines.
5. **Planting trees**
   Around houses can also act as effective noise barriers.
6. **Usage of absorptive materials**
   To control interior noise.

Preventive Measures:

- Noise can be reduced by prescribing noise limits for vehicular traffic, ban on honking of horns.
- Creation of silent zones near schools and hospitals.
- Redesigning of buildings to make them noise proof.
- Reduction of traffic density.

3. (b) Write a note on disposal of radioactive wastes (or) Explain the effects nuclear and radiation pollution.

(8marks)

Nuclear Pollution (Radio Active Pollution)

Introduction:

Nuclear energy is used to produce clean electric power. The energy released in the splitting of nuclei in the atoms is used to generate electricity.

Sources:

- Natural sources.
- Manmade (Anthropogenic) sources.

Natural sources:

- Space-Emits cosmic rays.
- Soil, rocks, air, water, food, radon-222etc. also contain one or more radioactive substances.

Man-made sources:

Power plants, X-rays, bombs etc. where radioactive substances are used.

Effects:

- Exposure of the brain and CNS to radiation causes death within hours or days.
- Eye on radiation forms cataracts that impair sights.
- It leads to vomiting; bleeding of the gums, mouth ulcers.
- Blood vessel damage show red spots on the skin.
- Unborn children are vulnerable to brain damage or mental retardation.

Control measures:

- Nuclear devices should not be exploded in air. It should be exploded underground.

- In reactors, gaseous coolants may used to prevent extraneous activation products.
- Containments may decrease the radioactive emissions.
- Nuclear medicines and radiation therapy should be applied when necessary with minimum dose.
- Use of high chimneys and ventilations at the working place seems to be an effective way for dispersing radio-pollutants.
- Disposal methods make the pollutant in a confined place to spread over a large space such that pollution can be weakened and its effects can be reduced.

Disposal of Radioactive wastes (Nuclear Hazards):

1. High level wastes. (HLW)

Ex: Spent nuclear fuel

- HLW have a very high radioactivity per unit volume.
- Since they are too dangerous, must be contained either by converting them into inert solids (ceramics) and then buried deep into earth or stored in deep salt mines.

2. Medium level wastes.

Ex: Filters, reactor components, etc.,

- MLW is solidified and are mixed with concrete in steel drums before being in deep mines or below the sea bed in concrete chambers.

3. Low level wastes.

Ex: Solids or liquids contaminated with traces of radioactivity.

- LLW are disposed off in steel drums in concrete-lined trenches.

4. What is Thermal pollution and explain its effects and control measures. (16marks)

Definition:

Addition of excess of undesirable heat to water that makes it harmful to man, animals or aquatic life is called thermal pollution.

Causes of Thermal Pollution:

i) Nuclear power plants.
ii) Coal-fired power plants.
iii) Industrial effluents.
iv) Domestic sewage.
v) Hydro-electric power.

Nuclear power plants:

- It includes drainage from hospitals, research institutes, and nuclear experiments & explosions discharges toxic radio nuclides into nearby water streams.
- Heat effluents from power plants are discharged at 10° C higher than the receiving water which affects the aquatic flora and fauna.

Coal-fired power plants:

- Constitute the major sources of thermal pollutants.

- Heat effluents decrease the dissolved oxygen content of water.
- It results into killing of fish and other marine organisms.

Industrial effluents:

- The discharged water from stream-electric power industry using turbo generators will have a higher temperature ranging from 6° C to 9° C than the receiving water.
- It results in the increase of stream temperature to a level at which natural dissipation of heat will be inefficient.

Domestic sewage:

- It is commonly discharged into rivers, canals or streams with or without waste treatment which has higher temperature than receiving water.
- It decreases the content of dissolved oxygen and the of oxygen increases.
- This will set up the anaerobic condition results in release of foul and offensive gases in water.
- The marine organism will die out.

Effects of Thermal Pollution:

Reduction in dissolved oxygen:

- When the temperature in water increases, there is reduction in dissolved oxygen.

Increase in Toxicity:

- The rising temperature increase the toxicity of the poison present in water

- A 10° C rise in temperature doubles the toxic effect of potassium cyanide causing massive mortality of fish.

Interference with biological activities:

- The temperature changes totally disrupt the entire ecosystem like controlling respiratory rates, digestion, excretion and overall development of aquatic organisms.

Direct mortality:

- Unutilized heat in water is responsible for direct mortality of aquatic organism.
- Above a particular temperature death occurs to fish due to failure in respiratory system, nervous system process.

Control measures of thermal pollution:

- Cooling towers.
- Cooling ponds.
- Spray ponds.
- Artificial lakes.

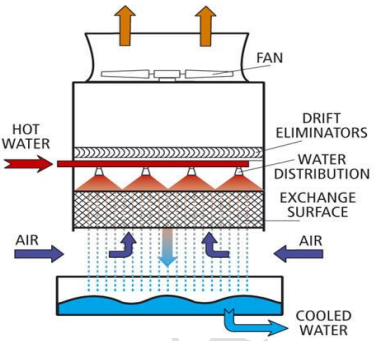
Cooling towers:

- It transfers some of the heat from hot water to the surrounding atmosphere by the process of evaporation.
- It is used to dissipate the recovered waste heat to eliminate the problems of thermal pollution.

Types of cooling towers

1. Wet cooling towers

- ❖ Hot water coming out from the condenser is allowed to spray over baffeles.
- ❖ Cool air with high velocity is passed from sides, which takes away the heat and cools the water.



2. Dry cooling tower:
   - ❖ Hot water is allowed to flow in a long spiral pipes.
   - ❖ Cool air is passed over these hot pipes, which cools down the hot water.

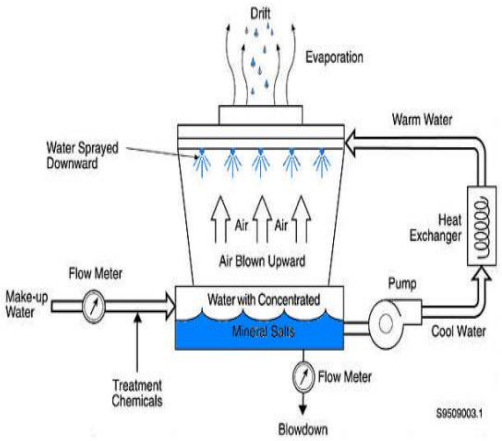
Cooling ponds:

- It is the simplest method of cooling thermal discharges.
- Heated effluents maximize the dissipation of heat to the atmosphere & minimize the water area and volume.
- This warm water wedge acts like a cooling pond.

Spray ponds:

- The water from the condenser is pass into the ponds through sprayers

- The water is sprayed through nozzles as fine droplets.
- Heat from the fine droplets gets dissipated to the atmosphere.



Artificial lakes:

- Man made bodies of water which offer possible alternative to once-through cooling.
- Heat effluents can be discharged into the lake at one end & water withdrawn from the other end.
- The heat is eventually dissipated through evaporation.

5. (a) Explain the methods of Disposal of municipal solid waste (or) Discuss briefly the disposal of municipal solid waste.

Solid waste management (or) waste shed management

A) Land fill B) Incineration C) Composting

Landfill:

- ❖ Solid wastes are placed in sanitary landfill system in alternative layers of 80cm thick refuse, covered with earth fill of 20 cm thickness.
- ❖ After two or three years, solid waste volume shrinks by 25-30% and the land is used for parks, roads and small buildings.

Advantages:

- Simple & economical.
- Segregation not required.
- Landfills can be used for other purposes.
- Natural resources are returned & recycled.

Disadvantages:

- Large area is required.
- Transportation cost is heavy.
- Causes fire hazard due to the formation of methane in wet weather.

Incineration (or) Thermal Process:

- The combustible substances such as paper, rubbish, garbage a burnt in the incinerators.
- The left out ashes, clinkers from incinerators accounts for 10 to 20% which need for further disposal by sanatory landfill.

- The heat from the incinerator is used for producing electricity throughout turbines.
- The wet waste is dried in preheated called destructors which can incinerate about 100 to 150 tons per hour.
- The temperature maintained in combustion chamber about 700^{o}C & increased to 1000^{o}C when electricity is to be generated.

Advantages:

- The clinker can be used for other purposes; residue is only 20-25%.
- It requires very little space.
- Cost of transportation is not high as incinerators are within city limits.
- Safest from hygienic point of view.
- An incinerator of 300 tons per day can generate 3MW of power.

Disadvantages:

- Its capital &operating cost is high.
- Needs skilled personnel.
- Needs further disposal of smoke & dust to reduce air pollution.

Composting:

- In this method, bulk organic waste is converted into fertilizing manure by biological action.
- The separated biodegradable waste is dumped in underground earthen trenches in layers of 1.5m & is finally covered with earth of about 20 cm and left over for decomposition.
- For active decomposition microorganisms such as actinomycetes are introduced.
- After 2 to 3 days biological action starts & temperature is increased about 75°C & finally odourless powdery brown coloured mass known as ***humus*** which has fertilizing value can be used for agricultural field.
- It contains a lot of nitrogen, phosphates & other minerals.
- WHO has set up a compost plant in New Delhi in 1981with capacity of 90 to 100 tons of waste every day.

Advantages:

- When this is added to soil, it increases water retention & ion exchange capacity of soil.
- Industrial solid wastes can also be treated.
- It can be sold, thus it reduces cost of disposing of wastes.
- Recycling occurs.

Disadvantages:

- The non-consumables have to be disposed separately.
- No assured market, as it does not reach farmers.

5. (b) Explain causes, effects of Marine pollution. (8marks)

Definition

- The discharge of waste substances into the sea resulting in harm to living resources, hazards to human health, hindrance to fishery and impairment of quality for use of sea water.

Sources:

Dumping the wastes:

- The most serious issue is dumping of untreated wastes and sewage into oceans by the coastal towns and cities and industrial units into rivers.
- Rivers receive huge amount of sewage, garbage, agricultural discharge, pesticides, including, heavy metals.
- Huge quantity of plastic is being dumped in sea.

Effects:

- Many marine birds ingest plastic that causes gastro intestinal disorders.

Oil pollution of marine water:

- The great damage to water is imposed by petroleum and its products.
- Heavy petroleum products precipitate to the bottom or absorbed on rock, stone, and sand banks to inhibit the life of hydrocarbons.
- One drop of petroleum spreads over a great area to isolate the water from contact with atmospheric oxygen.

Examples:

- Oil enters water from cracks of oil tankers, accidental spillage, cleaning of fuel tanks by merchant and warships and also from street cleaning.
- Heavy petroleum products precipitate to the bottom or an adsorbed on rock, stone and sand blanks to inhibit the life of hydrobionts.

Effects

- The continuous oil films inhibit photosynthesis and the formation of oxygen.
- This inhibits the growth of plankton, which is the main source of the hydrobionts inhabiting the water body.
- All aquatic animals depend either directly or indirectly on plankton, which is the basis of the tropic chain.

- The surface of water in contact with the shore is usually contaminated with oil, which interferes with the normal development of many hydrocarbons.

Effects of marine pollution:

- The presence of heavy metals and organic pollutants cause more damage in birds as thinning of eggshell and tissue damage of eggs.
- Oil pollution cause damage to marine fauna and flora including algae, fish, birds, invertebrates.
- About 50,000 to 2, 50,000 birds are killed every year by oil.
- Oil spilling in sea water causes abnormally low body temperature in birds resulting in hypothermia.
- Nearly 150 rare species of bald eagles also became Victims when they ingested oil during Exxon Valdez accident
- The continuous oil films inhibit photosynthesis and formation of oxygen.
- This inhibits the growth of plankton, which is the main source of the hydrobionts inhabiting the water body.
- Hydrocarbons and benzpyrene accumulate in food chain and consumption of fish by man may cause cancer.

6. (a) Discuss the role of individual in control of pollution. (8marks)

1. Plant more trees.
2. Help more in pollution prevention than control
3. Use water, energy and other resources efficiently
4. Purchase recyclable and environmentally safe product.
5. Use CFC free refrigerators.
6. Use natural gas than coal.
7. Reduce deforestation
8. Increase use of renewable resources.
9. Use organic manure
10. Slow population growth

6. (b) Discuss the major soil pollutants and their impact. (8marks)

Definition:

- Soil pollution is defined as "the contamination of soil by human and natural activities which may cause harmful effects on living being".

Types:

Soil pollution mainly results from the following sources

- Industrial wastes.
- Urban wastes.
- Agricultural wastes.
- Radioactive practices.
- Biological agents.

Industrial wastes:.

- The industrial pollutants are mainly discharged from the various original such as pulp and paper mills, chemical industries, oil refiners, sugar factories, tanneries, textiles, etc.
- These pollutants affect and alter the chemical and biological properties of soil and serious effects on living organisms.

Urban wastes:

- Urban wastes comprise both commercial and domestic wastes consisting of dried sludge of sewage.

- All the urban solid wastes are commonly referred to as refuse.

Constituents of urban refuse:

- This pollution is mainly due to garbage & rubbish materials like plastics, glasses, metallic cans, fibres, paper, rubber, street sweepings, fuel residues, leaves.
- This causes serious effects which is mainly due to difficulties in degraded.

Agricultural practices:

- Modern agricultural practices pollute the soil to a large extent.
- Today pesticides, advancing agro-technology, huge quantities of fertilizers are added to increase the crop yield.
- Apart from these farm wastes, manure, slurry, soil erosion containing mostly inorganic chemicals are reported to cause soil pollution.

Radioactive pollutants:

Radioactive substances resulting from explosions of nuclear dust and radioactive wastes penetrate the soil and accumulate there by creating land pollution.

Example:

- Radio nuclides of radium, thorium, uranium, isotopes of potassium (K-40) and carbon (C-14) are very common in soil, rock, water and air.
- Nuclear reactor produces waste containing Sr-90, I-129, Cs-137, and isotopes of iron which are most injurious.
- Sr-90 gets deposited in bones and tissues instead of calcium.

