GE8291 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

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

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, Scope and Importance of Environment – Need for Public Awareness - Concept of an Ecosystem – Structure and Function of an Ecosystem – Producers, Consumers and Decomposers – Energy Flow in the Ecosystem – Ecological Succession – Food Chains, Food Webs and Ecological Pyramids – Introduction, Types, Characteristic Features, Structure and Function of the (A) Forest Ecosystem (B) Grassland Ecosystem (C) Desert Ecosystem (D) Aquatic Ecosystems (Ponds, Streams, Lakes, Rivers, Oceans, Estuaries) – Introduction to Biodiversity Definition: Genetic, Species and Ecosystem Diversity – Bio geographical 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 8

Definition – Causes, Effects and Control Measures of: (A) Air Pollution (B) Water Pollution (C)Soil Pollution (D) Marine Pollution (E) Noise Pollution (F) Thermal Pollution (G) Nuclear Hazards – Soil Waste Management: Causes, Effects and Control Measures of Municipal Solid Wastes – Role of an Individual in Prevention of Pollution – Pollution Case Studies – Disaster Management: Floods, Earthquake, Cyclone and Landslides. Field Study of Local Polluted Site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest Resources: Use and Over-Exploitation, Deforestation, Case Studies - Timber Extraction, Mining, Dams and Their Effects on Forests and Tribal People – Water Resources: Use and Over-Utilization of Surface and Ground Water, Floods, Drought, Conflicts Over Water, Dams-Benefits and Problems – Mineral Resources: Use and Exploitation, Environmental Effects of Extracting and Using Mineral Resources, Case Studies – Food Resources: World Food Problems, Changes Caused by Agriculture and Overgrazing, Effects of Modern Agriculture, Fertilizer-Pesticide Problems, Water Logging, Salinity, Case Studies – Energy Resources: Growing Energy Needs, Renewable and Non Renewable Energy Sources, Use of Alternate Energy Sources. Case Studies – Land Resources: Land as a Resource, Land Degradation, Man Induced Landslides, Soil Erosion and Desertification – Role of an Individual in Conservation of Natural Resources – Equitable Use of Resources for Sustainable Lifestyles. Field Study of Local Area to Document Environmental Assets – River / Forest / Grassland / Hill / Mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From Unsustainable to Sustainable Development – Urban Problems Related to Energy – Water Conservation, Rain Water Harvesting, Watershed Management – Resettlement and Rehabilitation of People; its Problems and Concerns, Case Studies – Role of Non-Governmental Organization- Environmental Ethics: Issues and Possible Solutions – Climate Change, Global Warming, Acid Rain, Ozone Layer Depletion, Nuclear Accidents and Holocaust, Case Studies. – Wasteland Reclamation – Consumerism and Waste Products – Environment Production Act– Air (Prevention And Control Of Pollution) Act – Water (Prevention And Control Of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Enforcement Machinery Involved in Environmental Legislation- Central and State Pollution Control Boards- Public Awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population Growth, Variation Among Nations – Population Explosion – Family Welfare Programme – Environment and Human Health – Human Rights – Value Education – HIV / AIDS – Women and Child Welfare – Role of Information Technology in Environment and Human Health – Case Studies.

TOTAL: 45 PERIODS

OUTCOMES:

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

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

TEXT BOOKS:

1. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.

REFERENCES:

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press 2005.

Subject Code: GE8291 Year/Semester: II /04
Subject Name: ENVIRONMENTAL SCIENCE AND ENGINEERING
Subject Handler: A.JAYANTHI, Associate Professor, Department of Physics

UNIT I - ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

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

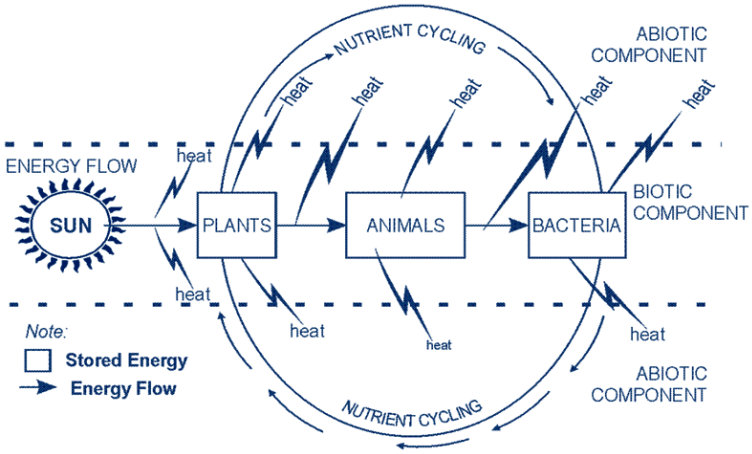
Q. No.	PART – A
1.	**State the significance and scope of environmental education. May 2011** BTL1 • People will understand the concept of need of development without destruction of environment. • Motivate the active participants in environmental protection and improvement. • Develop a concern and respect for the environment.
2	**Give some important physical hazards and their health effects.** BTL2 • The substance (or) activities that threaten your physical safety. **E.g**. Heat, Cold, Radiation, noise. • **Health effects** – Damage of cells, Skin cancer, Damage of ear drum etc.
3	**Define environment and ecosystem. April 2011** BTL1 • **Environment**: The sum of total of all the living and non-living things around us influencing one another. • **Ecosystem**: A group of organisms interacting among themselves and with environment for exchanging energy and matter.
4	**Explain the concept of an ecosystem. (Chen AU Jun 2007, Apr 2011, Dec2013)** BTL2 A group of organism interacting among themselves and with the environment. May be natural like a pond, a lake, a river, an ocean, or a forest or may be manmade like an aquarium, cropland, garden, dam etc.
5	**What are the components of ecosystem?** BTL1 i) Abiotic or Non-living component - Physical components and Chemical components **ii)** Biotic or Living component – Autotrophs (Producers), Heterotrophs (Consumers), Saprotrophs (Decomposers-Microconsumers)

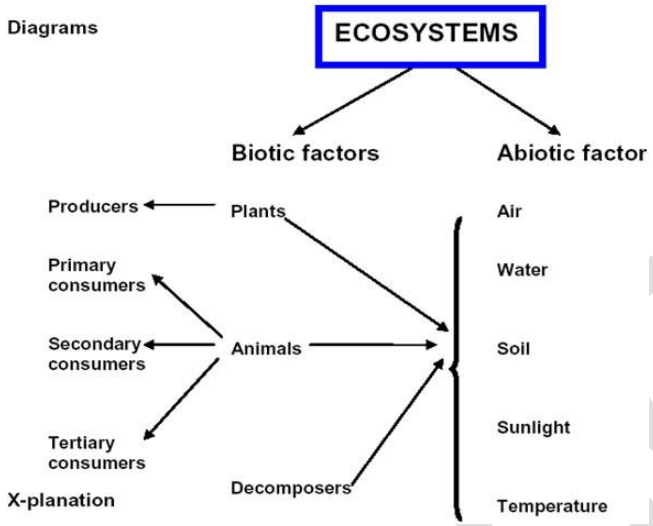
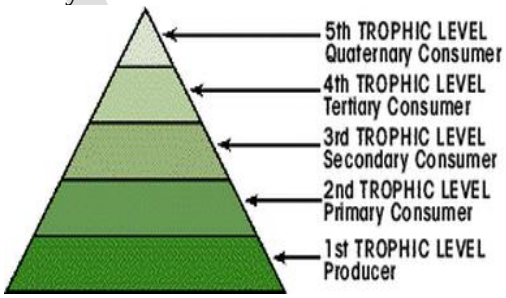
6	**Define Ecological succession. (NOV/DEC 2013)** BTL1 The progressive replacement of one community by another till the development of stable community in a particular area.
7	**Name the types of consumers.** BTL4 • Herbivores (or) Primary Consumers (plant eater) • Carnivores (or) Secondary Consumers (meat eater) • Omnivores (or) Tertiary Consumers (meat + plant eater)
8	**What are Decomposers?** BTL1 Organisms which feed on dead organisms, plants and animals and decompose them into simpler compounds. Examples – Bacteria, fungi etc.
9	**What are autotrophic and heterotrophic components of an ecosystem? Give examples (Coim. A.U. Dec 2009)** BTL1 • **Autotrophic components** Self-nourishing organisms. The members of autotrophic components are producers. They derive energy from sunlight and make organic compounds from inorganic substances. Examples: Green plants, algae, bacteria, etc., • **Heterotrophic components** Components that dependent on others for food. The members of heterotrophic components are consumers and decomposers. Herbivores, carnivores (or) omnivores. • **Saprotrops:** They are decomposers - bacteria, fungi, etc.
10	**Define the terms producers and consumers. (A.U. May 2008, Dec 2011)** BTL1 • **Producers**-Synthesize their food themselves through photosynthesis. • **Consumers**-Organisms which cannot prepare their own food and depends directly or indirectly on the producers.
11	**Define primary production and secondary production. (Chen A.U. Dec 2008)** BTL1 • **Primary production** - The conversion of radiant energy into organic substances by photosynthesis by producers (Plants). • **Secondary production**- Distribution of energy in the form of food to the consumer (or) the energy stored by the consumer.
12	**What is Ecological pyramids?** BTL1 Graphical representation of structures and function of tropic levels of an ecosystem, starting with producers at the bottom and each successive tropic level forming the apex is known as ecological pyramids.
13	**Name different types of ecosystems**. **(Chen AU Jan 2006)** BTL1 • Natural ecosystem: 1) Terrestrial ecosystem 2) Aquatic ecosystem a. Forest ecosystems b. Grassland ecosystems c. Desert ecosystems d. Pond ecosystem. e. Lake ecosystem f. River ecosystem g. Marine ecosystem • Man-made ecosystem
14	**What are the characteristics of desert ecosystem? (Chen A.U. Dec 2008)** BTL1 • The desert air is dry and the climate is hot. • Annual rainfall is less that 25cm. • The soil is very poor in nutrients and organic matter. • Vegetation is poor

15	**What is meant by keystone species? (Chen A.U. Dec 2008)** BTL1 Within a habitat each species connects and depends on other species. But, while each species contribute to habitat functioning, some species do more than others in the overall scheme of things. Without the work of these key species, the habitat changes significantly. These species are called keystone species. When a keystone species disappears from its habitat, that habitat changes drastically.
16	**What are the types of grassland ecosystem? (Chen A.U. Dec 2010)** BTL1 There are three types of grassland ecosystem based on the climate condition. i) Tropical grassland ii)Temperate grassland iii) Polar grassland
17	**What are food chains? Mention their type**. **(Chen A.U. Dec 2010)** BTL1 **Food chain-**The sequence of eating and being eaten in an ecosystem. **Types :** i) Grazing food chain (from the living green plants goes to grazing herbivores, and on to carnivores) **ii)** Detritus food chain (Primary source of energy is dead organic matter called 'detritus' which are fallen leaves, plant parts or dead animal bodies)
18	**Define Biodiversity (or) What is biodiversity and its significance? (Chen AU Dec 2005, Jun 2006,Apr 2011,Apr 2015)** BTL1 • The variety and variability among all groups of living organisms and the ecosystem in which they occur. **Significance:** • Very important for human life, as we depend on plants, micro-organisms, earth's animals for our food, medicine and industrial products. • Also important for forestry, fisheries and agriculture, which depend on rich variety of various biological resources available in nature. • Protects the fresh air, clean water and productive land. • Loss of biodiversity has serious economic and social costs for any country
19	**Define genetic diversity, species diversity and ecosystem diversity. (TNV AU Dec 2008, Chen AU Dec 2007, May 2008, Dec2010, 2011)** BTL1 • **Genetic diversity**-Diversity of genes within a species. • **Species diversity**–Diversity among species in an ecosystem. • **Ecosystem diversity**-Diversity at the ecological or habitat level.
20	**What are biodiversity hot-spots? (Chen AU Apr 2011)** BTL1 The geographic areas which possess the high endemic species. The two important biodiversity hot spots in India- 1. Eastern Himalayas 2. Western Ghats.
21	**What are the criteria for recognizing hot spots? (Chen AU Dec 2011)** BTL1 • The Richness of the endemic species is the primary criterion for recognizing hot spots • The hot spots should have a significant percentage of specialized species. • The site is under threat. • It should contain important gene pools of plants of potentially useful plants.
22	**India is a mega diversity nation–Account. (Chen A.U. Dec 2008, Dec 2009)** BTL4 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%.