Biological agents:

- Soil gets large quantities of human, animal and bird's excreta which constitute the major source of land pollution by biological agents.

Example:

- Sludge causes serious damages to plants within few years.
- As it contains more viruses and viable intestinal worms.
- Waste water, municipal garbage and wrong methods of agricultural practices also induce heavy soil pollution.

Control measures of soil pollution:

The pressure on intensification of farm activities increases for two reasons.

- Population growth
- Decrease of the available farm land due to urbanization

6. Write a detailed note on photochemical reactions taking place in the atmosphere (or)
Discuss about the causes, impacts and control-measures of ozone depletion in the atmosphere.

Ozone is a gas (O_3) found throughout the atmosphere,but most highly concentrated in the stratosphere between 10 and 50km above sea level, where its known as ozone layer.
Without the ozone layer,life on earths surface would not be possible.It protects us from the damaging ultraviolet radiation of the sun.In particular it filters out UV-B radiation.

Mechanism of ozone layer depletion.
The ozone layer was attacked by chlorofluoro carbon(CFCs) which are released into atmosphere by refrigeration units, air conditioning systems,aerosol sprays ad cleaning solvents. Chlorofluoro carbons release chloring which breaks ozone into oxygen.

$$CF_2Cl_2 + h\upsilon \rightarrow Cl + CF_2Cl$$

$$CF_2Cl + O_2 \rightarrow CF_2O + ClO$$

$$Cl + O_3 \rightarrow ClO + O_2$$

$$ClO + O^{\cdot} \rightarrow Cl + O_2$$

Each chlorine atom is capable of attacking several ozone molecules. So that a long chain process is involved.A 1% loss of ozone results in a 2% increase in UV rays reaching the earth's surface.

Ozone depleting substances.
CFC-Chloro fluoro Carbon
HCFC-HydroChlor Fluoro Carbon.
BFC-Bromo Fluoro Carbons.

Environmental impact:

1) The UV rays damage genetic material in the skin cells which cause skin cancer.
2) Prolonged human exposure to UV rays may lead to slow blindness called actinic keratitis.
3) Degradation of paints,plastics,polyemeric material.
4) UV rays directly affect the aquaticforms such as fish,crabs.

Control measures.
1.Replacing CFCs by other materials which are less damaging.
2.Manufacturing and using of ozone depleting chemicals should be stopped.

Incineration/Deep burial

7. What are the effects of heavy metals in aquatic environment?

Water pollution is any chemicals, biological or physical change in water quality that has a harmful effect on living organisms or makes water unsuitable for desired uses.

The effect of metal in water and waste water range from beneficial through troublesome to dangerously toxic. Some metals are essential, others may adversely affect water consumers, wastewater treatment systems and receiving water. Some metal may be either beneficial or toxic, depending on concentration.

Primary mechanism for toxicity to organisms that live in the water column is by absorption to or uptake across the gills: this physiological process requires metal to be in a dissolved form. This is not to say that particulate metal appear to exhibit substantially less toxicity than does dissolved metal.

Includes all metals, inorganic and organically bound, both dissolved and particulate will give a unrealistic high value of those metals that are biological available to aquatic organisms.

Not all metals are acutely in small concentrations. The heavy metal include Cu, Fe, Cd, Zn, Hg and Pb are most toxic to

aquatic organisms. Some water quality characteristic which affect metal toxicity include T, pH, hardness, anlaklinity

Effects of Heavy metals in aquatic environment

S. No	Pollutant	Source/Causes	Effects
1	Hg	Industrial wastes	Minamata disease (resulted from the contaminated waters of the Minamata bay in Japan in 1953) - causes numbness of limbs, lips and tongue, blurred vision, deafness and mental derangement.
2	Lead	Industrial wastes	Absorbed into blood and affects PBCs, liver, kidney, bone, brain and the penpheral nervous system. Lead poisoning.
3	Cadmium	Cadmium industnes, fertilisers	Deposited in organs like the kidney, pancreas, liver, intestinal mucosa, etc. Cadmium poisoning causes headache, vomiting, bronchial pneumonia, kidney necrosis, etc.
4	Arsenic	Fertilisers	Arsenic poisoning causes renal failure and death, It can cause nerve disorder, kidney and liver disorders, muscular atrophy, etc.

UNIT-III

NATURAL RESOURCES

PART-A

1. What are renewable resources? Give examples

s (A.U. Dec 2009) (TCY A.U. Dec 2008, 09)

These resources are capable of being regenerated by ecological processes within a reasonable time period. They have the potential to renew themselves

Examples: Soil, water, wind energy, solar energy, etc.,

2. What is overgrazing?

Overgrazing is a process of eating away the forest vegetation without giving it a chance to regenerate.

3. State the problems caused by the construction of dam. (A.U. June 2007)

i) Displacement of tribal people

ii) Loss of forest, flora and fauna

iii) Landslips, sedimentation and siltation occurs

iv) Stagnation and water logging around reservoirs retards plant growth.

v) Breeding of vectors and spread of vector-borne diseases.

4. What is water logging? (A.U. Dec 2006) (Coim. A.U. Dec 2009)

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

Problems in water logging:

Pore-voids in the soil get filled with water and the soil-air gets depleted. In such a condition the roots of the plants do not get adequate air for respiration. So, mechanical strength of the soil decreases and crop yield falls.

5. What is mean by soil erosion?

(A.U. June 2007)

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

6. What is deforestation? What are the causes for deforestation? (A.U. Dec 2008, Dec 2009)

Deforestation is the process of removal of forest resources due to many natural and man-made activities. In general deforestation means destruction of forests.

Cause

i) Developmental project leads to destruction of forest
ii) Mining have a serious impact on forest areas.
iii) Forest fires is one of the major cause of deforestation
iv) Fuel requirement
v) Wood is the important raw material for so many purpose

7. List the advantages and disadvantages of the hydel power. (Nov'2010)

Advantages:

1. It is renewable & low costs.
2. It is multi-purpose projects helping in controlling flood, irrigation.

Disadvantages:

1. Affects forest, agriculture land, tribal people.
2. create health problems

8. What are the effects of the over utilization of ground water? (Nov'2010)

1. Decrease of ground water.
2. Ground subsidence.
3. Earthquake& landslide.

9. What do you mean by environmental impact? (Nov/Dec 2009)

The effect on the natural environment caused by various human actions. It includes 2 types. Indirect effects– Eg: pollution, Direct effects– Eg: cutting down trees.

10. Write a note on tidal power.

Ocean tides produced by gravitational forces of the sun and moon contain enormous amount of energy which can be harnessed by constructing a tidal barrage.

11. Write briefly about geothermal energy.

- ❖ Temperature of the earth increases at the rate of 20 – 75^{o}C per Km, when we move down the earth's surface.
- ❖ High temperature and pressure fields exists below the earth's surface in many places.
- ❖ The energy harnessed from the high temperature present inside the earth is called geothermal energy.

12. Mention the major environment impacts of mining.

i) Mining reduces the shape and size of the forest areas.

ii) During mining operations, vibrations are developed which leads to earthquake.

iii) Migration of tribal people for searching land and food.

13. What do you mean by natural resources? Give examples.

Natural resources are the sources which are useful to man or can be transformed into a useful product. They are classified into 2 types.

i) Renewable resources

ii) Non-renewable resources.

14. What do you mean by desertification? Give its effects. (Nov'13)

Desertification is a progressive destruction or degradation of arid or semiarid lands to desert.

Effect:

- ❖ Around 80% of the productive land in the arid and semi-arid regions are converted into desert.
- ❖ Around 600 million people are threatened by desertification.

15. How does land degradation takes place? Write its adverse effects.

Land degradation is the process of deterioration of soil or less of fertility of the soil.

Effects:

i) Loss of soil fertility, soil texture and structure due to loss of invaluable nutrients.

ii) Increase in water logging, salinity, alkalinity and acidity problems.

iii) Loss of economic social and biodiversity.

PART – B & C

1. (a) Discuss the causes, effect and preventive of deforestation. (8marks)

Deforestation

Definition:

It is the process of removal (or) elimination of forest resources due to many

natural and man-made activities.

Causes of deforestation:

1. Developmental Projects:

They cause deforestation in two ways.

- ❖ Through submergence of forest area underwater,
- ❖ Destructing forest areas for construction works.

Ex: Hydro-electric projects, road, dam's construction etc.

2. Mining Projects:

- ❖ Mining is the process of extracting mineral resources from the earth.
- ❖ The shape and size of forest is reduced.

Ex: Mining of Mica, Coal, Manganese, Limestone, etc.

3. Fuel Requirements:

Rural and tribal people are dependent on forest for fuel, especially wood. It is also the most important raw material for industries.

Ex: For making furniture, match-boxes, etc

4. Shifting cultivation:

The replacement of forest eco-system for mono specific cultivation leads to deforestation.

5. Forest Fire:

It is one of the major causes for deforestation. Due to human interruption and rise in ambient temperature, forest fire happens now-a-days.

Effects of deforestation:

1. Global warming:

- Cutting and burning of trees increases CO_2 content in the atmosphere.
- It results in global climate changes, sea level increases, depletion of ozone layer.

2. Loss of biodiversity:

- Many species are destroyed due to deforestation.
- Animals and plants depend on them for food and habitat become extinct.

3. Soil erosion:

- Natural vegetation acts as a barrier to reduce wind velocity, due to deforestation it results in soil erosion.

4. Floods and landslides:

- Due to deforestation, frequent floods, landslides in hilly areas and wind speed are heavy.

Preventive Measures:

- Afforestation,
- Conducting awareness program,
- Strict laws implementation,
- Discouraging the usage of wood as fuel,

- Controlling forest fire.

1. (b) Discuss about the environmental degradation due to mineral resources in detail. (8marks)

Mineral Resources

Minerals:

- Minerals are naturally occurring substances having definite chemical composition and physical properties.

Impacts of Extracting Mineral Resources:

Mining:

Mining is the process of extraction of metals from a mineral deposit.

Types of Mining:

1. Surface Mining:

It is the process of extracting minerals from shallow depth of the earth.

2. Underground mining:

It is the process of extracting minerals from deep depth of the earth.

Environmental damage:

1. Devegetation and defacing of landscape:

- ❖ The top soil as well as the vegetation are removed from the mining area.
- ❖ Devegetation leads to several ecological losses

2. Ground Water Contamination

- ❖ Mining pollutes the ground water.
- ❖ Usually, sulphur present as an impurity in many ores, gets converted into sulphuric acid due to microbial action and converted into sulphuric acid.

3. Surface water pollution:

- ❖ The drainage of acid mine often contaminates the n earby streams and lakes.
- ❖ It kills many aquatic animals.

4. Air pollution:

- ❖ Smelting and roasting are done to purify the metals, which emits enormous amounts of air pollutants damaging the nearby vegetation.

5. Subsidence of land:

- ❖ It is mainly associated with underground mining.
- ❖ Subsidence of mining area results in cracks in houses

Impacts of mining:

- ➢ Destruction of natural habitat of many flora fauna in forests
- ➢ Over exploitation of mineral resources leads to wastage and dissemination of mineral deposits.
- ➢ It causes noise pollution.
- ➢ During minining vibrations occur in earth which may lead to earth quakes in sever cases.

- It reduce the shape of forests.
- It pollute water bodies in nearby areas.
- Migration of tribal people

2. (a) Explain in detail the ill effect of over utilization of ground and surface water. (8marks)

Over utilization of ground and surface water.

Due to the growth of population and industries demand for water has also increased, and the nature too can't recharge again.

Effects*:*

1. Decrease of ground water:

Due to over usage of ground water, the ground water level has decreased.

Reason:

- Poor rainfall
- Construction of buildings
- Increase in runoff

2. Ground subsidence:

- The sinking of overlaying land surface is known as ground subsidence.

Problems:

- Damage in building.
- Fracture in pipes.
- Reverse the flow of canals.
- Tidal flooding.

3. Lowering of water table:

- Over usage of ground water for agricultural activities results in Lowering of water table.
- Change in speed and direction of water flow.

4. Intrusion of salt water:

- Over usage of ground water near coastal areas results in salt water intrusion.

Problem:

- Water is not fit for drinking purpose.

5. Earthquake and landslides:

- Decrease in ground water content causes earthquake, famine and landslides.

6. Drying up of well:

- Ground water depletion results in drying up of bore well and dug well.

7. Pollution of water:

- Water containing nitrate in agricultural land go depth into ground water and pollute ground water

Problem:

- Water is not fit for drinking purpose.

2. (b) Discuss in detail the effects (or) Impacts (or) Adverse effects of modern agriculture.

Effects (or) Impacts (or) Adverse effects of modern agriculture:

1. **Problems in using fertilizer**

Micronutrient imbalance:

Excess use of Chemical fertilizers contains nitrogen, phosphorous and potassium causes micro nutrient imbalance in fields.

Blue baby syndrome:

Use of nitrogenous fertilizers in fields contaminates ground water.

When concentration exceeds 25mg/lit it causes health problem called blue baby syndrome in infants.

Eutrophication

- Fertilizers contain nitrogen & phosphorous are washed out by runoff water that cause over nourishment in lakes.
- Due to eutrophication algal blooms grows faster and their quick death pollutes the water.

2. Problems in using pesticides

First generation pesticides:

- Sulphur, arsenic, lead and mercury used to kill pests.

Second generation pesticides:

- Dichloro Diphenyl Trichloromethane (DDT) used to kill pests.

(a)**Death of non target organisms**

Few insecticides also kill the non target species which are useful to us.

(b) **Producing new pests:**

Few pests become immune to pesticides and survive even after the application of

pesticides. Such pests are called super pests and they produce highly resistant

generations.

3. Water logging:

- Land where water stand for most of the year

Problem:

- Soil get filled with water & soil pores get depleted, therefore mechanical strength

of the soil decreases.

Cause:

- excessive water supply to the croplands
- heavy rain
- poor drainage

Remedy:

- preventing excessive irrigation
- subsurface drainage technology
- bio drainage by trees like eucalyptus

4. Salinity:

- Non absorbed water by the soil undergo evaporation leaving dissolved salts in the

topsoil, this accumulation is called salinity of the soil.

➢ Salts may be-sodium chloride, calcium chloride, magnesium chloride, sodium sulphate, sodium bicarbonate, sodium carbonate.

Problem:

❖ Water used for irrigation gets evaporated under dry conditions leaving behind the salts in the upper portion of the soil, therefore soil becomes alkaline and crop yield decreases.

Remedy:

❖ flushing out of salt deposit by applying good quality of water

❖ Using subsurface drainage system the salt water is flushed out.

3. Write in detail about the renewable and non renewable energy resources. (16marks)

(any two from each)

Renewable energy resource:

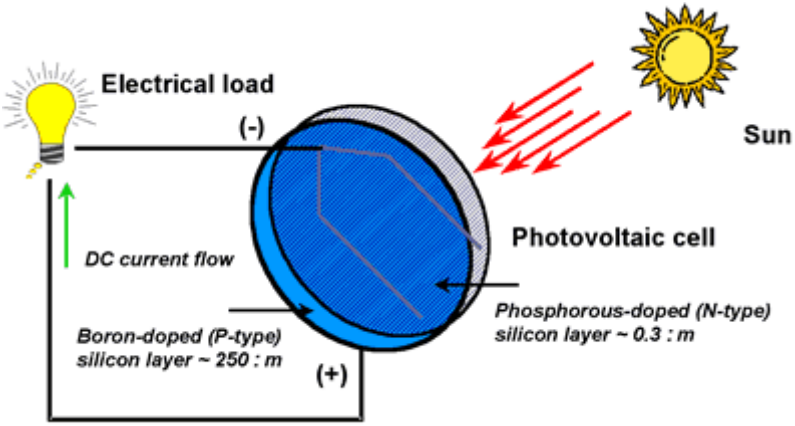
➢ It is a natural resource.
➢ They can be regenerated.
➢ They can be used endlessly.

1. Solar energy:

- We get this energy directly from sun.
- Nuclear fusion reaction taking place in sun produces large amount of heat and light.

Methods of harvesting solar energy:

a. Solar cells:



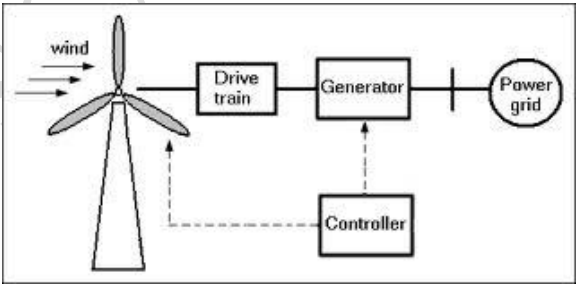
- It contains p-type and n- type semiconductors in close contact with each other.
- When sun rays falls on the top layer of p-type semiconductor, the electrons cross the p-n junction into n-type semiconductor.
- There by potential difference between two layers is created, which causes flow of electrons (ie. an electric current).

Use:

- Calculators, water pumps. Solar battery, Solar water heater etc.

2. Wind energy:

- Moving air is called wind.
- Energy recovered from the force of the wind is called wind energy.
- The energy possessed by wind is because of its high speed.
- The wind energy is harnessed by making useof wind mills.
- The blades of the wind mill keep on rotating continuously due to the force of the striking wind which turns a generator to produce electricity.



Disadvantages (or) Demerits

1. Public resists for locating the wind forms in populated areas due to noise generated by the machines and loss of aesthetic appearance.

2. Wind forms located on the migratory routes of birds will cause hazards.

3. Wind forms produce unwanted sound.

4. Wind turbines interfere with electromagnetic signals (TV, Radio signals).

b. Wind farms:

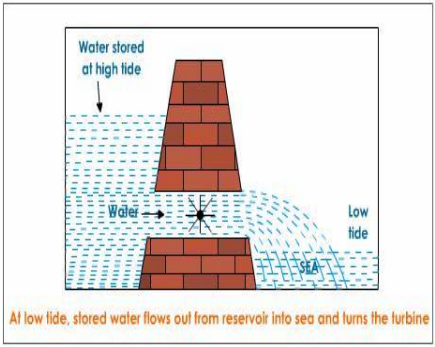
- It is the large number of wind mills installed and joined together in a definite pattern.
- They produce large amount of electrical energy.

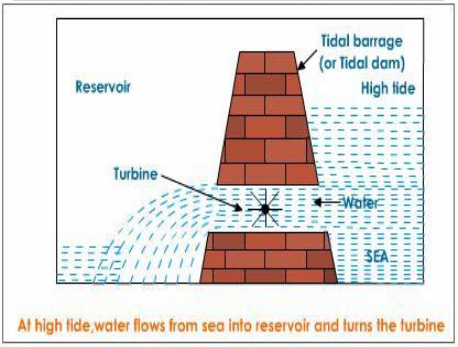
Advantages:

- No air pollution.
- It is very cheap.

3. Tidal energy:

- Tides are caused by the gravitational force of sun and moon.
- This energy is harvested by constructing a tidal barrage.
- During high tide the sea water is allowed to flow into the barrage.
- During the low tides the water in the barrage is allowed into the sea.
- In both the ways the turbine rotates producing large amount of energy.





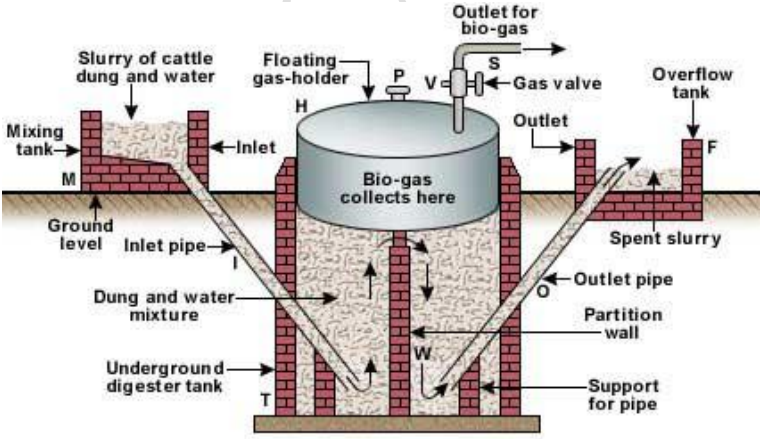
4. Biomass energy:

- It is the organic matter produced by plants or animals.
- Biomass is the organic matter produced by the plants or animals which include wood, crop, residues, cattle dung agricultural wastes etc.
- The burning of biogas cause air pollution and produce a lot of ash.
- It is therefore more useful to convert biomass into biogas or bio fuels.

- **Ex:** wood, crop residues, cattle dung …

5.Biogas:

- Biogas is a mixture of methane, carbon dioxide, hydrogen and hydrogen sulphide.
- Biogas is produced by anaerobic degradation of animal wastes in the presence of water.
- Anaerobic degradation means break down of organic matter by bacteria in the absence of oxygen.
- Biogas has many advantages. It is clean, non-polluting and cheap.
- There is direct supply of gas from the plant and there is no storage problem



Floating gas-holder type bio-gas plant.

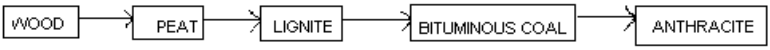
Non-Renewable Energy Resources:

- It is a natural resource.
- They cannot be regenerated quickly and requires a long duration.
- They cannot be used endlessly.

1. Coal:

- It is a solid fossil fuel.
- It is formed by the intense heat and pressure on the plants buried 300 – 400 yrs before.

Various stages of coal:



Disadvantages:

- It causes global warming.
- It has impurities like S and N.

2. Petroleum:

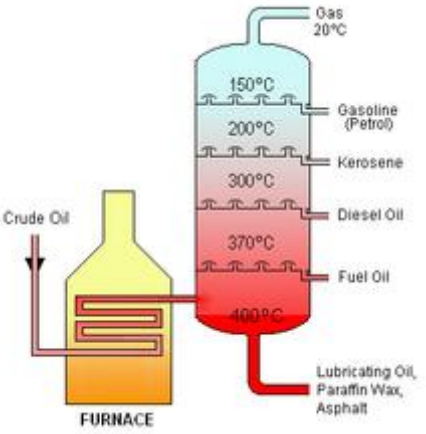
- This crude oil is a thick liquid having hydrocarbons like S, O and N.
- The world has 67% of petroleum reserves.

Occurrence:

- It is formed by decomposition of dead matters buried under water bodies at high temperature for millions of yrs.

Fractional distillation:

- The hydrocarbons are separated from crude- petroleum oil by purifying and fractionating the crude petroleum oil
- The purified crude oil is then heated to about 400°C in an iron retort, where the oil gets vapourised. The hot vapours are then passed into the bottom of a "fractionating column"
- The fractionating column is a tall cylindrical tower containing a number of horizontal stainless steel trays at short distances. Each tray is provided with small chimney covered with a loose cap.
- When the vapours of the oil go up in the fractionating column, they become cooler and get condensed at different trays.



Various fractions, compositions and their uses:

S.No	Name of the fractions	Uses
1	Uncondensed gases	As a fuel under the name of LPG
2	Petroleum ether	As a solvent
3	Gasoline or petrol	Fuel for IC engines
4	Naphtha or solvent spirit	As a solvent in paints and in dry cleaning
5	Kerosene oil	Fuel for stoves and jet engines
6	Diesel oil	Diesel engine fuel
7	Heavy oil	Fuel for ships and for production of gasoline by cracking

3. LPG:

- It is obtained as a by-product during fractional distillation of crude petroleum oil or by cracking of heavy oil.
- It consists of propane and butane.
- It can be readily liquefied under pressure, so it can be economically stored and transported in cylinders.
- It is colorless and odorless.
- Therefore, mercaptans are used for detection of any leakage.

Uses

- It is used as a domestic and industrial fuel
- It is also used as a motor fuel.

4. Natural gas:

- It is found above the oil in oil well.
- It is a mixture of 50 – 90% of methane.

- Its calorific value is 12000 – 14000K.cal/m^3.

Occurrence:

- It is formed by decomposition of dead matter under lake at high pressure.

5. Nuclear energy:

- There are 2 types to produce this energy:
  1. Nuclear fusion.
  2. Nuclear fission.

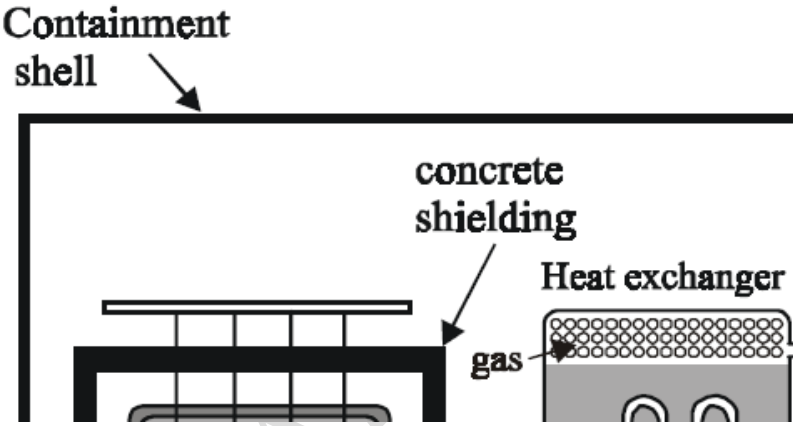
Nuclear fission:

- It is a nuclear change where a heavy nucleus is split at high temperatures to form lighter nuclei.
- The large amount of energy released is used to produce electricity.

EX $_{92}U^{235} + {}_0n^1 \rightarrow {}_{56}Ba^{139} + {}_{36}Kr^{94} + 3{}_0n^1$

Working

Light Water Nuclear Power Plant



- ❖ The fission reaction is initiated by inserting fuel rod into the reactor and neutrons is allowed to bombarded on the fuel rods.
- ❖ The heat emitted by fission of U^{235} in the fuel core is absorbed by the coolant (light water).
- ❖ The heated coolant (water at 300°C) then goes to the heat exchanger containing sea water.
- ❖ The coolant here, transfers heat to sea water, which is converted into steam.
- ❖ The steam then drives the turbines, generating electricity.

Nuclear power in India:

- Tarapur, Kalpakkam, Ranapratap Sagar and Narora.

4. (a) Discuss the role of an individual in conservation of natural resources. (8marks)

1. Conservation of energy:

- Switch off light, fans and other appliances when not in use.
- Use solar cooker, this will reduce the usage of LPG.
- Dry the clothes in sunlight instead of driers.
- Grow trees near the house and get a cool air, so the electricity bill will reduce.
- Use always pressure cooker.
- Ride bicycle or just walk instead of using car and scooter.

2. Conservation of water:

- Use minimum water for all domestic purposes.
- Check for water leaks in pipes and toilets and repair them promptly.
- Use drip irrigation to improve irrigation efficiency.
- The wasted water, coming out from kitchen, bathtub, can be used for watering the plants.
- Build rainwater harvesting system in your house.

3. Conservation of soil:

- Grow different types of plants, herbs, trees which bind the soil and prevent its erosion.

- While constructing the house don't uproot the trees.
- Don't irrigate the plants using a strong flow of water, as it will wash off the top soil.
- Soil erosion can be prevented by the use of sprinkling irrigation.
- Use green manure in the garden.
- Use mixed cropping, so that some specific soil nutrients will not get depleted.

4. Conservation of food resources:

- Eat only minimum amount of food. Avoid over eating.
- Doesn't waste the food instead give it to someone before getting spoiled.
- Cook only required amount of the food.
- Don't cook food unnecessarily.
- Don't store the large amount of food grains.