23	**Give few examples for endangered and endemic species of India. (Chen A.U. Dec 2008)** BTL3 **Endangered species** i) **Reptiles:** Tortoise, python; ii) **Mammals:** Indian wolf, Red fox, Tiger; iii) **Primates:** Hoolock gibbon, Golden monkey; iv) **Plants :**Rauvolserpentina, Santalum **Endemic Species** i) **Flora:**Sapria Himalayan, Ovaria lurida ; **ii) Fauna:** Monitor lizards, Indian salamander
24	**Define endangered and endemic species. (Chen A.U. Dec 2006, Apr 2011, Dec 2014)** BTL2 **EndangeredSpecies**-Species which number has been reduced to a critical level. Unless protected and conserved, it becomes immediate danger of extinction. **Endemic species**-The species which found only in a particular region.
25	**Define in-situ conservation and ex-situ conservation** BTL1 **In-situ conservation** - Protection of fauna and flora within their natural habitat, where the species normally occurs is called in-situ conservation. **Ex-situ conservation** - Protection of fauna and flora outside their natural habitats
26	**Enumerate the human activities which destroy the biodiversity**. **(Chen AU Jan 2006)** BTL2 • The farmers prefer hybrid seeds; as a result many plant species become extinct. • For the production of drugs the pharmaceutical companies collect wild plants, so several medicinal plants now become extinct. • Tropical forest is the main sources of world's medicine. Every year these forests are disappearing due to agriculture, mining and logging
27	**Define food web.** BTL1 A network of food chains where different types of organisms are connected at different tropic levels.
28	**Write the food chain in forest ecosystem.** BTL4 Grasshopper→ Woodpecker →Snake → Owl
29	**Write the food chain in lake ecosystem.** BTL4 Algae → Ciliates →Small fish → Large fish
30	**What is biome?** BTL1 Set of ecosystems which are exposed to same climatic conditions and having dominant species with similar life cyclic, climatic adoptions and physical structure.
31	**What is photosynthesis? (or) How the carbohydrates are produced by plants?** BTL1 Chlorophyll present in the leaves of plants converts CO_2 and H_2O in the presence of sunlight into carbohydrates. $$6CO_2 + 12H_2O \xrightarrow{hr} C_6H_{12}O_6 + 6O_2 + 6H_2O$$
32	**List the different processes of ecological succession.** BTL1 i) Nudation ii) Invasion iii) Competition iii) Reaction iv) Stabilizations
33	**Define extinct, threatened and vulnerable species. (Chen A.U. Dec 2006, Apr 2011, Dec 2014)** BTL2 • **Extinct species –** The species no longer found in the world. • **ThreatenedSpecies** Becoming rare and that may become in danger of extinction if current trends continue. • **Vulnerable Species**- Species which population facing continuous decline due to habitat destruction or over exploitation.

34	**Mention the types of lakes.** BTL4 • **Oligotrophic lakes:** Have low nutrient concentrations. • **Eutrophic lakes**: Over nourished by nutrients like N and P. • **Dystrophic lakes**: Have low pH, high humic acid content and brown waters. • **Volcanic lakes**: Receive water from magma after volcanic eruptions. • **Meromictic lakes**: Rich in salts. • **Artificial lakes:** Created due to construction of dams
35	**List the different zones of oceans.** BTL4 • **Coastal zone:** Relatively warm, nutrient rich shallow water, High primary productivity. • **Open sea**: Deeper part of the ocean. Vertically divided into three regions. i) **Euphotic zone:** Receives abundant light and shows high photosynthetic activity ii) **Bathyal zone:** Receives dim light and is usually geologically active. iii) **Abyssal zone:** Dark zone and is very deep (2000 to 5000 meters)
36.	**How do the desert plants adopt to the climate? (MAY 2018)** BTL4 Most of the plants have the ability to lack of rainfall. They have widespread roots which are close to the surface. This enables the roots to absorb water quickly, before it evaporates. Plants like cactus survives because of their thick waxy layer on the outside of its stems and leaves. This helps to retain water and protect tissues severe sunlight.
37.	**Define nitrogen cycle and oxygen cycle.** BTL1 **Nitrogen cycle**-Exchange of nitrogen between the lithosphere and atmosphere in cyclic manner. **Oxygen cycle**-Exchange of O_2 between the lithosphere and atmosphere and hydrosphere in a cyclic manner. Cyclic process of Photosynthesis and respiration.
38.	**What is an indicator species? (MAY 2018)** BTL1 An indicator species is an organism whose presence, absence or abundance reflects a specific environmental condition. Indicator species can signal a change in the biological condition of a particular ecosystem, and thus may be used as a proxy to diagnose the health of an ecosystem**.** Example:Plants or lichens sensitive to heavy metals or acids in precipitation may be indicators of air pollution**.**
	PART – B
1.	
	What is environment? List its types. Explain its scope and significance of environment studies.(13M) BTL2 **Answer: Page: 1.2–1.4-A. Ravikrishnan** **Definition-** The sum of all living and non-living things around us influence one another. (2 M) **Types-**i) Natural environment – naturally created all biotic and non-biotic components. ii) Man-made environment- Created by man. (2 M) **Scope of environmental studies** i) Awareness and sensitivity + related problems. ii) Motivate active participation. iii) Identification and solving environmental problems. iv) Awareness on conservation of natural resources. (4 M) **Significance or importance** i) Environment issues being of internal importance.

	ii) Problems cropped in the wake of development. iii) Explosively increase in pollution. iv) Need for an alternative solution. v) Need to save Humanity from extinction. vi) Need for Wise planning of development. (5 M)
2.	
	Explain the flow of energy through the atmosphere and its utilities in an ecosystem. (8M)(AU Dec. 2008) BTL2 **Answer: Page:** 2.10–2.11-**A. Ravikrishnan** Atmosphere → Sunlight major source of energy → Plants (Photosynthesis) Primary Consumer → Secondary consumer → Decomposer First law of thermodynamics. Plants (Photosynthesis) Second law of thermodynamics. Primary Consumer → Secondary consumer → Decomposer • Loss of energy takes place through respiration, running, hunting etc • Biotic components and abiotic components are linked together through energy flow and nutrient cycling. (5 M)  (3 M)
3.	
	Explain abiotic and various biotic components of an Ecosystem with neat sketch. (13M) (A.U. Dec 2007) BTL2 **Answer: Page:**2.6–2.8-**A. Ravikrishnan** **Abiotic**-Nonliving components-Physical and chemical components.(2 M) **Biotic components**-Living organisms. i) **Autotrophs-Producers (Plants)**–Self nourishing Organisms. (3 M) ii) **Consumers (Animals)** (**Heterotrophs**)–Cannot make their own food. Herbivores-Carnivores-Omnivores. (3 M) iii) **Decomposers (Micro-Organisms) (Saprotrops)-** Feed on dead organisms. (3 M)

	 Diagram – (2M)
4.	
	Write down the ecological succession and ecological pyramid. (13M) (A.U. Dec 2010, Apr 2015, May 2006) BTL1 **Answer: Page: 2.16 – 2.17-A. Ravikrishnan** • **Ecological succession-**The progressive replacement of one community by another till the development of stable community in a particular area. (1 M) • **Stages of ecological succession** (1 M) • (i) Pioneer community – First group of organism established their community in the area. • Seral or seres stage- Variuos developmental stages of a community. • **Types of ecological succession:** (4M) • **Primary succession**– Gradual establishment of biotic communities on a lifeless ground • (a) Hydrarch (or) Hydrosere: Establishment starts in a watery area like pond and lake. • (b) Xerarch or Xerosere: Establishment starts in a dry area like, desert and rock. • **Secondary succession**: Establishment of biotic communities in an area, where some type of biotic community is already present. • **Process of Ecological Succession:**i) Nudation ii) Invasion–migration and establishment iii) competition iv) Reaction and v) Stabilization. (4 M) • **Ecological Pyramids-**Graphic representation of tropic structure and function of an ecosystem  (3 M)
5.	

Explain the structure and function of the following. (i) Forest ecosystem (ii) Grassland ecosystem (iii) Desert ecosystem (iv) Aquatic ecosystem (13M) (A.U. May2011, May 2006) BTL2

Answer: Page: 2.30 – 2.31, 2.33 – 2.34, 2.36 – 2.37, 2.38 – 2.40, 2.43 – 2.44-A. Ravikrishnan

(i) Structure and Function offorest ecosystem:

- **Abiotic components** - Physical components found in the soil and atmosphere. Exs: Climatic factors (temperature, light, rainfall) and minerals.
- **Biotic components-Producers**-Plants-Photosynthesis-Trees, shrubs and ground vegetation.
- **Consumers**-Primary consumers (herbivores)-Ants, flies, insects, mice, deer, squirrels.
- **Secondary consumers** (primary carnivores)- Snakes, birds, fox.
- **Tertiary consumers**-Tigre, lion, etc.
- **Decomposers**–Bacteria and fungi. (3M)

(ii) Structure and Function of Grassland Ecosystem.-

- **Abiotic**–C, H, O, N, P, S etc.–Supplied by rates, nitrates, phosphates and sulphates.
- **Biotic**–Producers–Grasses, forbs and shrubs
- **Consumers**–Cows, cows, buffaloes, deer, sheep
- **Decomposers**–Fungi and bacteria. (3M)

(iii) Structure & Function of Desert Ecosystem-

- **Abiotic**–temperature, rainfall, sunlight, water,
- **Biotic** – Producers – shrubs, bushes, grasses,
- **Consumers**–Squirrels, mice, foxes;
- **Decomposers** – fungi and bacteria. (3M)

(iv) Structure and Function of Aquatic Ecosystem-Pond–Temporary-Fresh water body.