5. Conservation of forest:

- Use non-timber products.
- Plant more trees and protect them.
- Grassing, fishing must be controlled.

4. (b) Describe in briefly the types function and uses of forest. (8marks)

Forest Resources

- Forests are one of the most important renewable natural resources on the earth.

- It covers one-third of the world's land surface.

Types of forests:

1. Evergreen forests,
2. Deciduous forests,
3. Coniferous forests.

1. Evergreen Forests:

- This forest consists of trees that retain green foliage throughout the year.
- They are found in equatorial regions, where the rainfall is heavy.
  Ex: The silent valley in Kerala.

2. Deciduous Forests:

Tropical Deciduous Forests:

- They are found in tropical monsoon.
- They shed their leaves during summer season.

Temperature Deciduous Forests:

- They shed their leaves during winter season.

3. Coniferous Forests:

- These forests consist of trees with needled type trees which preserve moisture.

Functions Of Forests:

- Habitat to millions of plants and animals,
- Recycle rainwater and remove pollutants,
- Control water quality and quantity,
- Moderate temperature and climate,
- Prevent soil erosion,
- Promote tourism and aesthetic value.

Uses (Or) Benefits Of Forests:

Commercial Uses

- Forests provide timber, fire wood, food material, resin, gum, non-edible oil, drugs, medicine, rubber, fibers, bamboo, honey, hides, etc.

Ecological Uses:

- Production of Oxygen,
- Reducing Global Warming,
- Wild life habitat,
- Regulation of hydrological cycle,

- Soil conservation,
- Pollution moderators.
- Minimize the use of papers and fuel wood.
- Avoid of executing developmental work like dam road, construction in forest area.

5. (a) Write the causes and effects of land (soil) degradation. (8marks)

Effects :

(1) The soil structure and texture are deteriorated.
(2) Loss of soil fertility
(3) Increase in water logging, salinity, alkalinity and acidity problems
(4) Loss of economic, social and biodiversity

Causes :

1. Population : Due to increase in population more pressure on limited land resources

for food, fibre and fuel wood

2. **Urbanization** : The increased urbanization leads to decrease in agricultural lands

3. **Fertilizers and pesticides**: Increased use of fertilizers and pesticides lead to land degradation, soil pollution and water pollution.

4. **Damage of Top Soil** : Increase in food production generally leads to damage of top soil through nutrient depletion.

5. Water-logging, soilerosion, salinity etc leads to land degradation.

5. (b) Explain in detail about causes, effects and control measures of soil erosion. (8marks)

Soil erosion is the process of removal of superficial layer of the soil from one place to another.

Types of soil erosion

(i) Normal erosion: It is caused by the gradual removal of top soil by natural process.

(ii) Accelerated soil erosion : It is mainly caused by manmade activities

Harmful effects of soil erosion:

1) Soil fertility is lost
2) Loss of ability of soil to hold water and sediments.
3) Sediment runoff can pollute water and kill aquatic life.

Causes of Soil erosion :

(i) Water : It affects soil in form of rain, runoff etc.,

(ii) Wind : It carry away the fine particles of soil

(iii) Biotic agents : Over grazing, mining and deforestation are the major causes for soil erosion.

(iv) Land Slides : It also cause soil erosion.

(v) Construction : Construction of dams, buildings, roads remove the protective vegetal cover and leads to soil erosion.

Control of Soil erosion

1. **Conservational or till farming** : In this method the tilling machine makes slits in the unploughed soil and inject seeds, fertilizers and water in the silt.

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

3. **Terracing:** It involves conversion of steep slopes into series of broad terraces, which run across the contour. This retains water for crops and reduces soil erosion.

4. **Alley Cropping (or) Agro Forestry:** It involves planting crops in strips or alleys between rows of trees of shrubs, that can provide fruits and fuel wood.Even after crops are harvested the soil will not eroded because trees and shrubs still remain on the soil and hold the soil.

5. Wind Breaks (or) Shelter breaks: the trees are planted long rows along the boundary of cultivated lands reduces soil erosion.

6. (a) **Discuss the effects of dams on forests and tribal people.** (8 marks)

Effects of dam on forest:

- Thousands of hectares of forest have been cleared for executing river valley projects.
- The forest is also cleared for residential accommodation, office buildings, etc.,
- Construction of dams under these projects led to killing of wild animals and destroying the aquatic life.
- Hydroelectric projects provide opportunities for the spresd of water borne diseases.
- The big river valley projects also cause water logging which leads to salinity.

Effects of dam on tribal people:

- ❖ The greatest social cost of big dam is the widespread displacement of tribal people.
- ❖ Displacement and cultural change affects the tribal people both mentally and physically.
- ❖ Tribal people are ill-treated by the modern society.
- ❖ Many of the displaced people were not recognized and resettled or compensated.
- ❖ Tribal people and their culture cannot be questioned and destroyed.
- ❖ The body conditions of tribal people will not suit with the new areas and hence they will be affected by many diseases.

6. (b) Write briefly on the Hydrological cycle. (8marks)

Definition:

The process of evaporation, condensation and transpiration is called hydrological cycle.

1. Evaporation
2. Condensation and precipitation
3. Transpiration and respiration

1. Evaporation:

- ❖ Heat energy from the sun constantly causes evaporation from all the water surfaces.

- ❖ Oceans, rivers, streams lose water due to evaporation.

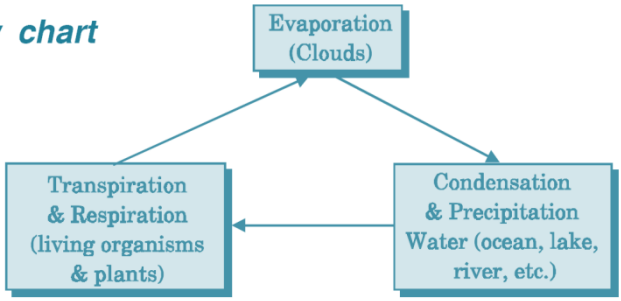
2. Condensation and precipitation:

- ❖ Precipitation occurs due to the condensation of water from a gaseous state in the atmosphere and falls to earth.
- ❖ Once water condenses, it is pulled into the ground by gravity.

3. Transpiration and respiration:

- ❖ Much of the water, plants absorb through their roots, is lost to the atmosphere from the leaves. This process is known as transpiration.
- ❖ In both animals and plants, the breakdown of sugars to produce energy with the liberation of byproducts carbon dioxide and water.

Flow chart



UNIT IV

SOCIAL ISSUES AND THE ENVIRONMENT

PART-A

1. Define the term sustainable development (or) What is meant by sustainable development? (Coim &TNV A.U. Dec 2009) (TCY A.U. Dec 2008; Dec2009)

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

2. What are the advantages of the rain water harvesting? (TNV A.U. Dec 2008) (A.U. May 2008)

Rain water harvesting is a technique of capturing and storing of water for future generation.

Advantages:

i) Increasing the availability of water from well
ii) Rise in ground water level
iii) Minimizing the soil erosion and flood hazards
iv) Future generation is assured of water

3. What is meant by environmental audit? (A.U. Dec 2008)

- ❖ Environmental audit are intended to quantify environmental performance and environmental position.
- ❖ In this way they perform analogous function to financial audits. It also aims to define what needs to be done to improve on indications of such performance and position

4. What are landslides? (A.U. May 2008)

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

5. Define the term Tsunami (Coim A.U. Dec 2009)

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.

6. What is ECO Mark?

- ❖ Environmentally friendly products are generally indicated by the symbol is called Eco mark.
- ❖ It is a certification mark issued by the Bureau of Indian standard (BIS) to the environmentally products.

7. What are the various sources of radioactive pollution? (A.U. Dec 2008)

Natural sources

i) The very important natural source is space, which emit cosmic rays

ii) Soil, rocks, air, water, food, radioactive radon, etc also contain one or more radioactive substances

Man-made sources

Man made sources are nuclear power plants, x-rays, nuclear accidents, nuclear bombs,

diagnostics kits, etc., where radioactive substances are used.

8. What are biomedical wastes?

Biomedical wastes are one type of bio-wastes generated from health care activities

(hospitals, nursing homes, health centres, laboratories, research centres blood bank, etc.,).

They may be solid or liquid in nature.

9. Define the term environmental ethics.

"Environmental ethics refers to the issues, principles and guidelines relating to human interactions with their environment".

10. List the objectives of "Forest conservation Act".

(Dec'12)

i) To protect and conserve the forest

ii) To ensure judicious use of forest products.

11. List out any four important of environmental protection act.

i) To protect and improvement of the environment.

ii) To prevent hazards to all living creatures and property.

iii) To maintain harmonious relationship between humans and their environment.

iv) To lay down procedures and safe guards for the prevention of accidents which cause pollution and remedial measures.

12. List the objectives of watershed management. (Dec'11)

i) To minimize the risks of floods, droughts and landslides.

ii) To develop rural areas.

iii) To manage the watershed for developmental activities like domestic water supply, irrigation, etc.,

iv) To generate employment opportunities.

13. Define E-Wastes. (Dec'11)

E-Wastes are defined as "electronic and electrical wastes. Electronic equipments like computers, printers, mobile phones, Xerox machines.,etc. After using these instruments , they are thrown as waste.

14. Define urbanization.

(Nov'2010)

Urbanizatisssson is the movement of human population from rural areas to urban areas for the want of better health, employment, education, transport, etc.

15. Why are radioactive wastes disposed of in salt water?

(May'10)

Salt water would slowly carry the nuclear wastes downward into the earth's mantle and also radioactive rays would not reach the earth surface easily

PART-B & C

1. (a) Discuss about the concepts or approaches for sustainable development. (8marks)

Definition:

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

True Sustainable Development:

True sustainable development aims at optimum use of natural resources with high degree of reusability, minimum wastage, and least generation of toxic by-products and maximum productivity.

Concept/Approaches/Significance for sustainable development:

To build up the sustainable development, the following approaches / methods are proposed.

Developing appropriate technology

It is the one, which is locally adaptable, eco-friendly, resources-efficient and culturally suitable. It uses local labours, less resources and produces minimum waste.

Reduce, Reuse, Recycle (3-R) Approach:

- It insists optimum us of natural resources, using it again and again instead of throwing it on the waste land or water and recycling the material into further products.
- It reduces waste generation and pollution.

Providing environmental education and awareness:

By providing environmental education and awareness, the thinking and attitude of people towards our earth and the environment can be changed.

Consumption of renewable resources:

In order to attain sustainability, it is very important to consume the natural resources in such a way that the consumption should not exceedregeneration capacity.

Conservation of non-renewable resources:

Non-Renewable Resources should be conserved by recycling and reusing.

Population Control:

By controlling population growth, we can make sustainable development.

1. (b) Discuss in detail about the causes and issues for resettlement and rehabilitation of people. (8marks)

Resettlement and rehabilitation of people

Resettlement and Rehabilitation is one of the most serious problems caused by the developmental activities.

Causes of displacement of people

1. Due to developmental activities:

- Developmental activities include construction of dams, mining, roads, airports, ports; urban expansion etc.,
- These activities cause large scale displacement of local people from their home and loss of their traditional profession or occupation.

Dams in India:

- In our country, a number of big and medium dams have been constructed under different valley projects.

  Ex: (a)Hirakud Dam (b) Tehri Dam

Other problems

- Submergence of valuable forest cover
- Water logging and its adverse effects
- Possibility of an earthquake

2. Due to Disaster:

- Disaster may be of natural of manmade

(a) **Natural Disaster:** It includes, earthquake, floods, droughts, landslides, avalanches

(b) **Manmade Disaster:** It includes, industrial accidents, nuclear accidents, dam burst

3. Due to conservation initiatives:

- These include national park, sanctuary, forest reserve, biosphere reserve

Resettlement

- Resettlement is simple relocation or displacement of human population.
- This process does not focus on their future welfare.

Rehabilitation

- Rehabilitation involves making the system to work again by allowing the systems to function naturally.
- It includes replacing the lost economic assets, safeguard employing provide safe land for building, restore social services, repair damaged infrastructures, etc,.

Rehabilitation issues

- In India, most of the displacements have resulted due to land requirements to the government for various reasons.

Important issues

- Tribals are usually the most affected among the displaced, who are already very poor.

- Displacement further increased their poverty due to loss f home, land, jobs, food security and social isolation.
- Loss of identity and loss of the intimate link between the people and the environment is one of the big losses.

Rehabilitation policy

- The extent of damage and suffering that the proposed project would cause should be studied and ascertained before starting the project.
- The people should be rehabilitated on "minimum dislocation basis", by choosing adjacent areas

The advantages of rehabilitation should be on par with those of the beneficiaries of the proposed project.

2. (a) Explain in detail about the strategies for water conservation. (8marks)

Definition:

The process of saving water for future utilization is known as water conservation.

Need for water conservation:

- Over exploitation of ground water leads to drought.
- Better life style requires more fresh water.
- As population increase, the requirement of water is also more.
- Due to deforestation the rainfall decreasing.

- Agricultural & industrial activities require more fresh water.

Strategies of water conservation:

1. **Reducing evaporation losses:**

By placing the horizontal barriers of asphalt below the soil surface, evaporation of water in humid region can be reduced.

2. **Reducing irrigation losses:**
   - Sprinkling irrigation and drip irrigation conserves water.
   - Irrigation in early morning or later evening reduces evaporation losses.
3. **Re-use of water:**
   - Treated waste water can be used for ferti-irrigation.
   - Grey water from washings may be used for washing cars, watering gardens.
4. **Preventing wastage of water:**
   - Closing the taps when not in use.
   - Repairing any leakage from pipes.
5. **Decreasing run-off losses:**
   - By using contour cultivation or terrace farming the run off on soil can be reduced.
6. **Avoid discharge of sewage:**
   - The discharge of sewage into natural water resources should be prevented.

2. (b) What are the causes needs and methods of waste land reclamation? (8marks)

Waste land reclamation

Waste land:

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

Types of waste Land:

1. Uncultivable waste lands
2. Cultivable waste lands

Uncultivable waste lands:

These lands cannot be brought under cultivation.

Ex: sandy deserts

Cultivable waste lands:

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

Ex: 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.
- Excessive use of pesticides.
- By the sewage & industrial wastes.

- Over exploitation of natural resources.

Need of waste land reclamation:

- To improve physical structure and quality of the soil.
- To prevent flooding, erosion and landslides.
- To supply fuel, fodder and timber for local use.
- To conserve the biological resources and natural ecosystem.
- To avoid over exploitation of natural resources.

Methods of 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. In continuous leaching 0.5 to 1.0 cm water is required to remove 90% of 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:**
   - Soil solidity can be reduced with gypsum.
   - Calcium of gypsum replaces sodium from the exchangeable sites.
   - This process converts clay back into calcium clay.
6. **Afforestation Programmes:**

   The National development board has decided to bring 5 million acres of waste land annually for firewood and fodder plantation.
7. **Social Forestry programmes:**

   These programmes involve strip plantation on road, canal –sides, degraded forest land etc.

3.Explain in detail about the important features and objectives of environmental legislation laws.

(16marks)

1. Water (prevention and control of pollution) ACT 1974:

- This act provides for maintaining and restoring the sources of water it also provides for preventing and controlling water pollution.

Objectives of water act:

- Prevention and control of water pollution.
- Maintaining or restoring the wholesomeness of water.
- Establishing central and state boards for the prevention and control of water pollution.

Important features of water act:

- This act aims at, to protect the water from all kinds of pollution and to preserve the quality of water in all aquifers.
- The act further provides for the establishment of central boards and state boards for prevention of water pollution.
- The states are empowered to restrain any person from discharging a pollutant or sewage or effluent into any water body without the consent of the board.

State pollution control board:

The consent of the state pollution control board is needed to

- Take steps to establish any industry or any treatment and disposal system or any extension or addition that to, which is likely to discharge or trade effluent into a stream or well or river or on a land.
- Use any new or altered outlet for the discharge of sewage.
- Begin to make any new discharge of sewage.

2. Air (Prevention and control of Pollution) ACT, 1981:

- This act was enacted in the conference held at Stockholm in 1972.
- It deals with the problem relating to air pollution.
- It envisages the establish of central board and state control boards endowed with absolute powers to monitor air quality and pollution control.

Objectives of air act are:

- To prevent, control and abatement of air pollution.

- To maintain the quality of air.
- To establish a board for the prevention and control of air pollution.

Important feature of air act:

- The central board may lay down the standards for the quality of air.
- The central board coordinates and settle distributes between state boards, in addition to providing technical assistance and guidance to state boards.
- The state boards are empowered to lay down the standards for emissions of air pollutants from industrial unit or automobile or other sources.

3. Forest (Conservation (Or) Preservative) ACT, 1980:

- This act provides conservation of forests and related aspects.
- This act also covers all type of forests including forests, protected forests any forested land.
- This act is enacted in 1980.It aims at to arrest deforestation.

Objectives of forest act:

- To protect and conserve the forest.
- To ensure judicious use of forest products.

Important feature of forest act:

- The reserved forests shall not be diverted or dereserved without the prior permission of the central government.
- The land that has been registered or forestland may not be used for non forest purposes.
- An illegal non forest activity within a forest area can be immediately stopped under act.

4. Wildlife (Protection) Act, 1972, Amended In 1983, 1986 AND 1991:

- 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.
- Some of them are listed as endangered species' in the wildlife (protection) act.

Objectives of the wildlife act:

- To maintain essential ecological processes and life supporting systems.
- To preserve biodiversity.
- To ensure the continuous use of species.

Important features:

- The act covers the rights and non rights of forests dwellers.

- It provides restricted grazing in sanctuaries but prohibits in national parks.
- It also prohibits the collection of non timber products.

5. Environment (Protection) ACT, 1986:

This act empowers the central government to fix the standards for quality of air, water, soil and noise and to formulate the procedures and safeguards for handling of hazard substances.

Objectives of environmental act:

- To protect and improvement of environment.
- To prevent hazards to all living creatures and property.
- To maintain harmonious relationship between humans and environment.

Important features:

- The act further empowers to lay down procedures and safeguards for the prevention of accidents which cause pollution and remedial measures if an accident occurs.
- The government has authority to close or prohibit or regulate industry or its operation, if the violation of provisions of the act occurs.
- The penal sections of the act contain more stringent penalties.
- Any person who fails to comply or who contravenes any provision of the act shall be punishable with imprisonment for a term extending to 5 years or be punishable with fine up to rupees 1lakh or both.

4. (a) Explain about the types effects and control measures of nuclear accidents and nuclear Holocaust. (8marks)

Nuclear Energy:

Energy released during a nuclear reaction is called nuclear energy. Nuclear reactors produce the nuclear energy either by nuclear fission or nuclear fusion. The nuclear power is clean and safe.

Nuclear Energy and Nuclear Accidents:

The serious hazard to human and environment is the release of large amount of energy and radioactive products into the atmosphere.

Type of Nuclear Accidents:

1. **Nuclear Test:**

   Nuclear explosions cause settling down the radioactive materials on the earth's surface & radioactive particles, rays into the atmosphere.

2. **Nuclear Power Plant Accidents:**

   The nuclear power plant located in the seismic vulnerable area may cause nuclear accidents.

3. **Improper Disposal Of Radioactive Waste:**

   Drums stored underground can rust and leak radioactive materials into water, land & air.

4. **Accident During Transport:**

   Trucks carrying radioactive wastes are involved.

5. **Core Melt Down:**

- This is the major accident in nuclear power plant.

Effects of Nuclear Radiation:

- Radiations may break chemical bonds such as DNA in cells.
- It may be even carried to future generations.
- People begin to suffer from fatigue, vomiting and loss of hair (radiation level: 100 -250 rads, low dose).
- It affects bone marrow, blood cells, natural resistance & blood to fail clot (radiation level: 400-500 rads, higher dose).
- It kills the organisms by damaging the tissues of heart, brain (radiation level: 10,000 rads, very higher dose).

Nuclear Holocaust

- It means destruction of biodiversity by nuclear equipment's& nuclear bombs.
- In a holocaust, a large number of living beings are totally destroyed.

Effects of Nuclear Holocaust:

1. **Nuclear winter:**

- Nuclear bombardment will cause combustion of wood; plastics etc., large quantity of black soot will be carried to the stratosphere.
- It will absorb all UV-radiations.
- So cooling will result. Due to this, water evaporation will reduce.

Effect of nuclear winter:

- Even in summer the temperature will be at freezing temperature.
- Crop productivity will be reduced.
- It ignites all combustible material; destroy all living beings, material crushing, and destruction of homes.

Examples of Nuclear Holocausts:

1. **Nuclear war:**

- Hiroshima & Nagasaki are the examples (II- world war).

2. **At Chernobyl:**

- When water cooling system, graphite moderated reactor lost their control, the reactor exploded.

Control measures:

- Precautions must be taken & training must be given to people who handle these materials.
- Constant monitoring of the radiation level.
- Regular checks & control measures are done by Atomic Energy Regulatory Board under the Department of Atomic Energy.

4. (b) What are the objectives and the factors affecting consumerism and waste products? (8marks)

Consumerism and waste products

Consumerism:

- Consumerism refers to the consumption of resources by the people.
- It is an organized movement of citizens & government.
- Consumerism is related to both increase in our demand due to change in life-style.

Traditionally favorable rights of sellers:

- Right to introduce any product.
- Right to charge any prize.
- Right to spend any amount to promote the product.
- Right to use incentives.

Traditional buyer rights:

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

Important information's to be known by buyers:

- Ingredients of a product.
- Manufacturing date & expiry date.
- If the product has been manufactured against the law of nature.

Objectives of consumerism:

- It improves the rights & powers of the buyers.
- It involves making the manufacturer liable for the entire life cycle of product.
- It forces the manufacturer to reuse & recycle the product after usage.

- The reusable packing materials like bottles can be taken back to the manufacturer.
- Active consumerism improves human health & happiness and also it saves resources.

SOURCES OF WASTES:

- Sources are agriculture, mining, industrial & municipal wastes.

Examples for waste products:

It includes glass, papers, plastics, metals, automobile wastes, dead animals, etc.,

E-waste:

Electronic equipment's like computers, printers, mobile phones, Xerox machines, calculators, etc.,

Effects of wastes:

- The waste from chemical industries & from explosives are dangerous to human life.
- The wastes degrade soil & make unfit for irrigation.
- E-waste contains 1000 chemicals which cause pollution. These also cause cancer & other respiratory problems.
- Plastics are difficult to recycle or incinerate safely.

Factors affecting consumerism and generation of wastes:

1. People over-population:

- It occurs when there are more people than the available supply of food & water.
- Over population causes degradation of resources, poverty & premature death in less developed countries (LDCs).

2. Consumption Over-Population:

- It occurs when there are less people than the available resources.
- If the consumption is more, the generation of waste is also more.

5. Explain in detail about the methods for water conservation. (16marks)

Methods of water conservation

- Rainwater harvesting.
- Watershed management.

i) Rainwater Harvesting

Rainwater harvesting is a technique of capturing and storing of rainwater for further utilization.

Need for Rainwater Harvesting:

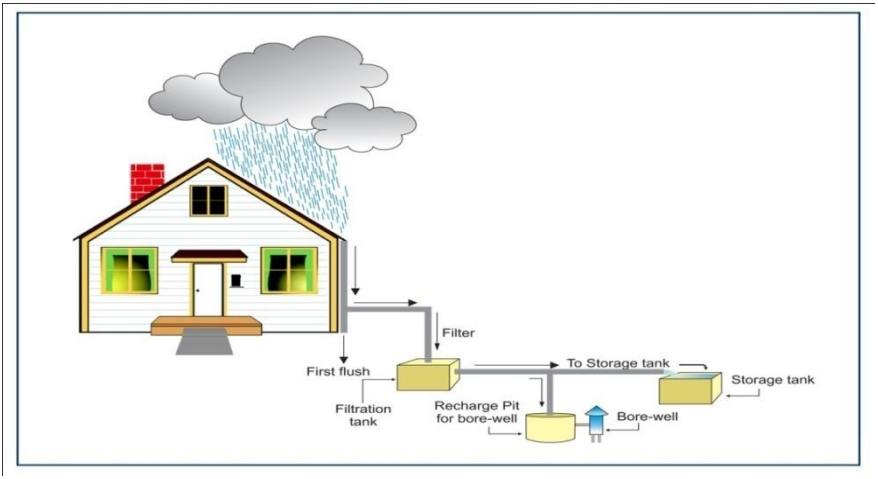
- To meet the increasing demands of water.
- To raise the water table by recharging the ground water.
- To reduce the surface runoff loss.
- To reduce storm water runoff and soil erosion.
- To minimize water crisis and water conflicts.

Concept of Rainwater Harvesting:

It involves collecting water that falls on the roof of house during rain storms and conveying it through PVC or Aluminium pipe to a near covered storage unit. A smoother, cleaner and more impervious roofing material contributes to better water quality and greater quantity.

Type of rainwater harvesting

Roof top rainwater harvesting method:



- ❖ It is the method of collecting rainwater from roof of the building and storing it in the ground for our future use.
- ❖ It is the low cost and effective technique for urban houses.

- ❖ The rainwater from the top of the roofs, road surfaces, and play grounds is diverted into the surface tank or recharge pits through a delivery system.

Advantages of Rainwater Harvesting:

- Reduction in the use of current for pumping water.
- Increasing the availability of water from well.
- Rise in groundwater levels.
- Minimizing the soil erosion and flood hazards.
- Future generation is assured of water.

ii) Watershed management:

- The management of rainfall and resultant runoff is called watershed management.

Factors affecting watershed:

- The watersheds are found to be degraded due to uncontrolled land use activities.
- Overgrazing, deforestation, mining, construction activities also affect watersheds.
- Droughty climates also affects watershed.

Need for watershed management:

- To minimize the risk of floods, droughts and landslides.

- To develop the rural areas for improving the economy of the region.
- To protect the soil from erosion by runoff.
- To raise the groundwater level.
- To generate huge employment opportunities in the backward rain-fed areas.

Watershed management techniques:

Trenches (Pits):

Trenches were dug at equal intervals to improve groundwater storage.

Earthern dam or stone embankment:

To check the run-off water, earthen dam must be constructed in the catchment area.

Farm Pond:

A farm pond can be built to improve water storage capacity of the catchment area.

Underground barriers (dykes):

Underground barriers should be built along the mullahs to raise the water table.

Maintenance of watershed:

1. **Water harvesting**:
   Proper storage of water in watershed is done and the water can be used in dry seasons in low rainfall areas.
2. **Afforestation and Agroforestry**:

Afforestation and Agroforestry help to prevent soil erosion and retention of moisture in watershed areas.

3. **Reducing soil erosion**:
   Terracing, bounding, contour cropping, strip cropping etc., are used to minimize soil erosion.
4. **Scientific mining and quarrying**:
   Due to improper mining, the stability of the hills get disturbed resulting in landslides and rapid soil erosion.
5. **Public participation**:
   People must be motivated for protecting a freshly planted area and maintaining a water harvesting structure, implemented by the government.
6. **Minimizing livestock population**:
   Livestock population, present in the surrounding villages of the watershed should be reduced.

6. (a) What is an earthquake? Write about its effects and measures to face the earthquake. (Nov/Dec13)

Definition:

Sudden vibration caused on the earth's surface due to sudden release of tremendous amount of energy stored in the rocks under the earth's crust.

Causes:

- Earthquakes are caused due to disequilibrium in any part of the earth crust.
- Underground nuclear testing.

- Decrease of underground water level.