- **Abiotic**– Temperature, light, water, organic and inorganic compounds.
- **Biotic**–Producers–green photosynthetic organisms,
- **Consumers**–Protozoa, small fish, ciliates, flagellates
- **Decomposers**–Fungi, bacteria and flagellates. (2M)

Structure and Function of Aquatic Ecosystem-Lakes–Natural shallow water bodies

- **Abiotic**–Temperature, light, proteins and lipids, turbidity, oxygen and carbon dioxide.
- **Biotic–Producers**–Phytoplanktons, algae, flagellates,
- **Consumers**–Protozoans, insects, small fishes, large fish;
- **Decomposers**–Bacteria, fungi and actinomycetes. (2M)

6.

Classify and explain the values of biodiversity. (13M) (A.U. Dec 2010, May 11) BTL2

Answer:Page:3.5 – 3.9-A. Ravikrishnan

Classify values biodiversity – Consumptive use values; Productive use values; Social values; Ethical values; Optional values. (1M)

Consumptive use values–Direct use values; products are harvested and consumed directly. Food, Drugs, Fuel. (2 M)

Productive use values–Products derived from the animals and plants-commercial value. (2M)

	Social values–Bio-resources used to the society. Associated with the social life, religion and spiritual aspects of the people. (2M) **Ethical values**–"All life must be preserved". In India biodiversity have great value on religious and cultural basis. (2M) **Optional values**–Any species may be proved to be a valuable species after someday. (2M) **Aesthetic values-** Beautiful nature of plants and animals insist us to protect the biodiversity. "Eco-tourism" (2M)
7.	
	Explain the role of biodiversity at global, national and local levels. (13M) (A.U. May 07, Apr 10, May 11) BTL2 **Answer: Page: 3.9 – 3.14-A. Ravikrishnan** **Role of Global biodiversity**- Total number of living species in the world are about 20 million. But, of which only about 1.5 million species are found and given scientific names. Tropical deforestation alone is reducing the biodiversity by 0.5% every year. **Terrestrial biodiversity or biomass** i) Largest ecological units present in different geographic areas named in different ways ii) Tropical rain forests –About 50 to 75% of global biodiversity lies in these tropical rain forest. iii) More than 25% of the world's prescription drugs are extracted from plants in tropical rain forest iv) Nearly 1,30,000 flowering plants are found available v) Temperate rain forests - Have much less biodiversity. 1,70,000 flowering plants, 30, 000 vertebrates, 2,50,000 other group of species are found. (3 M) **Marine diversity** i) Much higher than terrestrial biodiversity ii) Estuaries coastal waters and oceans are biologically diverse but the diversity is very low iii) Out of 35 existing phyla of multicellular animals, 34 are marine iv) List of few living species (2 M) **National level biodiversity**: i) India is second largest nation containing 5% of world's biodiversity and 2% of the earth surface. The second largest nation containing 50% of world's biodiversity and 2% of earth surface. ii) 10^{th} rank among the plant rich countries of the world. iii) 11^{th} rank among the endemic species of higher vertebrates. iv) 6^{th} rank among the centers of diversity and origin of agricultural crops. v) An agricultural country and its economic growth depend on the production of many crops. vi) India "mega - diversity" nation because it is rich in both fauna and flora. vii) Many species in India has Medicinal value and Commercial value (5M) **Biodiversity at local level** -1. Point richness 2. Alpha richness 3. Beta richness 4. Gamma richness. (3M)
8.	
	(i) Give the various hot spots of biodiversity.(ii) Explain the various threats to biodiversity along with the means to conserve them. (13M) (May 2008, MAY/JUNE 2013) BTL4

	Answer: Page: 3.18 – 3.25-A. Ravikrishnan (i) **Biodiversity hotspot**-The geographic areas which possess high endemic species. Eastern Himalayas, Western Ghats. (2M) **(ii)Threatsto biodiversity** • **Habitat loss**-The loss of populations of interbreeding organisms. Threatened a wide range of animals and plants. Factors influencing habitat loss and any two remedies. (3M) • **Poaching**-Killing of animals (or) commercial hunting. Leads to loss of animal biodiversity. Factors influencing poaching loss and any two remedies to overcome. (3M) • **Man-Wild life conflict-** Arise when wildlife starts causing immense damage and danger to the man. Factor influencing man-wild life conflict and two conserve methods. (3M) • **Over exploitation of natural resources** i) Serious threat to the wildlife. ii) Disturbance in migratory routes of animals. iii) Cause of destruction of many species. (2M)
9.	
	Explain in-situ and ex-situ conservation along with their merits and limitations. (A.U. May 2008, Dec 2010, May 11, Dec 11) (13M) BTL2 **Answer: Page: 3.34 – 3.40-A. Ravikrishnan** **Conservation of Biodiversity:** management of biosphere so that it will yield the greatest sustainable benefit to present generation while maintaining its potential to meet the needs of future generation. (1M) **In-Situ Conservation (within habitat)** - Protection of wild flora and fauna within their habitat nature. (1 M) Biosphere reserves, National Parks, Sanctuaries, Reserve forests etc. (Each 1 M = 4M) **Advantages:** Cheap and convenient method. Species gets adjusted the natural disasters like drought, floods, forest fires. (1 M) **Limitations:** Large surface area of the earth required – shortage of staff and pollution may lead to improper maintenance of the habitat. (1 M) **Ex-Situ Conservation (outside habitat)** – Protection of flora and fauna outside their habitat nature. (1 M) Gene banks, seed banks, zoos, botanical gardens, culture collections. (2 M) **Advantages:** Special care and attention lead, Assured food, water, shelter and security, Longer life span. (1 M) **Limitations:** Expensive method- Loss of freedom of wild life – Animals cannot survive in such environments. (1 M)
10.	
	Write a note on endangered and endemic species of India. (13M) (A.U. Dec 2009) BTL2 **Answer: Page: 3.28 – 3.33-A. Ravikrishnan** **Endangered Species –** Species number has been reduced to a critical level. Unless it is protected and conserved, it is in immediate danger of extinction.

i) In India 450 plant species identified as endangered species.
ii) About 100 mammals and 150 birds are endangered species.
iii) India biodiversity threatened due to habitat destruction, degradation and over exploitation.
iv) No. of endangered species in India

Group of Threatened species	Number of Threatened species
Plants	250
Birds	70
Mammals	86
Reptiles	25
Amphibians	3
Fishes	3
Molluscs	2

(6M)

Factors affecting endangered species

- Pollution
- Over exploitation
- Climate change

Remedial measures

- International Treaties on Endangered Species (ITES) (1M)

Endemic Species-Species found only in a particular region

i) In India, Out of 47,000 species 7,000 plants are endemic.
ii) About 62% endemic flora found in Himalayas, Khasi Hills and Western Ghats.
iii) **Fauna-**Animals present in particular region or period. E.g. Sapriya Himalayan, Ovaria lurida, Nepenthes Khasiana, Pedicularisparroter, Pitcher plants and Orchids etc.
iv) Out of 81,000 animal species–Large number of species are described to be endemic
v) 62% amphibians, 50% Lizards are endemic to Western Ghats
vi) No. of endemic species in India
vii)

Group	No. of Species
Land	878
Freshwater	89
Insecta	16214
Amphibia	110
Reptilia	214
Aves	69
Nannakua	38

viii) **Flora**–Plantspresent in a particular region or period. Friendly bacteria which helps to protect the human body against invasion by pathogens. E.g. Monitor lizards, reticulated python, Indian Salamander, Viviparous toad

Group	No. of Species
Pteridophyta	200
Angiosperms	4950

(5M)

	Factor affecting endemic species • Habitat loss and fragmentation • Pollution (1M)
11.	
	What are the major causes of Man- wild life conflict? Discuss the remedial steps that can curb the conflict. (13M) (A.U. Dec 2011, Apr 2015) BTL4 **Answer: Page: 3.26–3.28-A. Ravikrishnan** **Man-Wildlife Conflicts-Causes:** i) Shrinking of forest ii) Human encroachment into forest areas iii) Animals suffering from illness, weak and injured take humans iv) Lack of alternate cultivation practices by forest department v) Electric fencing causes injury to animals, which in return turn violent vi) Poor cash compensation by govt. to farmers vii) Food crops near forest areas attract wild animals. (10 M) **Remedies to curb the conflict** i) Adequate crop and cattle compensation schemes must be started. ii) Solar powered fencing must be provided along with electric current proof trenches. iii) Cropping pattern should be changed near the forest borders. iv) Adequate food and water should be made available within the forest areas. v) The development and constructional work near the forest area must be avoided. (3 M)
	PART – C
1.	
	(i) Elaborate about the different biological zones of India. (5M) BTL6 **(ii) Discuss a case study on (a) Man and wild life conflicts (b) Productive use of biodiversity. (10M)** BTL6 **Answer: Page: 3.4 – 3.5, 3.26–3.28, 3.8-3.9 A. Ravikrishnan** **(i) Biogeographically Classification of India:** i) Division of India according to biogeographic characteristics. The study of the distribution of species, organisms, and ecosystems in geographic space and through geological time. The biogeographic zones of India are as follows: ii) Himalayan zone; Desert zone; Semiarid zone; Western Ghats zone; Deccan plateau zone; Gangetic plain zone; North east zone; Coastal zone; Islands present near the shore line; Trans Himalayan zone. (5 M) **(ii) Case study on Man-Wildlife Conflicts:** i) Wildlife causing damage and danger to humans and properties – crops/houses ii) In Samalpur (Orissa) 195 humans were killed in the last 5 years by elephants. iii) Humans responded by killing 98 elephants and injuring 30 elephants. iv) In Nepal, 17 peoples were killed in the Royal Chitwan National Park by a man-eating tiger. v) Electrical fencing, explosives were some of the methods adopted by villages to kill wild animals.

Causes:

i) Shrinking of forest
ii) Human encroachment into forest areas
iii) Animals suffering from illness, weak and injured take humans
iv) Lack of alternate cultivation practices by forest department.
v) Electric fencing causes injury to animals, which in return turn violent
vi) Poor cash compensation by govt. to farmers
vii) Garbage near human settlements or food crops near forest areas. (7 M)

Productive use of biodiversity

Products derived from the animals and plants have obtained a commercial value.

Plant product	Industry
Wood	Paper and pulp industry, plywood industry Railway sleeper industry.
Cotton	Textile industry
Fruits, vegetables	Food industry
Leather	Leather industry
Ivory	Ivory - works
Pearl	Pearls industry

(3M)

2.

Inspect about the characteristic features of a pond, river and marine ecosystem and also quote a typical food chain based on that respective ecosystem. (15M) BTL4

Answer: Page: 2.27 – 2.29, 2.33 – 2.36-A. Ravikrishnan

Pond Ecosystem

i) Small bodies of freshwater with shallow and still water, marsh, and aquatic plants.
i) Temporary, only seasonal.
ii) Stagnant fresh water body.
iii) Get polluted easily due to limited amount of water
iv) The size and depth of ponds often varies greatly
v) Diverse array of aquatic life
vi) Top predators may include large fish, herons, or alligators.(3 M)

Food Chain–Producers-Green plants, phytoplanktonslike hydrilla, vallisneria, pistia, sagittaria→**Primary consumers**-Zooplanktons like insects, dragon fly larvae, crustaceans, Larvae of insects, beetles, fishes, molluscs→**Secondary consumers**-Insects like water beetles, frogs, fishes →**Tertiary Consumers**-Big fishes, kingfisher, water birds →**Decomposers**–Fungi, bacteria.
(2M)

River Ecosystem:

i) River viewed as a system operating in its natural environment includes biotic as well as abiotic.
i) Fresh water and free flowing water systems.
ii) Due to mixing of water, dissolved oxygen content is more.
iii) River deposits large amount of nutrients
iv) Unidirectional flow.

	v) State of continuous physical change. High degree of spatial and temporal heterogeneity at all scales. (3M) **Food Chain**–**Producers**-Phytoplankton, algae, water grasses, aquatic masses, amphibious plants →**Primary consumers**-Water insects, snails, fishes →**Secondary consumers**-Birds and mammals →**Decomposers**–Fungi, bacteria. (2M) **Ocean Ecosystem:** i) Largest of Earth's aquatic ecosystems. ii) Include oceans, salt marsh and intertidal ecology estuaries and lagoons, mangroves and coral reefs, the deep sea and the sea floor. iii) Since ship, submarines can sail in ocean, commercial activities may be carried out. iv) Rich in biodiversity. v) Moderates the temperature of the earth vi) Contrasted with freshwater ecosystems. vii) Very important for the overall health of both marine and terrestrial environments. (3M) **Food Chain**–**Producers**-Phytoplanktons, marine plants →**Consumers-Primary consumers**-Crustaceans, moiluscs, fish →**Secondary consumers**-Herring sahd, mackerel→**Tertiary Consumers**-Cod, Haddock → Decomposers–Fungi, bacteria and flagellates. (2M)
3.	
	What is forest ecosystem? List the types of forest ecosystem. Explain the features, characteristics, structure and function forest ecosystem. (15M) BTL1 **Answer: Page: 2.17–2.21-A. Ravikrishnan** **Definition -** Contains tall and dense trees grow that support many animals and birds. (2M) **Types of Forest ecosystem** i) Tropical rain forests. ii) Tropical deciduous forests. iii) Tropical scrub forests. iv) Temperate rain forests. v) Temperate deciduous forests. (2M) **Features of Forest ecosystems** i) **Tropical rain forests:** Found near the equator. High temperature. Broad leaf trees and lion, tiger and monkey are present. ii) **Tropical deciduous forests:** Found little away from the equator. Warm climate and rain only during monsoon. Have deciduous trees and deer, fox, rabbit and rat. iii) **Tropical scrub forests:** Dry climate for longer time. Have small deciduous trees and shrubs and deer, fox, etc., iv) **Temperate rain forests:** Found in temperate areas with adequate rainfall. Coniferous trees and squirrels, fox, cats, bear etc., v) **Temperate deciduous forests:** Found in areas with moderate temperatures. Broad leaf deciduous trees and deer, fox, bear, etc(4M) **Characteristics of forest ecosystem:** i) Warm temperature and adequate rainfall →Generation of number of ponds, lakes etc., ii) Maintains climate and rainfall. iii) Supports many wild animals and protects biodiversity. iv) The soil is rich in organic matter and nutrients, which support the growth of trees.

v) The conversion of organic matter into nutrients is very fast. (2M)

Structure and Function of forest ecosystem:

i) **Abiotic components** - Physical components found in the soil and atmosphere. E.g. Climatic factors and minerals.

ii) **Biotic components-Producers**-The plants absorb sunlight and produce food through photosynthesis–E.g. Trees, shrubs and ground vegetation.

iii) **Consumers**-Herbivores-E.g. Ants, flies, insects, mice, deer, squirrels. Secondary consumers -primary carnivores-E.g. Snakes, birds, fox. Tertiary consumers- Tiger, lion, etc.

iv) **Decomposers**–E.g. Bacteria and fungi. (5M)

4.

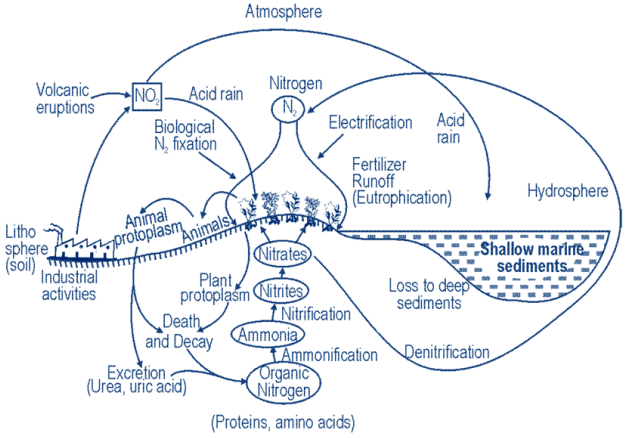
(i) Survey the following topics with a neat diagram. (a) Nitrogen cycle b) Oxygen cycle c) Energy flow in the ecosystem. (12M) BTL4

(ii) Analyze in detail about hydrosere and xerosere (3M) BTL4

Answer: Page: 2.13 - 2.15 and 2.9 – 2.11 and 2.16-A. Ravikrishnan

(i)(a) Nitrogen cycle-Exchange of nitrogen between the lithosphere and atmosphere in cyclic manner.

Atmosphere nitrogen → Plants (protein, vitamin, amino acids) → Consumer → Decomposer Nitrates→ammonia by anaerobic bacteria → nitrites by Nitrosomonas → nitrates by Nitrobacter - → Rhizobium fixing N_2 in the roots. (3M)

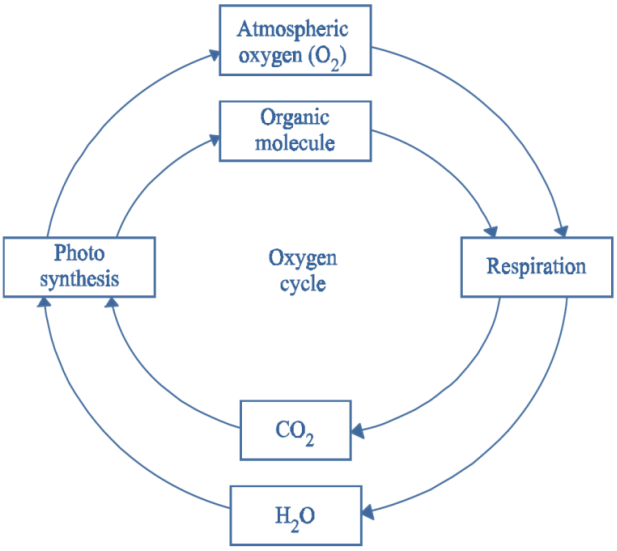


(2 M)

(i)(b) Oxygen cycle – Exchange of O_2 between the lithosphere and atmosphere and hydrosphere in a cyclic manner. Cyclic process of Photosynthesis and respiration. (4M)

$$6CO_2 + 6H_2O + Energy \rightarrow C_6H_{12}O_6 + 6O_2 \ (Photosynthesis)$$

$$6O_2 + C_6H_{12}O_6 \rightarrow 6O_2 + 6H_2O + Energy \ \ (Respiration)$$



(1 M)

(i)(c)Energy Flow In The Ecosystem

Sunlight → Plants (photosynthesis) → Primary Consumer → Secondary consumer → decomposer

- Loss of energy takes place through respiration, running, hunting etc
- Biotic components and abiotic components are linked together through energy flow and nutrient cycling. (2 M)

(ii) **Hydrosere**–Establishment starting in a watery area; **Xerarch**–Establishment starting in a dry area like, desert and rock. (3 M)

5.	**Compare the physical and chemical characteristics of Marine water with terrestrial water. (15 M)** BTL4 **Answer: Page: 2.37 - 2. and 2.9 – 2.11 and 2.16-A. Ravikrishnan**

UNIT – II ENVIRONMENTAL POLLUTION

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

PART * A

1. **Define the term pollution. List its types**. BTL1

Pollution-The unfavorable alteration of our surroundings

Types of Pollution-

- Air Pollution
- Water Pollution
- Soil Pollution
- Marine Pollution
- Noise Pollution
- Thermal Pollution and
- Nuclear hazards

2. **What is air pollution?** BTL1

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.

3. **Define bio-degradable pollutant and non-biodegradable pollutant.** BTL1

Bio-degradable pollutant - Decompose rapidly by natural processes

Non-biodegradable pollutant - Do not decompose or decompose slowly in the environment

4. **State the composition of atmospheric air.** BTL1

Constituents	%
Nitrogen	78
Oxygen	21
Argon (Ar)	< 1
CO_2	0.037
Water vapour	Remaining
O_2, He, NH_3	Trace amount

5. **State the Indian ambient air quality standards.** BTL1

Category	Area	Concentration in µg/m3			
		SPM	SO_2	NO_X	CO
A	Industrial and mixed use	500	120	120	5,000
B	Residential and rural	200	80	80	2,000
C	Sensitive (hill stations, tourist resorts, monuments	100	30	30	1,000

6. **Outline the causes of air pollution?** BTL2

- Incomplete burning of fossil fuels, liberate CO, NO_2, Suspended Particulate Matter (SPM) etc.

<table>
<tr><td></td><td>

Coal burning in power plants, liberate SO_2
Ozone
Agriculture, decay of plants, liberate hydrocarbons.