Effects of Earthquake:

Richter Scale	Severity of earthquake
Less than 4	Insignificant
4-4.9	Minor
5-5.9	Damaging
6-6.9	Destructive
7-7.9	Major
More than 8	Great

- The shocks produced by earthquakes in hilly and mountainous area may cause landslides.
- It also collapses houses and other structures due to poor construction and the people die in thousands.
- Severe earthquake results in deformation of ground surface.
- Earthquake travels through sea water generates high sea waves called Tsunami. This causes great loss of life and property.

Prevention And Control

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

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

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

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

b) Define flood? Write about its effects and measures to face the earthquake.

Definition:

Whenever the magnitude of water flow exceeds the carrying capacity of the channel

within its banks, the excess of water over flows on the surroundings causes floods.

Causes:

- ❖ Heavy rain, rainfall during cyclone causes flood
- ❖ Sudden snow melt also raises the quantity of water in streams and causes flood.
- ❖ Reduction in the carrying capacity of the channels, due to accumulation of sediments causes floods.
- ❖ Sudden and excess release of impounded water behind dams.
- ❖ Clearing of forests for agriculture has also increased severity of floods.

Effects of floods.

- ❖ Floods cause heavy suffering to people living in low lying areas because the houses and properties are washed away.

- ❖ Floods damage standing crops and livestock.
- ❖ Floods cause a great economic loss and health related problems due to widespread contamination.

Preventive measures:

- ❖ Encroachment of flood ways should be banned.
- ❖ Building walls prevent spilling out the flood water over flood plains.
- ❖ Build check-dams on small streams, move building off the blood plains.
- ❖ Restore wetlands, replace ground cover on water-course.
- ❖ River-networking in the country also reduce flood.
- ❖ Optical and microwave data from IRS is also used for flood management.
- ❖ Flood forecasts and flood warning are also given by the central water commission.
- ❖ Reduction of runoff by increasing infiltration through appropriate afforestation.

6. Name any three significant biomedical wastes ad their safe disposal.

Bio-medical wastes are one type of biowastes generated from health care activities (hospitals,nursing homes,health centres,laboratories,research centres,blood banks,etc)

Steps involved in management of biomedical wastes..

1.Generation and Accumulation.
2.Handling and Storage.
3.Transport and Disposal.

Category	Type of wastes	Treatment/Disposal
1	Human anatomical wastes. Body parts,organs, body tissues.	Incineration/Deep burial
2	Animal wastes. Body parts,bleeding parts,body fluid.	Incineration/Deep burial
3	Waste sharps Needle,syringes,blade	Disinfection/microwaing
4	Solid wastes Items contaminated with blood,cotton,	Incineration/microwaving
5	Liquid wastes. Laboratory washing,cleaning	Discharged into drains.

7. What is Green chemistry? Explain the various principle of green chemistry with suitable examples

Principles of Green Principles:

Define: **Green chemistry is the chemistry that involves designing and production of chemicals without polluting the environment.**

(1) Prevention of wastes: **It is better prevent to waste than to treat**

(2) Atom economy: **Synthetic methods should be designed to maximize the incorporation of all materials used in the process of formation of final product.**

(3) Less hazardous chemical synthesis: **Synthetic methods should be designed to use and generate materials, which posses no toxicity.**

(4) Designing safer chemicals: **Chemical substances should be designed to affect their desire functions during minimizing their toxicity.**

(5) Safer solvents and auxiliaries: **Use of auxiliaries substances should be made unnecessary wherever possible.**

(6) Design for energy efficiency: **Energy recoverments during the chemical processes should be minimized.**

(7) Use of renewable feedstock: **Raw material should be renewable rather than depleting.**

(8) Reduce derivatives: **Unnecessary derivatives should be reduced should be minimized.**

(9) Catalysis: **Catalytic reagents are superior to stoichiometric agents.**

(10) Design for degradation: **Chemicals should be designed as degradation easily to avoid harmful effects.**

(11) Real time analysis for pollution prevention: **Analytical methods should be continuously monitoring for control prior the pollution.**

(12) Substances for Safer chemistry to accident prevention: **Substances should be carefully selected to avoid accidents when reactions carried out.**

Unit V
Human Population and Environment
PART-A

1. What is population explosion? (TCY A.U. Dec 2008, Dec 2009) (A.U. Dec 2009)

The enormous increase in population, due to low death rate and high birth rate, is termed as population explosion. The human population explosion is not increasing at a uniform rate all over the world.

2. Define doubling time with reference to population growth. (A.U. Dec 2008)

It is the time required for a population to the double its size at a constant annual rate. It is calculated as follows

Td (Doubling time) =70/r Where, r= annual growth rate

If a nation has 2% annual growth, its population will double in next 35 yrs.

3. Mention some ill effects of HIV/AIDS on the environment. (A.U. Dec 2008)

i) Large number of death occurs, which affect environment and natural resources

ii) Due to large number of death, 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.

4. State the role of Information technology in Environment.

(Coim A.U. Dec 2009) (A.U. Jan 2006)

Information technology plays a vital role in the field of environmental education. Information technology means collection, processing storage and dissemination of the information. A number of software have been developed so study about the environment.

5. What are the reasons behind the increased population growth in the less developed nations compared with developed nations. (A.U. Dec 2007)

i) The rapid population growth is due to less death rates.

ii) The availability of the antibiotics, immunization, and increased food production leads to population growth.

6. What are the objectives of family welfare programme?

(TNV A.U. Dec 2009)

i) Slowing down the population explosion by reducing fertility.

ii) Pressure on the environment, due to over exploitation of natural resources is reduced

7. Write the importance of value education

(TCY A.U. Dec 2009)

i) To improve the integral growth of human being.

ii) To create attitude and improvement towards sustainable lifestyle

iii) To increase the awareness about our national history, culture, rights, national integration, community development and environment.

iv) To create and develop awareness about the values and their significance and role.

8. What are the objectives of environmental impact assessment (EIA)

(Coim A.U. Dec 2009)

EIA is 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 decision making.

Objectives

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 are the problems arise.

9. What is meant by remote sensing? (Dec'10)

- ❖ It refers to any method, which can be used to gather information about an object actually coming in contact with it.
- ❖ It is used to denote identification of earth feature by detecting the characteristics electromagnetic radiation that is reflected (or) emitted by the earth.

10. Define immigration and emigration. (Dec' 09)

Immigration: It denotes the arrival of individuals from neighboring population.

Emigration: It denotes the dispersal of individuals from the original population to new areas.

11. What is meant by NIMBY syndrome?

NIMBY means Not In My Back Yard, which describes the opposition of residents to the nearby location of something they consider undesirable.

Eg: An airport is a example of NIMBY syndrome.

12. What is human development index? (Nov 2011)

It is a comparative measure of life expectancy, literacy, education and standards of living for countries worldwide. It is used to distinguish whether the country is a developed, a developed country.

13. **What do you mean by Total fertility rate, Zero population growth?**

- **Total fertility rate** is defined as the average number of children that would be born to a woman in her lifetime if the age specific birth rates remain constant.
- When birth plus immigration in a population are just equal to deaths plus emigration, it is said to be **Zero population growth.**

PART-B & C

1. What are the major role of IT in environment and Human health? (16marks)

Role of Information Technology in Environment

The internet facilities, information through satellites, world wide web provide us up-to-date information on various aspects of environment and weather.

Software's for Environment Education:

1) Remote Sensing:

- ❖ Remote sensing refers to any method which can be used to gather information about an object without actually coming in contact with it.
- ❖ At present the term remote sensing is used more commonly to denote identification of earth feature.

Applications:

i) In agriculture:

Remote sensing can provide valuable information for land & water management.

ii) In forest:

It gives information about type, density & extends of forest cover.

iii) In land cover:

Data is converted to map the special resolution plays a role on the scale of mapping.

iv) Water resources:

It's used in surface water body mapping, ground water targeting, wetland, and flood monitoring.

2) Data Base:

Data base is the collection of interrelated data on various subjects.

Data base is arranged in a systematic manner that is easily manageable.

Applications:

i) Ministry of environment & forest

ii) National management Information system

iii) Environmental Information system

3) Geographical Information System:

GIS is a technique of superimposing various thematic maps using digital data on a large number of interrelated aspects.

Applications:

i) Different thematic maps containing digital information are superimposed on a layered form.

ii) Interpretation of polluted zones.

iii) Use to check unplanned growth.

4) Satellite Data:

- sIt helps in providing correct & reliable information about forest cover.
- It provides information about monsoon, ozone layer depletion.
- Many new reserves of oil, minerals can be discovered.

5) World wide web:

More current data is available on World Wide Web.

Application:

- Provide information on principles, problems, application of environmental science.
- It has digital photos, power- point lecture presentation, animations.

Role of information technology in human health

Introduction:

- It plays a key role in human health.
- Health service technology involves three systems.
    1. Finance & accounting
    2. Pathology
    3. Patient Administration: clinical system.

Application:

i) The data regarding birth & death rates, immunization and sanitation programme are maintained more accurately.
ii) It monitors the health of the people.
iii) Information regarding the outbreak of epidemic diseases can be conveyed.
iv) With a central control system the hospital can run effectively.

2. Discuss in detail about Women welfare and Child welfare? (16marks)

Women Welfare:

The main aim of women welfare is to improve the status of the women by providing opportunities in education, employment and economic independence.

Need of women welfare:

i) Generally women face the following problems in the society.
ii) So there is an urgent need for policy reforms and more stringent legislation and education.
iii) Women suffer gender discrimination and devaluation at home, at workplace, in matrimony etc.,
iv) High number of cases of dowry deaths, rape, criminal offences.
v) The human rights of women are violated, in the male dominated society.
vi) In policy making and decision making process, women are neglected.

Objectives of women welfare:

To overcome the above problem the following objectives are needed.

ii) To provide education.
iii) To impart vocational training.
iv) To generate awareness about the environment.
v) To improve the employment opportunities.
vi) To aware problems of population.

vii) To restore the dignity, status, equality and respect for women.

Objectives of a National commission for women:

- To examine constitutional and legal rights for women.
- To review existing legislations.
- To sensitize the enforcement and administrative machinery to women's cases.

Environmental Degradation and Women Welfare:

- The developmental work not only affects the natural environment but also affects the traditional, cultural and family life of women.

Measures (or) various schemes and organization towards women welfare:

1. The national network for women and mining (NNWM):
    - It is fighting for a "gender audit" of India's mining companies.
2. United Nations Decade for women:
    - It witnessed inclusion of several women welfare related issues on international agenda.
3. International Convention on the Elimination of All forms of Discrimination against Women (CEDAW):
    - It has created an international standard for the protection and promotion of women.
4. Non-Government Organization (NGO'S) as Mahila Mandals:

- It creates awareness among women of remote villages to empower them, train then, educate them and help them to become economically self-dependent.

5. Ministry for women and child development:
    - It aims to work for the upliftment of women by family planning, health care, education and awareness.

Child Welfare:

- ❖ Children occupy nearly 40% of total population.
- ❖ They are considered to be the assets of a society.

Reason for child labours:

1. **Poverty**:
    - Poverty is the main reason to force these children to work in unhealthy conditions.
2. **Want of money**:
    - Parents require money for their family, so they are in position to send their children for work.

Measures (Or) Various schemes and organization towards child welfare:

1. **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 in our society.

Rights of the child:

- The right to survival
- The right to participation
- The right to development
- The right to protection

2. **World summit on children**:

- It had focused agenda for well being of the children targeted to be achieved in the beginning of the new millennium.

2. **Ministry of human resource development (MHRD**):

- It concentrated on child's health, education, nutrition, etc.,

Environmental degradaion and child welfare:

- Children are most affected due to environmental pollution.
- Water borne diseases are the biggest threat to children.
- Around 6 million children are affected be these diseases in India.

Center for Science and Environment (CSE):

- Its scientific report says, 'children consume more water, food and air than adults, and hence more susceptible to an environmental contamination'.

3. (a) Explain in detail about Human rights? (8marks)

HUMAN RIGHTS

1. Human right to freedom
2. Human right to property
3. Human right to freedom of religion
4. Human right to culture and education
5. Human right to constitutional remedies
6. Human right to equality
7. Human right against exploitation
8. Human right to food and environment
9. Human right to good health.

1. Human rights 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.

2. Human right to property

- Every human beings has the right to earn property.

3. 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.

4. **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.
5. **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.
6. **Human right to equality**
   - All citizens are equal before the law.
   - There is no any discrimination on grounds of religion, caste, sex (or) place of birth.
   - All are given equal opportunity for employment.
7. **Human right against exploitation**
   - Children should not be employed as labours.
   - Every citizen has the right to fight against exploitation.
8. **Human right to food and environment**

   All human beings have the right to get sufficient healthy food, safe drinking water and healthy environment

9. **Human right to good health**
   All human beings have the right to have very good physical and mental health.

3. (b) Explain the importance and methods of imparting value education? (8marks)

VALUE EDUCATION

Education

It is nothing but learning about the particular thing through knowledge. We can identify our values and ourselves with the help of knowledge and experience.

Types

i) Formal education-Self related learning process.
ii) Value education – Analyze based on instruments.
iii) Value-based environment education- Based on environment.

Objectives

- To improve the integral growth of human begins.
- To create attitudes and improvement towards sustainable lifestyle.
- To increase awareness about our national history our cultural heritage, constitutional rights, national integration, community develo9pment and environment.

- To create and develop awareness about the values and their significance and role.
- To know about various living and non- living organisms and their interaction with environment.

Types of values

- Universal values-Importance of the human conditions.
- Cultural values-Right, wrong, good and bad.
- Individual values-Individual personality and experiences.
- Global values-Human civilization.
- Spiritual values-Self-restraint, discipline.

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- laten 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 actor/actors by taking the role of another person but without the risk of reprisals.

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 man:

- This method makes use of the lives of the great man as the subject matter for trying to elicit their good deeds and thoughts worthy for emulation.