</td></tr>
<tr><td>7.</td><td>Define photochemical smog. (NOV/DEC 2006) BTL2
It is not related to smoke (or) fog. It is formed by the combination of NO, NO_2, CO_2, H_2O, CO, SO_2 and unburnt hydrocarbon particles. The important reaction is dissociation of NO_2 in sunlight. It is also named as los Angeles smog.</td></tr>
<tr><td>8.</td><td>What are the effects of various air pollutants on human health? BTL1
<table>
<tr><td>Name of the Pollutant</td><td>Name of the Diseases</td></tr>
<tr><td>NO_2</td><td>Lung irritation and damage</td></tr>
<tr><td>CO</td><td>Reacts with hemoglobin in red blood cells and reduces the ability of blood to bring oxygen to body cells and tissues, which causes headaches and anemia. At high levels it causes coma, irreversible brain cell damage and death.</td></tr>
<tr><td>SO_2</td><td>Breathing problems for healthy people.</td></tr>
<tr><td>SPM</td><td>Nose and throat irritation, lung damage, bronchitis, asthma, reproductive problems and cancer</td></tr>
<tr><td>Hydrocarbon</td><td>Carcinogenic</td></tr>
</table>
</td></tr>
<tr><td>9.</td><td>What are oxygen demanding wastes? (APR/MAY 2011) BTL1
Oxygen demanding wastes is the one to reduce amount of oxygen water in water is known as oxygen demanding wastes. The oxygen demanding wastes are BOD and COD
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 agent like $K_2Cr_2O_7$ and $KMnO_4$</td></tr>
<tr><td>10.</td><td>What Is PAN? Give Its Detrimental Effects. BTL1
PAN

Peroxy Acetyl Nitrates - Secondary Pollutant Present In Photochemical Smog.
It is a lachrymatory substance.
It is thermally unstable and decomposes into peroxy ethanol radicals and nitrogen dioxide gas.
It is an oxidant and more stable than ozone

Detrimental Effects

It is a powerful respiratory and eye irritants, toxic in nature.
Cause extensive damage to vegetation, causing skin cancer
Damages plants and art.
React explosively.
Plays a very large role in photochemical smog

</td></tr>
<tr><td>11.</td><td>How CFC’s are accumulated in atmosphere. (MAY/JUNE 2006) BTL1
CFC’s are accumulated in atmosphere through

Propellant in Aerosol spray cans
Cleaning solvents
Refrigerants (Freon) in refrigerators, air conditioners

</td></tr>
</table>

- Foam plastic blowing agent
- Blowing agent

12. **Define primary air pollutant and secondary air pollutant.** BTL1
Primary air pollutants - Those emitted directly in the atmosphere in harmful form. E.g. CO, NO, SO_2,
Secondary air pollutant – New pollutants formed by the reaction of some of the primary air pollutants with one another or with the basic components of air.
E.g. NO /NO_2→ HNO_3 / NO_3

13. **State the composition of soil.** BTL1

Components	%
Mineral matter (inorganic)	45
Organic matter	5
Soil water	25
Soil air	25

14. **State the water quality standards.** BTL1

S. No.	Parameter	WHO standard in mgs/litre	ISI standard in mgs/litre.
1.	Colour, odour and taste	Colourless, odourless and tasteless	Colourless, odourless and tasteless
2.	p^H	6.9	6.9
3.	Total dissolved solids	1500	-
4.	Dissolved oxygen	-	3.0
5.	Chloride	250	600
6.	Sulphate	400	1000
7.	Nitrate	45	-
8.	Cyanide	0.2	0.01
9.	Fluoride	1.5	3.0
10.	Chromium	0.05	0.05
11.	Lead	0.05	0.1
12.	Arsenic	0.05	0.2

15. **List the self-cleaning processes of atmosphere.** BTL4
- Dispersion
- Gravitational settling
- Flocculation
- Absorption
- Rain washout and so on

16. **What are point and non-point sources of water pollution?** BTL1
Point sources are discharged pollutants at specific location through pipes, ditches or sewers into bodies of surface water.
Non-point sources: They cannot be traced at any single site of discharge. They are usually large

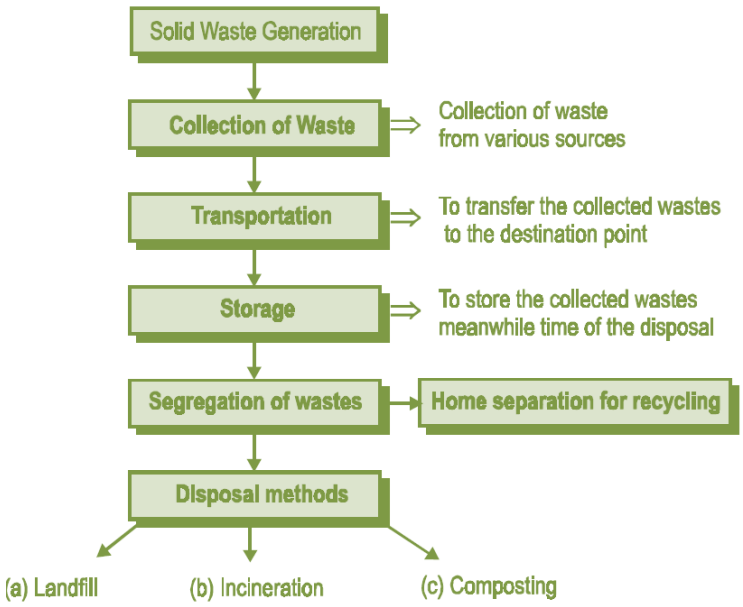
	land areas or air sheds that pollute water by runoff, subsurface flow or deposition from the atmosphere.
17.	**Write any four major water pollutants. (MAY/JUNE 2006)** BTL1 • Infectious agents • Oxygen demanding wastes • Inorganic chemicals • Organic chemicals • Plant nutrients • Sediments • Radioactive materials • Heat (any four)
18.	**What is marine pollution? Name the sources and effects of marine pollution. (MAY/JUNE 2005, NOV/DEC 2014)** BTL1 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. • Dumping the wastes - Marine birds ingest plastic which causes gastrointestinal disorders • Oil - Damage to marine fauna and flora, retard the rate of O_2 uptake by water.
19.	**Define noise pollution. When a sound does cause noise pollution? (NOV/DEC 2013, APR/MAY 2015)** BTL1 • Noise pollution is defined as the unwanted, unpleasant or disagreeable sound that causes discomfort for all living beings. • The sound intensity is measured in decibel (dB), which is tenth part of the longest unit Bel. One dB is equal to the faintest sound, a human ear can hear. If the intensity of the sound exceeds 80 dB, noise pollution occurs. Noise above 140 dB becomes painful.
20.	**Give any four methods to control noise pollution. (MAY/JUNE 2007)** BTL1 • Source Control • Transmission Path Intervention • Receptor control • Oiling
21.	**Define thermal pollution. (NOV/DEC 2005, NOV/DEC 2008)** BTL1 The addition of excess of undesirable heat to water that makes it harmful to man, animal or aquatic life or otherwise causes significant departures from the normal activities of aquatic communities in water.
22.	**What are the causes of thermal pollutions?** BTL 1 • Nuclear power plants • Coal-fired power plants • Industrial effluents • Domestic sewage • Hydro-electric power
23.	**Define hazardous wastes. Why nuclear hazards are so dangerous? (NOV/DEC 2006)** BTL1 • Wastes like toxic chemicals, radioactive or biological substances which contribute to an increase in mortality or in serious irreversible illness to human health and environment are

	called hazardous wastes. • Radioactive radiation, liberated by nuclear hazards, affects the cells in the body and the function of glands and organs. People suffer from blood cancer and bone cancer if exposed to doses around 100 to 1000 roentgens. Unlike the other pollution, radioactive pollution can cause genetic disorders even in the subsequent generations.
24.	**What are the various sources of radioactive pollution? (NOV/DEC 2008, APR/MAY 2015)** BTL1 • Natural sources. The very important natural source is space, which emit cosmic rays. Soil, rocks, air, water, food, radioactive radon-222 etc. also contain one or more radioactive substances. • Man-made sources Man-made sources are nuclear power plants, X-rays, nuclear accidents, nuclear bombs, diagnostic kits, etc., where radioactive substances are used.
25.	**List any four causes of floods. (NOV/DEC 2010)** BTL4 • Heavy rain, rainfall during cyclone causes flood. • Sudden snow melt also raises the quantity of water in streams and causes flood. • Clearing of forests for agriculture has also increased severity of floods. • Reduction in the carrying capacity of the channel, due to accumulation of Sediments cause floods
26.	**What are the types of solid wastes? (NOV/DEC 2006, MAY/JUNE 2007)** BTL2 a. Municipal wastes ; b. Industrial wastes ; c. Hazardous wastes
27.	**Mention the sources of solid wastes. (NOV/DEC 2009)** BTL1 • Domestic wastes – cloth, waste papers • Commercial wastes – cans, bottle, polythene bags • Construction wastes – Wood, Concrete • Biomedical wastes – Infectious wastes • Industrial wastes – Nuclear and thermal power plants • Hazardous wastes – Toxic wastes, chronic toxicity
28.	**Differentiate between recycling and reuse. (NOV/DEC 2007, APR/MAY 2011)** BTL4 • Reuse The refillable containers, which discarded after use can be reused. Rubber rings can be made from the discarded cycle tubes which reduces the waste generation during manufacturing of rubber bands. • Recycling Recycling is the reprocessing of the discarded materials into new useful products Example • Old aluminum cans and glass bottles are melted and recast into new cans and bottles • Preparation of cellulose insulation from paper.
29.	**What are the roles of women in environmental pollution? (NOV/DEC 2008)** BTL1 In rural areas women plant trees and grass, grow vegetables with the drip-irrigation method on order to save water. b. In urban areas they go shopping using cloth bags to reduce white pollution.
30.	**What are the effects of thermal pollution? (APR/MAY 2011)** BTL1

	• Reduction in dissolved oxygen • Increase in toxicity • Interference with biological activity • Interference with reproduction • Direct mortality • Food storage for fish
31.	**What do you meant by soil pollution? Or Define soil pollution. (NOV/DEC 2010) Write the causes of soil pollution.** BTL1 The pollution affects and alter the chemical and biological properties of soil. As a result, hazardous chemical can enter into human food chain from the soil or water disturbs the biochemical process and finally lead to serious effects on living organism.
32.	**What are causes of noise pollution? (NOV/DEC 2010)** BTL1 • By machine like mechanical saws and pneumatic drill. • From transport, rail, air craft, road vehicles like scooters, cars, motorcycles, buses. • Common noise makers are musical instruments, TV, VCR, radios, transistors, • Telephone and loudspeakers.
33.	**What is a Dobson unit? (MAY/JUNE 2007)** BTL1 The amount of atmospheric ozone is measured by "Dobson spectrometer" and is expressed in Dobson units (DU). 1 DU is equivalent to a 0.01 mm thickness of pure ozone at the density it possesses if it is brought to the ground level (1atm) pressure • In temperate latitude its concentration is 350 DU • In tropics its concentration is 250 DU • In sub polar region its concentration is 450 DU
34.	**What are the harmful effects of landslides?** BTL1 • Landslides block the roads and diverts the passage • Erosion of soil increases. • Sudden landslides damage the houses, crop yield, live stock etc.
35.	**What do you know about particulate? (MAY/JUNE 2018)** BTL1 Particulate refers to all atmospheric substances that are not gases. They can be suspended droplets or solid particles or mixtures of the two. Particulates can be composed of materials ranging in size from 100mm to 0.1mm and less. The chemical composition of particulate pollutants is very much dependent upon the origin of the particulate.
36.	**What are landslides? (MAY/JUNE 2018)** BTL1 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.
37.	**Define the term Tsunami.** BTL2 A tsunami is a large wave that is generated in a water body when the sea floor is deformed by seismic activity. This activity displaces the overlying water in the ocean.
	PART * B
1	**Discuss the causes, effects and control of marine pollution. (7 M) (NOV/DEC 2009, APR/MAY 2010, NOV/DEC 2011)** BTL6 **Answer : Page: 4.32 - 4.34- A. Ravikrishnan** • Definition- The discharge of waste substances into the sea resulting in harm to living organisms, hazards to human health, hindrance to fishery and impairment of quality for use

	of sea water. (1 M) • Sources (Causes) of marine pollution Dumping the wastes-large amount of sewage, garbage, agricultural discharge, pesticides and huge amount of plastics. (1 M) Oil pollution of marine water-Imposed by petroleum and its products. (1 M) • Effects of marine pollution on human health and environment – Oil spilling in sea inhibit the photosynthesis-damage to marine fauna and flora including algae, fish, birds, invertebrates-hydrocarbons and benzpyrene accumulate in food chain and consumption of fish by man cause cancer. (2 M) • Control measures – Plans for conserving marine biodiversity-education about marine ecosystems-industrial units on the coastal lines equipped with pollution control instruments-urban growth should be regulated-fisherman needs should be accommodated. (2 M)
2	**What is an earthquake? Write about its causes, effects and measures to face the earthquake. (8 M) (APR/MAY 2008, NOV/DEC 2008, NOV/DEC 13, NOV/DEC 2014)** BTL4 **Answer : Refer : 4.78 – 4.80 - A. Ravikrishnan** • Definition: An earthquake is a sudden vibration caused on the earth's surface due to the sudden release of tremendous amount of energy stored in the rocks under the earth's crust. (2 M) • Causes- disequilibrium in any part of the earth crust-volcanic eruption, hydrostatic pressure and manmade activities-underground nuclear testing-decrease of groundwater level. (2M) • Effects- hilly and mountains cause landslides-collapses houses due to poor construction, peoples die increases depending on the severity-seismic waves caused by earth quakes under the sea. (2 M) • Preventive measures-constructing earthquake resistant buildings, wooden houses are preferred – information about magnitude of intensity should give by seismic hazard map by Seismologist. (2 M)
3	**Describe the sources, effects and various measures to control of noise pollution. (7 M) (NOV/DEC 2009, MAY/JUNE 11, NOV/DEC 2014)** BTL4 **Answer : Page:4.37 to 4.40 - A. Ravikrishnan** • **Definition** – The unwanted , unpleasant or disagreeable sound that causes discomfort for all the living beings (1 M) • **Types and sources** Industrial noise-by machines, particularly mechanical saws and pneumatic drill is unbearable and is a nuisance to public. (1 M) Transport noise-road traffic noise, rail traffic noise and craft noise. (1M) Neighborhood noise-household gadgets and community like musical instruments, transistors, telephones, TV, VCR, radios, etc. (1M) • **Effects** (2M) Interferescommunication

	Hearing damage (90dB) Physiological and Psychologicaldisorders • **Control and preventive measures** (1M) Reduction in source ofnoise Noise making machines should be kept in containers with sound absorbingmedia Proper oiling will reduce noise frommachinery Using silencers – fibrousmaterial Plantingtrees Legislation can prevent excess sound production, unnecessary horn blowingetc.
4	**What are types, sources and the effects of improper municipal solid waste management? State the measures recommended for proper management for the solid wastes. (7M + 6M) (MAY/JUNE 2005, APR/MAY 2010, NOV/DEC 2010, MAY/JUNE 2011, NOV/DEC 2011, NOV/DEC 2013, APR/MAY 2015)** BTL1 **Answer : Page: 4.61 to 4.70 - A. Ravikrishnan** • Effects of solid wastes (2 M) • Types Urban or municipal wastes Industrial wastes Hazardous wastes (1 M) • Sources Urban or municipal wastes Domestic wastes Commercial wastes Construction wastes Biomedical wastes (1 M) Industrial wastes Nuclear power plants Chemical industries Other industries (1 M) Hazardous wastes Toxic wastes Reactive wastes Corrosive wastes Radioactive wastes Infectious wastes Heavy metals (2 M) • Process of solid waste management Flow chart



(2 M)

Reduce the usage of raw materials
Reuse of waste materials
Recycling of material (1 M)

- Discarding wastes

Landfill – Advantages - Disadvantages (1 M)
Incineration - Advantages - Disadvantages (1 M)
Composting - Advantages - Disadvantages (1 M)

5 **Mention any five air pollutants with their source, effects and control measures. (7 M) (NOV/DEC 2005, APR/MAY 2006, NOV/DEC2005, MAY/JUNE 2013)** BTL1

Answer : Page:4.4 to 4.11 - A. Ravikrishnan

- Any five air pollutants (1 M)
- Sources, health effects, environmental effects and control measures

Carbon monoxide (CO) (1 M)
Nitrogen dioxide (NO_2) (1 M)
Sulphur dioxide (SO_2) (1 M)
Suspended Particulate Matter (SPM) (1 M)
Ozone (1 M)
Hydrocarbons (Aromatic and aliphatic) (1 M) Any five (5 M)

- Control measures (1 M)

6 **How can you, as an individual, prevent environmental pollution? Why such an effort at an individual level is important. (6 M) (NOV/DEC 2009, NOV/DEC 2010,MAY/JUNE 2014, NOV/DEC 2014, APR/MAY 2015)** BTL4

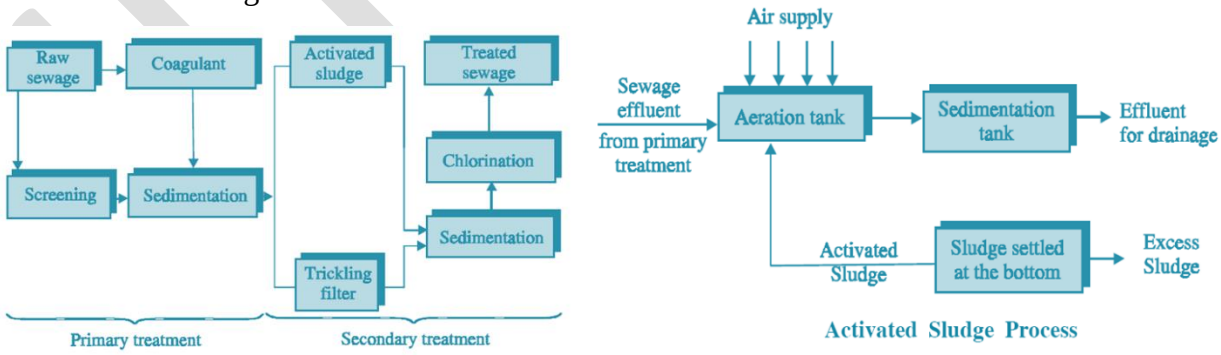
Answer : Page:4.61 to 4.62 - A. Ravikrishnan

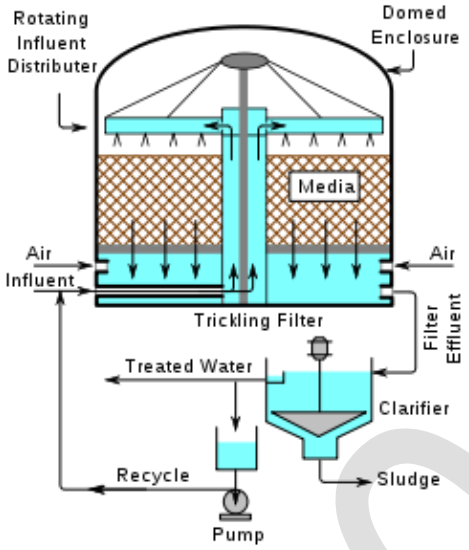
Role and responsibility of individual participation:

Use stairs instead ofelevators
Use public transportation walk or ride abicycle

	Plant trees aroundbuilding Turn off lights, television sets and computer when not inuse. Pay immediate attention to leaks inpipes. Install waste savingequipments. Recycle glass metal andpaper. Compost gardenwaste Segregate waste andrecycle Buy locally made long losingmaterial Buy environmentally degradableproducts. Take some bag from home to market topurchase.
7	**Explain the causes, effects and control measure of water pollution. (13 M) (MAY/JUNE 2013) (NOV/DEC 2013)** BTL42 **Answer : Page: 4.12 to 4.24 A. Ravikrishnan** • **Definition** – The alteration and physical, chemical and biological characteristics of water which may cause harmful effects on humans and aquatic life (1 M) • **Causes:** (4M) Infectious agents Oxygen demanding wastes Inorganic chemicals Organic chemicals Plant nutrients Sediments Radioactive materials Heat Point and non-point sources **Effects of water pollution** (4M) 1. Objectionable colour and odouris unacceptable and unsuitable for drinking and other purposes. 2. highly turbid and very hard water is unpleasant to drink, foodprocessing 3. acid and alkaline water cause serious healthproblem 4. water borne infectious enteric disease like typhoid, cholera, dysentery, are the predominant health hazard arising from drinking contaminatedwater 5. radioactive pollution enter human body through food and get accumulated in thyroid gland, liver, bones andmuscles 6. biodegradable waster deplete D O in the receiving stream, affect the flora cause creates anaerobicconditions 7. non biodegradable waste and pesticides travel the food chain and ultimately reach human where they accumulate in fattytissues 8. thermal discharge in stream depletes DO 9. phosphate, nitrate, promote the growth of algae and encourageeutrophication 10. Industrial effluents result in addition of poisonous chemicals such as arsenic, mercury, lead may reach human body through contaminatedfood. **Control measures of water pollution** (4M)

	a) lay down standardfor a. drinkingwater b. disposal of waste water into watercourse/sewer/land monitoring b) Waste watertreatment • preliminarytreatment • primarytreatment • secondarytreatment • advancedtreatment
8	**Explain the sources, effects and various measures to control of thermal pollution. (13 M) (MAY/JUNE 2013, NOV/DEC 2013)** BTL4 **Answer : Page:4.40 to 4.46 - A. Ravikrishnan** • Definition The addition of excess of undesirable heat to water that makes it harmful to man, animal or aquatic life of otherwise causes significant departures from the normal activities of aquatic communities in water (1 M) • Sources of thermal pollution Nuclear power plants Coal-fired power plants Industrial effluents Domestic sewage Hydro-electric power (5 M) • Effects of thermal pollution on human health Reduction in dissolved oxygen Increase in Toxicity Interference with biological activities Interference with reproduction Direct mortality Food storage for fish (3 M) • Control measures Cooling towers Cooling ponds Spray ponds Artificial lakes (4 M)
9.	**Give a note on** **(a) Floods** **(b) Cyclone** **(c) Landslides** **(13M)** BTL2 **Answer : Refer : 4.72 – 4.77 - A. Ravikrishnan** • Definition of flood: 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 (1 M) • Causes and effects (2 M) • Preventive measures of floods (1 M)