4. (a) Write the origin, mode of transmission, symptoms and control measure of AIDS? (10marks)

HIV /AIDS

AIDS is the abbreviated form for **Acquired Immuno Deficiency Syndrome** caused by a virus called HIV (**Human Immune deficiency Virus**).

Origin of HIV/AIDS

1. **Through African Monkey**
    - African monkey or Chimpanzees To human.
2. **Through Vaccine Programme**
    - Polio, small pox vaccine from monkey's kidney-Africa.
    - Hepatitis-B viral vaccine-Los Angles and New York.

Factors influencing modes of Transmission of HIV

- Unprotected sex with infected person.

- Using needles or syringes from HIV positive person.
- During pregnancy, breast feeding HIV transmits from mother to infant babies.
- Blood transfusion during accident and pregnancy.
- Biologically the male to female transmission is 2 to 4 time more efficient than female to male transmission.
- Women's cervical tissue is more vulnerable to HIV than men.

The most common methods of transmission of HIV:

- Unprotected sex with an infected partner
- Sharing needles with infected person

Almost eliminated as risk factors for HIV transmission:

- Transmission from infected mother to fetus
- Infection from blood products

Factors not influencing transmission of HIV

- Tears, food, air, cough, handshake and normal kissing.
- Mosquito flies and insect bites.
- Sharing of utensils, clothes, toilets and bathroom.

Effects

- Death
- Loss of labor
- Inability to work
- Lack of energy.

Functions of HIV in human body

- White blood cells (WBC) are responsible for the formation of antibodies called T-helper cells'-helper cells are the key infection fighters in the immune system.
- Once HIV cells are enter into the body they destroy the T-cells and cause many diseases.

Symptoms

I. Minor symptoms

- Persistent cough for more than one month.
- General skin disease.
- Viral infection.
- Fungus infection in mouth and throat.
- Frequent fever, headache and fatigue.

II. Major symptoms

- Diarrhea for more than one month.
- TB for more than one month.
- Fall of hairs.
- 10% of body weight loss within short period.

Control and Preventive measures

- Education.
- Prevention of Blood borne HIV transmission.
- Primary health care.
- Counseling services.
- Drug treatment.

Scenario in India

- Large number of cases has been reported in Maharashtra and Tamil Nadu.

World Scenario

- Nearly 90% of the HIV affected peoples live in developing countries.
- 13% of world's population lives in Africa.
- About 3 million people so far died due to HIV in 2003.
- In the world AIDS ranking India is in 2nd place.

4. (b) Explain the methods of family planning? (6marks)

Methods of Family Planning

Traditional method:

- It includes some traditions like taboos and folk medicine.

Modern method- Permanent method

- It is done by 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.

Temporary method

(a) Condoms

- Condoms are used by males to prevent sperms

(b) Copper Ts

- Copper Ts are small objects and can be placed by a doctor in the uterus so that the ovum cannot be implanted, even if fertilized.

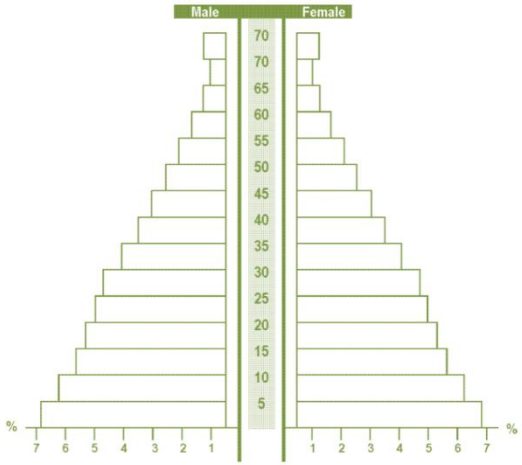
(c) Oral contraceptive pills and inject able drugs are available that prevent the sperms from fertilization.

5. (a) Discuss variation of population based on age structure? (8marks)

Age structure of population can be classified in to three classes.

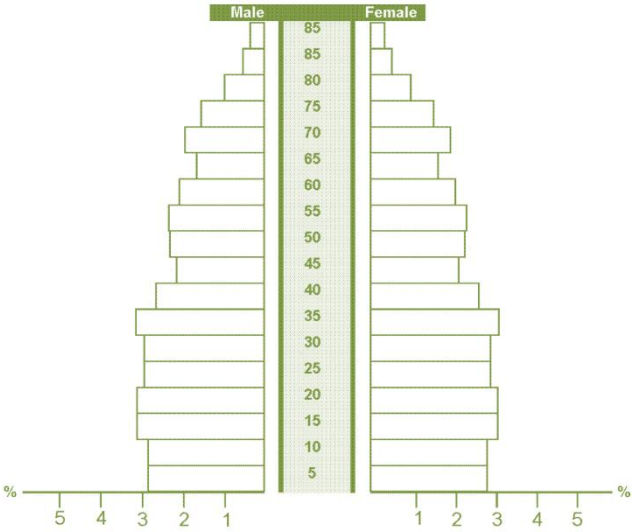
(i) Pre- productive population (0-14 years)
(ii) Reproductive population (15- 44 years)
(iii) Post reproductive population (above 45 years)

Pyramid shaped variation of population: (increase)



- The above figure shows that the pre – productive age group populations (0 -14 years) is more indicated at the base of pyramid, and post productive age group population (above 45 years) is less, indicated at the top of pyramid.
- The large number of age people will soon enter into reproductive age group population (15- 44 years) which increases population growth.

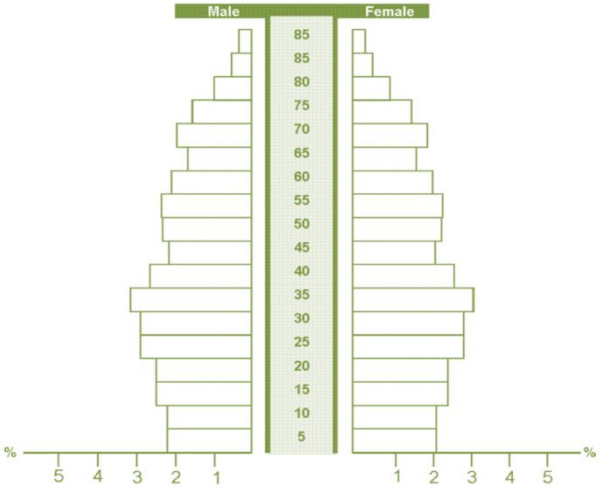
Bell shaped variation of population (Stable)
Example: USA, UK, Canada, etc.



- The above figure shows that the pre – productive age 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.

Urn shaped variation of population (decrease)

Example: Germany, Italy, Sweden, Japan. Etc.



- ❖ The figure shows that the pre – productive age group population (0 – 14 years) is smaller than the reproductive age group population (15 – 44 years).
- ❖ 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.

5. (b) Discuss briefly the factors that affect human population growth rate (or) Population explosion? (8marks)

Introduction:

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 1980, the global population was about 1 billion people. It took about 130 years (in 1936) to reach 2 billion.

Causes:

- The rapid population growth is due to decrease in death rate and increase in birth rate.
- The availability of antibiotics, immunisation, increased food production, clean water and air decreases the famine – related deaths and infant mortality.
- In agricultural based countries, children's are required to help parents in the fields that is why population increases in the developing countries.

Characteristics of population growth

i. Exponential growth:

Population growth occurs exponentially like , 10, 10^2,10^3,10^4

ii. Doubling time:

It is the time required for a population to double its size at a constant annual rate. It is calculated as follows

Td(Doubling time) = 70/r

Where r= annual growth rate

iii. Infant mortality rate:

It is the percentage of infants died out of those born in one year.

iv. Total fertility rates (TFR)

It is the average number of children delivered by women in her life time.TFR

value varies from 2 in developed countries to 4.7 in developing countries.

v. Replacement level:

Two parents bearing two children will be replaced by their off spring. Due to

infant mortality this replacement level is changed.

vi. Male – Female ratio:

The ratio of girls and boys should be fairly balanced in a society to flourish.

vii. Demographic transition:

Population growth is related to economic development. The dead rate and birth

rates fall due to improved living conditions. This result in low population growth.

Effects:

- Increasing demands for food and natural resources.
- Inadequate housing and health services.
- Loss of agricultural lands.
- Unemployment and socio-political unrest.

- Environmental pollution.

6. Explain the Environment and human health relation

Environment and Human Health

Health: According to world health organisation (WHO) health is a state of complete physical, mental and social well-being and not merely the absence of diseases or infirmity.

Environment and public health issues are
i) Infectious Diseases

ii) Disposal of Chemicals

iii) Pesticide and heavy metal contamination

iv) Occupational hazards

vi) Radiation
vii) Food
viii) Settlement

i) Infectious diseases

Unhygienic conditions of environment forms the breeding grounds for various deadly diseases causing organism like virus, bacteria, vectors etc. They pose greater threats to health, more

severely in the developing countries. Infectious organism cause food poisoning, respiratory diseases and gastrointestinal diseases.

• **Water-borne(Polluted water):** Cholera, Dysentery, Amoebiosis, Hepatitis

• **Air-borne(Polluted air):** Asthma, Bronchitis, Pneumonia, Tuberculosis

• **Food-borne(Food-poisoning):** Cholera, Dysentery

• **Vector-borne:** Malaria, Typhoid, Filaria

• **Animal-borne:** Plague

ii) Disposed Chemicals

A large number of chemicals are introduced in the environment by anthropogenic activities Chemical can be divided into two categories

Hazardous: Any substance or preparation which by its physico-chemical properties or handling is liable to cause harm to human beings, other living organisms, property or environment. **Eg: explosives and inflammable chemicals**

Toxic Chemicals(Toxins): Poisonous chemicals which kill cells and can serious health concerns including death. These substances

can have pronounced impact on physic-chemical activities if it is present beyond threshold/permissible limit.

Carcinogenic: Cause cancer **Eg: aromatic hydrocarbons like benzene, various amines etc**

Mutagenic: affect genetic material (DNA) in cells **Eg: Polycyclic aromatic hydrocarbon, benzene, sodium azide.**

Teratogenic/Embryotoxins: Cause abnormalities during embryonic growth and development. **Eg: various pesticides, heavy metals etc**

Neurotoxins: Affect nervous system **Eg: Lead**

iii) Pesticide and heavy metal contamination:

Some of the pesticides and other pollutants may act as inhibit hormones in humans and other species and affect reproduction, development and various ailments including tumors.

Many chemical like DDT and other chlorinated pesticides accumulate in food chain and show deleterious effect at the top of the food chain. Heavy metals, arsenic, chromium, lead, mercury affect human health.

iv) Occupational Hazards

Workers in various factories, mines, construction of dams, buildings, commercial forms, forestry and agriculture are exposed to risks, especially health hazards **Dust:** Lung diseases

Silicosis: Dust contaminating free silica or silicon dioxide-reduces life expectancy.

Asbestosis: Finest fibres of asbestos find access to respiratory tract leading to respiratory problems

v) Noise

Sound levels beyond the permissible level of human ear may damage ears.

Elevated workplace or other noise can cause hearing impairment, hypertension, heart diseases etc. It can affect pregnant mothers and their foetus.

vi) Radiation

Cosmic and ultraviolet rays cause harmful effects on human health which may include cancer.

vii) Diet

Contamination of food can cause indigestion, food poisoning and other various ill effects. Undernutrition or malnutrition makes humans prone to other diseases.

viii) Settlement

Improper settlement and poor physical environment may cause various psychological problems which affect various vital physiological processes in the body.

6.b. What do you mean by environmental impact analysis? What are the methods followed for EIA?

EIA is defined as a formal process of predicting the environmental consequences of any development projects. It is used to identify the environmental, social and economic impacts of the project prior to decision making.

Process of EIA: The key elements used in the process of EIA are

1. Scoping 2. Screening
3. Identifying and evaluating alternatives
4. Mitigating measures dealing with uncertainity
5. Issuing environmental statements

1. Scoping

It is used to identify the key issues of the concern in the planning process at an early stage. It is also used to aid site selection and identify any possible alternatives.

2. Screening

It is used to decide whether an EIA is required or not based on the information collected.

3. Identifying and evaluating alternatives

It involves knowing alternatives sites and alternative techniques and their impacts.

4. Mitigating measures dealing with uncertainty

It reviews the action taken to prevent or minimize the adverse effects of project.

5. Issuing environmental statements

This is the final stage of the EIA process. It reports the findings of the EIA.

ANNA UNIVERSITY QUESTIONS

B.E/B.TECH DEGREE EXAMINATION

NOVEMBER/DECEMBER 2014

Third Semester

GE6351-ENVIRONMENTAL SCIENCE AND ENGINEERING

(REGULATION 2013)

Time: Three Hours

Maximum: 100 Marks

Answer all questions

PART – A (10*2=20 Marks)

1. What is an Abiotic Environment?
2. What are called endangered species?
3. Mention the effects of ozone on plants.
4. List the sources of Marine pollution.
5. What are the renewable resources?
6. Define the term landslide.
7. What is rain water harvesting?
8. What are the objectives of Water Act?
9. Define the term Nuclear Energy?
10. What are the sources of HIV infection?