	• Definition: Cyclone is a meteorological phenomenon, intense depressions forming over the open oceans and moving towards the land. On reaching the shores, it move into the interior of the land or along the shore lines. (1 M) • Causes and effects (2 M) • Preventive measures of cyclone (1 M) • Definition: 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. (1 M) • Causes and effects (2 M) Preventive measures of landslides (2 M)
10.	**Discuss the significance of parameters of drinking water quality standards. (7 M) (Dec. 2008)** BTL2 **Answer : Page:4.22 to 4.23 - A. Ravikrishnan** • Physical parameters Colour Tastes and Odours Turbidity and Sediments (2 M) • Chemical parameters P^H Acidity Alkalinity Flouride Nitrogen Chlorides Sulphates Nitrates Arsenic (6 M)
11.	**With a flow diagram explain the waste water treatment. (7 M) (Dec. 2007)** BTL2 **Answer : Page:4.20 to 4.22 - A. Ravikrishnan** Flow charts and Diagrams 



(1 + 1M)

Step-I Preliminary treatment (1 M)
Step-II Primary Treatment or Settling Process (1 M)
Step-III Secondary or Biological Treatment
Trickling Filter Process (1 M)
Activated Sludge Process (1 M)
Step-IV Tertiary Treatment (1 M)
Step-V Disposal of Sludge (1 M)

12. **Write a note on nuclear hazards (Nuclear pollution). (or) Explain the sources, effects and control measures of radioactive pollution. (7 M) (Dec. 2006)** BTL2

Answer : Page:4.48 to 4.50 - A. Ravikrishnan

Definition – The presence of radioactive elements in the environment (1M)

Causes:- (2M)

a)Natural Sources:
Solar rays
Radio nuclides in earth‟s crust
Environmental radiation
b)Manmade Sourse:
Medical X-rays
Radio isotopes
Nuclear test
Nuclear installations
Nuclear reactor

Effects:- (2M)

Causes skin burns, loss of teeth, vomiting anemia
Blood cancer
Brain damage

Control measures:- (2M)

Radiation exposure protection
Radiation contamination protection
Controlled area

	Disposal of radioactive waste
13.	**Explain the sources, effects and control measures of soil pollution. (8 M)** BTL2 **Answer : Page:4.54 - A. Ravikrishnan** Definition- The contamination of soil which may cause harmful to environment (1 M) Sources and effects Industrial wastes (1 M) Urban wastes (1 M) Agricultural practices (1 M) Radioactive pollutants (1 M) Biological agents (1 M) Control Measures Control of soil erosion Proper dumping of unwanted materials Production of natural fertilizers Proper hygienic conditions Public awareness Recycling and reuse of wastes Ban on toxic chemicals (2M)
	PART – C
1	**Discuss about the following case study (a) Bhopal gas tragedy (b) Gulf War (c) Mercury wastes (15 M)** BTL6 **Answer : Page:4.65,4.68 to 4.69 - A. Ravikrishnan** • **Causes and effects of Bhopal gas tragedy:** (5M) Pesticide factory-Union Carbide- corporation leak large volume of methyl iso cyanate – atmosphere Bhopal- India-midnight on December 3,1984-city- change- gas chamber-within a week 10,000 people died – 1000 people turned blind-lakhs of people still continue to suffer various diseases • **Causes and effects of Gullf War**: (5 M) Gulf war was fought between Iraq and US-Period of 6 weeks in 1991-American fighters dropped a lakh of bombs-force the Iraq army to withdraw from Kuwait- retreat of Iraq-burning of 700 oil wells-near sea shore –oil from well spills out into the sea-the floating oil oversea water nearly 80 km long-burning of oil wells nearly 10 months-released huge amounts of pollutants likeCO_2 and SO_2 into the atmosphere-1 million birdskilled. • **Causes and effects of mercury wastes**: (5 M) Minamata- Small hostel village in Japan –Chicago-chemical company produces Venyl polymer plastics-industry release its effluent into Minamata sea-Effluents by fishes – affect human being through food chain-damage central nervous system-loss of vision and hearing-loss of muscular coordination and severe headache- nervous disorders.
2	**Discuss about the following case study (a) Palar river pollution (b) Textile and dye industries (c) Chernobyl nuclear disaster. (15 M)** BTL4

	Answer : Page:4.66, 4.69 - A. Ravikrishnan **Explanation of Palar river pollution** (5 M) Palar river originates in Nandidurgam of Karnataka state and flows for about 350 km through Karnataka, Andra Pradesh and Tamil Nadu.Palar supply drinking water for several municipalities, towns and villages in Vellore district, Tamil Nadu**.** The effluent from the above industries affect the surface and underground water and make the water unfit for domestic work. The effluent also increase the pH of the soil and affect the cultivation. The rivers like Bhavani, Noyyal and Cauvery get polluted due to mixing of effluent from the above industries. Tamil Nadu Pollution Control Board (TNPCB) has directed all textile printers and dyers of Thirupur to not allow the effluent to mix in the river systems. **Explanation of Textile and dye industries** (5 M) There are nearly 500 dying units and 195 bleaching units operating in and around Tirupur. They consume large quantity of water for processing and later discharge waste water.The effluent from the above industries affect the surface and underground water and make the water unfit for domestic work. The effluent also increase the pH of the soil and affect the cultivation. The rivers like Bhavani, Noyyal and Cauvery get polluted due to mixing of effluent from the above industries. Tamil Nadu Pollution Control Board (TNPCB) has directed all textile printers and dyers of Thirupur to not allow the effluent to mix in the river systems. **Explanation of Chernobyl nuclear disaster** (5 M) Occur at Chernobyl in USSR 28 thApril,1986-the reactor exploded- result of uncontrolled nuclear reactions-radioactive fuel spread out in to the surrounding areas –killed at least 20,000 people-damage to soil, water and vegetation around 60km.
3.	**Compare the physical and chemical characteristics of Marine water with terrestrial water. (15 M) (May 2018)**BTL4 **Answer : Page:4.23 to 4.25 and 2.44 to2.46 - A. Ravikrishnan** **Physical and Chemical Characteristics of terrestrial water: (8M)** **The common specifications recommended by the U.S Public Health for Drinking Water are given below.** 1. Water should be clear and odourless. 2. It should be cool. 3. It should be pleasant to taste. 4. Turbidity of the water should not exceed 10 ppm. 5. pH of the water should be in the range of 7.0 - 8.5. 6. Chloride and sulphate contents should be less than 250 ppm. 7. Total hardness of the water should be less than 500 ppm. 8. Total dissolved solids should be less than 500 ppm. 9. Fluoride content of the water should be less than 1.5 ppm. 10. The water must be free from disease-producing bacteria. 11. Water should be free from objectionable dissolved gases like H_2S. 12. Water should be free from objectionable minerals such as lead, chromium, manganese and arsenic salts.

S. No.	Parameter	WHO standard in mgs/litre	ISI standard in mgs/litre.
1.	Colour, odour and taste	Colourless, odourless and tasteless	Colourless, odourless and tasteless
2.	p^H	6.9	6.9
3.	Total dissolved solids	1500	-
4.	Dissolved oxygen	-	3.0
5.	Chloride	250	600
6.	Sulphate	400	1000
7.	Nitrate	45	-
8.	Cyanide	0.2	0.01
9.	Fluoride	1.5	3.0
10.	Chromium	0.05	0.05
11.	Lead	0.05	0.1
12.	Arsenic	0.05	0.2

Physical and Chemical Characteristics of marine water: (7M)
Marine Ecosystem.

UNIT III – NATURAL RESOURCES

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 39 degradation of pollutants, Bioconversion of pollutants. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

Q.No.	PART * A
1.	**How are forest classified?** BTL2 1. Evergreen forests; 2. Deciduous forests; 3. Coniferous forests
2	**What are the preventive measures of deforestation?** BTL1 • Steps should be taken by the government to discourage the migration of people into the islands from mainland. • To counter the depletion of forest areas, tree plantation programs have been started. • Education and awareness programmes must be conducted. • Strict implementation of law of Forest Conservation Act • Forest fire must be controlled by modern techniques • Use of wood for fuel should be discouraged
3	**Define sustainable forestry (Chen AU Dec 2005)** BTL1 Sustainable forestry is the optimum use of forest resources, which meet the needs of the present without compromising the ability of future generations to meet their own needs.
4.	**Write the functions of forests**. **(Chen A.U. Jun 2006)** BTL2 • Forests perform very important functions both to humans and nature. • They are habitats to millions of plants, animals and wildlife. • They recycle rainwater and remove pollutants from air. They control water quality and quantity • They moderate temperature and weather and help to maintain humidity. • They influence soil Conditions and prevent soil erosion and perform watershed functions. • They promote tourism and contribute aesthetic beauty
5	**Define deforestation. What are the causes of deforestation? (Chen A.U. Jun 2006, Dec 2010)** BTL1 **Deforestation:** The process of destruction of forest (or) process of removal of or elimination of forest resources due to many natural or man-made activities.

<table>
<tr><td></td><td>The process of removal
Causes of deforestation: 1. Developmental projects. 2. Mining operations. 3. Raw-materials for industries. 4. Fuel requirements. 5. Shifting cultivation. 6. Forest fires</td></tr>
<tr><td>6</td><td>Differentiate between deforestation and forest degradation. (Chen A.U. Dec 2007, Dec2010) BTL4
<table>
<tr><th>Forest Degradation</th><th>Deforestation</th></tr>
<tr><td>It is the process of deterioration forest materials.</td><td>It is the process of destruction of forest materials.</td></tr>
<tr><td>Slow process</td><td>Rapid process.</td></tr>
<tr><td>Can be removed.</td><td>Cannot be recovered.</td></tr>
</table></td></tr>
<tr><td>7.</td><td>What are the consequences of timber extraction? BTL1
• Large scale timber extraction causes deforestation.
• Timber extraction leads to soil erosion, loss of fertility, landslides and loss of biodiversity.
• Timber extraction also leads to loss of tribal culture and extinction of tribal people.
• Timber extraction reduces thickness of the forest</td></tr>
<tr><td>8.</td><td>List the adverse effects of mining. (TNV A.U. Dec 2009, 2013) BTL1
• During mining operations, the vibrations are developed, which leads to earthquake.
• When materials are disturbed in significant quantities during mining process, large
• quantities of sediments are transported by water erosion
• Noise pollution is another major problem from mining operations.
• Mining reduces the shape and size of the forest areas.
• Destruction of natural habitat at the mine and waste disposal sites.</td></tr>
<tr><td>9</td><td>State the problems caused by the construction of Dam. (Chen AU Jan 2006) BTL3
▪ Displacement of tribal people.
▪ Loss of non-forest land.
▪ Loss of forests, flora and fauna.
▪ Landslips, sedimentation and siltation occur.
▪ Stagnation and water logging around reservoirs retards plant growth.
▪ Breeding of vectors and spread of vector-borne diseases.
▪ Reservoir induced seismicity (RIC) causes earthquakes.
▪ Navigation and aquaculture activities can be developed in the dam area.</td></tr>
<tr><td>10</td><td>What are the effects of dams on tribal? BTL1
• The greatest social cost of big dam is the widespread displacement of tribal people, such a biodiversity cannot be tolerated.
• Displacement and cultural change affects the tribal people both mentally and physically. They do not accommodate the modem food habits and life styles
• Tribal people are ill-treated by the modem society.
• Many of the displaced people were not recognized and resettled or compensated.
• Tribal people and their culture cannot be questioned and destroyed.
• Generally, the body conditions of tribal people (lived in forest) will not suit with the new areas and hence they will be affected by many diseases.</td></tr>
<tr><td>11.</td><td>Compare merits and problems of dams. (Chen A.U. Jun 2007) BTL4
<table>
<tr><th>Merits of dams</th><th>Problems of dams</th></tr>
</table></td></tr>
</table>

	Dams are built to control flood and store flood water.	Displacement of tribal people.
	Sometimes dams are used for diverting part or all of the water from river into	Loss of non-forest land.
	Dams are used mainly for drinking and agricultural purposes.	Loss of forests, flora and Fauna.
	Dams are built for generating electricity.	Water logging and salinity due to over irrigation.
	Dams are used for recreational purposes.	Reduced water flow and silt deposition in rivers.
	Navigation and fishery can be developed in the dam areas.	Salt water intrusion at river mouth.