PART – B (5*16=80 Marks)

11. a) i) Define Ecosystem. Give an account of structure and functions of grassland Ecosystem. (P-15) (8)

ii) What is biodiversity? Discuss the values and significance of biodiversity. (P-11) (8)

b) i) With a neat sketch discuss the Nitrogen Cycle. (8) (P-06)

ii) What do you meant by conservation of biodiversity? State and explain the basic approaches of wild life conservation. (P-22) (8)

12. a) i) Discuss the various chemical and photochemical reactions in the atmosphere. (8)

ii) Explain the sources, effects and control measures of noise pollution. (P-43) (8)

(or)

c) i) Write informative notes on water treatment processes. (P-36)

d) ii) Describe the role of an individual in the prevention of pollution. (P-85) (8+8)

13. a) i) Discuss the causes and effects of deforestation. (8) (P-67)

ii) What is land degradation? Discuss the factor responsible for land degradation. (P-89) (8)

OR

b) i) What are the changes caused by agriculture and overgrazing? (8)

ii) Discuss the production of biogas. Mention its uses. (P-79)

14. a) i) What are the objectives of water conservation? How is it carried out? (P-103) (8)

ii) What is an earth quake? Enumerates its effects. What measures should be taken to mitigate this disaster? (P-120)

(or)

b) i) Discuss the resettlement and rehabilitation of people, its problems and concerns. (P-150 (8)

ii) Briefly discuss to salient features of wildlife protection act (P-109) (8)

15. a) i) Discuss the variations of population among nations. (P-142) (8)

ii) Write the methods and strategies of imparting value education. (P-136) (8)

(or)

b) i) Write explanatory notes on women and child welfare. (P-130) (8)

ii) Explain the role of information technology in environment and human health. (P-127) (8)

B.E/B.TECH DEGREE EXAMINATION, APRIL/MAY 2015

Third Semester

GE6351-ENVIRONMENTAL SCIENCE AND ENGINEERING

(REGULATION 2013)

Time: Three Hours

Maximum: 100 Marks

Answer all questions

PART – A (10*2=20 Marks)

1. What are food chains?
2. Define biodiversity.
3. What do you mean by noise pollution?
4. What is acid rain?
5. What are renewable and non-renewable energy resources?
6. What is desertification?
7. What is consumerism?
8. What do you mean by disaster management?
9. Define population explosion.
10. List out the advantages of family welfare programmes?

PART – B (5*16=80 Marks)

11. a) i) Describe the types, characteristicfeautures, structure and functions of an aquatic ecosystem (P-8) (8)

ii) What are the major causes of man wild life conflicts? Discuss the remedial steps that can affect the conflict. (P-10) (8)

(or)

b) i)Explain the following:

1) Ecological succession (P-20)

2) Ecological Pyramid. (8)

ii) Explain the major factors that are responsible for the loss of biodiversity. (P-11) (8)

12. a) i) Explain the causes, effects and control measure of air pollution. (P-31) (8)

ii) Explain the control and preventive measures of municipal solid wastes (P-53) (8)

(or)

b) i) Write briefly about the hazards caused by the nuclear wastes. (P-47) (8)

ii) Explain in detail the role of an individual in pollution prevention. (P-15) (8)

13. a) i) What are the effects of deforestation? Is deforestation justified ? Comment. (P-67) (8)

ii) Discuss the impact of mining on environment and human health. (P-69) (8)

(or)

b) i) i)Explain the following:

1) Food resources

2) Mineral resources (P-69) (8)

ii) With the help of a neat diagram explain the production of bio-gas. (P-79) (8)

14.a) i) Explain the effects of nuclear accidents with two case studies (P-140) (8)

ii) Discuss various measures for waste land reclamation. (P-104) (8)

(or)

b) i) What is rain water harvesting? What are the purpose for it (8) (P-115)

ii) Name the laws that have been framed for environmental protection and mention the objectives for each act. (P-106) (8)

15.a) i) What is AIDS? What are the sources and mode of transmission of HIV infection? (P-138) (8)

ii)What are the objectives and elements of value education? How the same can be achieved? (P-136) (8)

(or)

b) i) Write notes on

1) Human rights (P-134)

2) Women and Child welfare (P-130) (8)

ii) Discuss the role of information technology in environment and human health case studies. (P-127) (8)

B.E/B.TECH DEGREE EXAMINATION,

NOVEMBER/DECEMBER 2015

Third Semester

GE6351-ENVIRONMENTAL SCIENCE AND ENGINEERING

(REGULATION 2013)

Time: Three Hours

Maximum: 100 Marks

Answer all questions

PART – A (10*2=20 Marks)

1. Define biodiversity.
2. What is food chain?
3. Define noise pollution.
4. What is the role of individual in pollution prevention?
5. What are renewable and non-renewable energy resources?
6. What do you meant by land degradation?
7. List out the advantages of rain water harvesting.
8. \Define consumerism.
9. State the role of information technology in Environment.
10. Define population explosion.

PART – B (5*16=80 Marks)

11. a) i) Describe the types, characteristic features, structure and functions of
    1) Forest Ecosystem (P-13)
    2) Aquatic Ecosystem (P-8) (8)

    ii) Explain the following:
    1) Ecological Succession (P-20)
    2) Ecological Pyramids (8)

(or)

b) i) What are the major causes of man-wild conflicts? (P-10) Discuss the remedial steps that can curb the conflict. (8)

ii) Explain briefly the energy flow through ecosystem. (P-5) (8)

12. a) i) Explain the causes, effects and control measure of water pollution. (P-36) (8)

ii) Explain the various methods of controlling air pollution. (P-31) (8)

(or)

b) i) Write a note on:
    1) Nuclear Hazards (P-48)
    2) Thermal pollution. (P-49) (8)

ii) What is marine pollution? Explain the ill effects of marine pollution with the help of a case study. (P-56) (8)

13. a) i) Discuss the impact of mining on environment and human health. (P-69) (8)

ii) What are the effects of deforestation? Is deforestation justified? Comment. (P-67) (8)

(or)

b) i) Explain the merits and demerits of dam. (P-92) (8)

ii) Write informative notes on modern agriculture. (P-73) (8)

14. a) i) Name the laws that have been framed for environmental protection and mention the objectives of each act. (P-106) (8)

ii) Discuss various measures for wasteland reclamation (P-104) (8)

(or)

b) i) Write a note on:

1) Earthquake (P-120)

2) Cyclone (8)

ii) Explain in detail, how biomedical wastes are managed and handled. (P-127) (8)

15. a) i) What is AIDS? What are the sources and mode of transmission of HIV infection? (P-138) (8)

ii) Write a note on the following:

1) Women and child welfare in India. (P-130)

2) Human rights. (P-130) (8)

(or)

b) i) What are the objectives and elements of value education? How can the same be achieved? (P-136)(8)

ii) Population explosion affects the environment seriously. Discuss. (8)

B.E/B.TECH DEGREE EXAMINATION, MAY/JUNE 2016

Third Semester

GE6351-ENVIRONMENTAL SCIENCE AND ENGINEERING

(REGULATION 2013)

Time: Three Hours

Maximum: 100 Marks

Answer all questions

PART – A (10*2=20 Marks)

1. Give any two examples of physical hazards.
2. Mention two primary and secondary consumers in grassland ecosystem.
3. What is PAN? Give its detrimental effect.
4. What are the causes of thermal pollution?

5. Mention any two environmental effects of mining of mineral resources.
6. What are the reasons for land degradation?
7. Explain the term sustainability briefly
8. State any two biomedical waste handling rules.
9. Mention any two family welfare programs adopted in India.
10. What do you understand by population explosion?

PART – B (5*16=80 Marks)

11. a) i) What is an ecosystem? What are its components? Explain the functions of each component with examples. (P-13) (8)

ii) Explain the factors that give threat to biodiversity. (P-9) (8)

(or)

b) i) How is biodiversity conserved in India? (P-22) (4)

ii) Explain oxygen and nitrogen cycle briefly with diagrams. (P-5) (12)

12. a) i) Write an elaborate note on chemical and photochemical reactions in the atmosphere. (10)

ii) What are the causes and effects of marine pollution? (P-56)

(or)

b) i) What are the methods adopted for the control of air pollutants? Explain each briefly. (P-31) (8)

ii) How are the water classified? Give examples of each type. (8)

13. a) i) How is biogas produced? What are its advantages? (P-79)

ii) What are the causes of modern agriculture? (P-73) (8+8)

(or)

b) i) What are renewable and non-renewable energy resources? Why are non-renewable energy resources preferred for energy utilization now-a-days? What are advantages and disadvantages of harnessing non-renewable energy resources? (P-75) (10)

ii) Explain bio conversion of pollutants with examples. (P-79)

14. a) i) Discuss the recent approaches to achieve sustainable development. (P-99) (8)

ii) What is green chemistry and what are its principles? (8)

(or)

b) i) Discuss the various applications of green chemistry for achieving sustainable development. (P-99) (8)

ii) Explain salient features of Water Act (P-106) (8)

15. a) i) What are sparsely populated areas? Give examples and reasons for poor populations in those areas. (P-142) (8)

ii) What is HIV? How is it caused? What are the preventive measures suggested? (P-138) (8)

(or)

b) i) Explain a note on EIA. (8)

ii) Discuss women and child welfare programs practiced in India. What are the hurdles encountered? (P-130) (8)

B.E/B.TECH DEGREE EXAMINATION,

NOVEMBER/DECEMBER 2016

Third Semester

GE6351-ENVIRONMENTAL SCIENCE AND ENGINEERING

(REGULATION 2013)

Time: Three Hours

Maximum: 100 Marks

Answer all questions

PART – A (10*2=20 Marks)

1. Define Ecosystem diversity.(P-15)
2. Write about any two chemical hazards present in the environment.(P-16)
3. Mention to measures to control thermal pollution caused by industries..(P-44)
4. List any four water quality parameters and their importance(P-46)
5. What is bio gas? Mention it uses(P-83)
6. Define Sustainable life styles(P-84)
7. Write any four principles of green chemistry(P-114)
8. What is consumerism? How does it affect the environment(P-116)
9. Define EIA and its Benefits (P-144)

10. What are the objectives of women welfare systems?(P-147)

PART – B (5*13=65 Marks)

11a) i) Describe the Function of an Ecosystem using Energy flow and Material Cycling (P-23) (7)

ii) Define Insitu and Exsitu conservation of bio diversity and Explain (6)

(or)

b) i) Explain the stages in ecological succession using appropriate terminology (P-21) (7)

ii) Justify India to be a Mega Bio diversity nation with the reqired Data (P-24) (6)

12a) i) Discuss about the causes, impacts and control measures of ozone depletion in the atomsphere (P-27) (7)

ii) Write a flow sheet and Explain the steps involved in solid waste management (P-54) (6)

(or)

b) i) Mention any four air pollutants with their sourses and Emission contol measures. (P-32) (7)

ii) What are the effects of Marine pollution? (P-57) (6)

13a) i) Explain the stages in desertification (P-59) (7)

ii) What is over utilization of water resourses?Mention the remedial measures (P-72) (6)

(or)

b) i) Write a note on 1) use of fertilizers and pestisides 2)soil salinity problems (P-74) (7)

ii) List the impact of Deforestation on the Environment (P-68) (6)

14)a) i) What is cyclone? Define cyclone management using forecasting (P-72) (7)

ii) What is ecomark? Explain (P-75) (6)

(or)

b) i) Describe about the air act 1981 (P-108) (7)

ii) Name any three significant bio medical waste and their safe disposal (P-110) (6)

15a) i) What is value Education , Mention its Importance. (P-137)

ii) Explain the role of GIS in Environmental management. (P-129)

(or)

b) i) What is population Explosion ?Give the resons behind it. (P-148) (7)

ii) Discuss the factors influencing human health under current environmental conditions. (6)

PART – C (1*15=15 Marks)

15a) i) Explain about any two methods of bio degradation of pollutants (P-21) (8)

ii)Mention a case study on (P-11, 12)

i)man and wild life conflicts

ii)Productive use of bio diversity

(or)

b) i) Illustrate any two methods of harnessing alternative sourses of energy (P-77) (8)

ii) Describe in detail about any one pollution related case study. (P-80) (7)

B.E/B.TECH DEGREE EXAMINATION, APRIL/MAY 2017

Third/Fourth/Fifth/Sixth/Seventh/Eighth Semester

GE6351-ENVIRONMENTAL SCIENCE AND ENGINEERING

(REGULATION 2013)

Time: Three Hours

Maximum: 100 Marks

Answer all questions

PART – A (10*2=20 Marks)

1. What do you understand by species bio-diversity?Give one example.(P-14)
2. How is nitrogen fixed in soil?(P-15)
3. What are the characteristics of PAN.(P-43)
4. Mention the effects of nuclear waste in human(P-44).
5. Give any two reasons for marine pollution.(P-82)

6. Write any two problems caused by high saline soils.(P-84)
7. How is cyclone formed?(P-114)
8. When does rehabilitation arise?.Mention any one problem to government during rehabilitation.(P-115)
9. What is meant by value education?(P-144)
10. Mention any two welfare programs for children adopted in India.(P-145)

PART – B (5*13=65 Marks)

11a) i) Explain the structure and functions of grass ecosystem (P-16) (6)

ii) Substantiate the statement ,India as a mega-diversity nation. (P-21) (7)

(or)

b) i)Write the importance of biological hazard in the environment (6)

ii) Explain the methods of conservation of bio-diversity (P-22) (7)

12a) i) How is noise pollution controlled? (P-44) (6)

ii) Write a detailed note on photochemical reactions taking place in the atmosphere(7)

(or)

b) i) What are the effects of heavy metals in aquatic environment(6)

ii) What is a particulate matter? How is it controlled by using equipment?(7)

13a) i) What are the reasons of deforestation. (P-68) (6)

ii) How is bio-gas generated? (P-81) (7)

(or)

b) i) Explain in detail the effect of modern agriculture which includes both beneficial and adverse effects. (P-74) (13)

14)a) i) What is green chemistry?Explain the various principles of green chemistry with suitable examples.(13)

(or)

b) i) Explain the features of the following i)Air act ii)Forest conservation act. (P-108) (13)

15a) i) Describe the following i)Environment and human health relation ii)HIV and Aids. (P-139) (13)

(or)

b) i) What do you mean by environmental impact analysis? What are the methods followed for EIA(13) (7)

PART – C (1*15=15 Marks)

16a) i) Enlist the rules of management and handling bio-medical waste and analyse critically the problems associated with the implementation. (P-127)

(or)

b) i) Analyse the environmental effects of extracting and using mineral resources and write the remedies taken. (P-70)