12. **Explain flood management**. BTL2

- Floods can be controlled by constructing dams or reservoirs.
- Channel management and embankments also control the floods.
- Encroachment of flood ways should be banned.
- Flood hazard may also be reduced by forecasting or flood warning.

13. **Write short note on mineral resources of India**. **(Coim A.U. Dec 2009)** BTL3

India has the following mineral resources

S.No.	Mineral	Place
1.	Iron	Bihar, Orissa, Tamil Nadu, Goa
2.	Coal	A.P, Bihar, MP, West Bengal
3.	Manganese	MP, Orissa, A.P, Rajasthan
4.	Copper	Bihar, A.P, MP, Orissa
5.	Gold	Karnataka, A.P
6.	Aluminum	MP, TN, Bihar, Orissa
7.	Tin	Bihar, Orissa and Rajasthan
8.	Chromium	Bihar, Orissa, MP, TN

14. **State the environmental effects of (mining) extracting and using mineral resources. (Chen AU Jun 2005)** BTL1

- Devegetation and defacing of landscape
- Ground water contamination
- Surface water pollution
- Air pollution
- Subsidence of land
- During mining operations, the vibrations are developed, which leads to earthquake.
- When materials are disturbed in significant quantities during mining process, large
- quantities of sediments are transported by water erosion
- Noise pollution is another major problem from mining operations.
- Mining reduces the shape and size of the forest areas.
- Destruction of natural habitat at the mine and waste disposal sites.

15 **What do you mean by environmental impact? (Chen A.U. Dec 2006) (or) Define environmental impact statement. (Coim. A.U. Dec 2009)** BTL1

	Environmental impact is nothing but the effect on the natural environment caused by various human actions. It includes two types (j) Indirect effects. Example: Pollution. (ii) Direct effects. Example: Cutting down trees
16	**Define overgrazing**. **Write the adverse effects caused by overgrazi**ng. (**TNV A.U. Dec 2008, A.U. May 2008 ,Dec 2013, Chen AU Dec 2006)** BTL1, BTL3 **Overgrazing:** Process of "eating away the forest vegetation without giving it a chance to regenerate". **Effects of overgrazing:** (i) Land degradation (ii) Soil erosion (iii) Loss of useful species
17	**What is water logging? List the effects of water logging.** (**Coim A.U. Dec 2009, Chen AU Dec 2006, Apr 11)** BTL1 Water logging is the land where water stand for most of the year or time. **Problems in water logging**: During water-logged conditions, 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.
18.	**Enumerate the desired qualities of an ideal pesticide**. (**A.U. Dec 2007)** BTL3 • An ideal pesticide must kill only the target species. • It must be a biodegradable. • It should not produce new pests. • It should not produce any toxic pesticide vapour. Excessive synthetic pesticide should not be used. • Chlorinated pesticides and organophosphate pesticides are hazardous, so they should be used.
19	**Define desertification, land degradation and land slide.** BTL1 **Desertification:** A progressive destruction or degradation of arid or semiarid lands to desert **Land degradation or Soil degradation:** The process of deterioration of soil or loss of fertility of the soil **Land slide:** Landslides are the downward and outward movement of a slope composed of earth materials such as rock, soil, artificial fills.
20	**What are the advantages in conjunctive use of water? (Chen A.U. Dec 2006)** BTL3 • Control of water logging. • Use of saline water, especially for cooling purposed. • Control of salt intrusion in coastal aquifers. • Controlled withdrawal of water from ground water aquifer
21	**What are renewable and non-renewable energy resources? (Chen. A.U. Dec 2009, TCY A.U. Dec 2008, Dec 2009,Apr 2015)** BTL1 Renewable energy resources are natural resources which can be regenerated continuously by the ecological process within a reasonable time period and are inexhaustible. They can be used again and again in an endless manner. Examples: solar energy, wind energy, tidal energy, ocean thermal energy Non-Renewable energy resources are natural resources which cannot be regenerated. E.g. coal, petroleum, minerals, oils, ground water
22	**Differentiate renewable and non-renewable sources of energy. (TNV A.U. Dec 2008, 11**)

<table>
<tr><td></td><td>BTL4
<table>
<tr><th>Renewable energy</th><th>Non-renewable energy</th></tr>
<tr><td>It is regenerated continuously</td><td>Cannot be regenerated.</td></tr>
<tr><td>In exhaustible</td><td>Exhaustible</td></tr>
<tr><td>It can be used again and again</td><td>Cannot be used again</td></tr>
<tr><td>It is pollution free</td><td>It pollutes the atmosphere</td></tr>
<tr><td>Available in unlimited amount in nature</td><td>Available in limited amount</td></tr>
<tr><td>It is developed in a short period</td><td>It is developed in a long period It is developed in a long period</td></tr>
</table></td></tr>
<tr><td>23</td><td>What are the conventional sources of energy for the mankind? (Chen AU Jan 2006) BTL1
Non-renewable energy resources are natural resources, which cannot be regenerated once they are exhausted. They cannot be used again.</td></tr>
<tr><td>24</td><td>What is geothermal energy? (Coim A.U. Dec 2009) BTL1
The energy harnessed form the high temperature present inside the earth is called geothermal energy</td></tr>
<tr><td>25</td><td>What is meant by soil erosion? List its types. (Chen A.U. Jun 2007) BTL1
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 litter.
1. Normal erosion 2. Accelerated erosion</td></tr>
<tr><td>26</td><td>Explain soil leaching. (Chen A.U. Dec 2006) BTL2
1. It removes valuable nutrients from the soil.
2. It may catty buried wastes into ground water and contaminates it.</td></tr>
<tr><td>27</td><td>Mention the factors causing soil erosion. (TCY A.U. Dec2008) BTL4
1. Water 2. Wind 3. Biotic agents 4. Landslides 5. Construction</td></tr>
<tr><td>28.</td><td>What are the present food problems of the world? (Chen A.U. Dec 2010) BTL4
We know that 79% of the area is covered with water and rest is land, of which most of the areas are forest, desert, mountain, barren area only less percentage of land is cultivated. So the food supplied from the rest of the land is not enough to feed all the people. The problem of population explosion has made it worse. The world population increases and cultivable land area decreases therefore the world food problem arises.
Urbanization is another problem in developing countries which deteriorates the agricultural lands.</td></tr>
<tr><td>29.</td><td>What are the effects of over utilization of groundwater? (Chen A.U. Dec 2010) BTL1
1. Decrease ground water 2. Ground subsidence 3. Lowering of water table 4. Intrusion of salt water 5. Earthquake and landslides 6. Drying up of wells 7. Pollution of water</td></tr>
<tr><td>30.</td><td>Define the term Nuclear energy. (A.U DEC2014, A.U.Apr.2015) BTL1
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 (or) nuclear energy is clean and safe</td></tr>
<tr><td>31.</td><td>Define sustainable life style and bio gas. BTL1
Sustainable life style: Sustainable development is the development of healthy environment without damaging the natural resources. In other words, all the natural resources must be used in such a way that it must be available for the future generation also.
Bio gas: Mixture of various gases formed by anaerobic degradation of biological matter in the absence of oxygen</td></tr>
</table>

PART * B

1	**Discuss the causes, ill effects and preventive measures of deforestation. (13M) (A.U. Dec 2005, Dec 2014, Apr 2015, A.U. Jan 2006, Dec 09, Apr 2015, A.U. Dec 2006, June 2007, A.U. May 2008)** BTL2 **Answer :Page : 5.7 – 5.9 - A. Ravikrishnan** **Causes (Sources) of Deforestation** **Developmental Projects:** Development projects cause deforestation in two ways. (i) Through submergence of forest area underwater. (ii) Destruction of forest area. Examples. Big dams, hydroelectric projects, construction (1 M) **Mining operations** Mining have a serious impact on forest areas. Mining operation reduces the forest area. Examples Mica, coal, manganese, limestone, etc. (1 M) **Raw materials for industries** Wood is the important raw material for so many purposes. Example - For making boxes, furniture, match-boxes, pulp, etc., (1 M) **Fuel requirements** In India both rural and tribal population depend on the forest for meeting their daily need of fuel wood, which leads to the pressure on forest, ultimately to deforestation. (1 M) **Shifting cultivation:**Replacement of forest ecosystem for monospecific tree plantation can lead to disappearance of number of plant and animal species. Examples: India is the richest nation with more than 15,000 species of plants, many of which is endangered due to deforestation (1M) **Forest fires:**Forest fire is one of the major causes for deforestation. Due to human interruption and rise in ambient temperature, forest fire is happened often nowadays. Thus, due to forest fire thousands of forest area gets destructed. (1 M) **Ill effects of deforestation on the environment** **Global warming:**Cutting and burning of forest trees increases the CO_2 content in the atmosphere, which in turn changes the global climatic pattern, rising sea levels and depletion of the protective ozone layer. **Loss of genetic diversity:**Destruction of our forest destroys the greatest storehouse of genetic diversity on earth, which provides new food and medicines for the entire world **Soil erosion:**Deforestation also causes soil erosion, landslides, floods and drought. Natural vegetation acts as a natural barrier to reduce the wind velocity, this in turn reduces soil erosion. 6000 million tons of soil gets eroded every year in India **Loss of biodiversity:**Most of the species are very sensitive to any disturbance and changes. When the plants no longer exist, animals that depend on them for food and habitat become extinct. **Loss of food grains:**As a result of soil erosion, the countries lose the food grains **Unemployment problems:**The people living around forest areas lose their livelihood **Flood and Landslides:**Frequent floods, landslides in hilly areas and wind speed are heavy. (Any five Each 1 M = 5 M) **Preventive measures (or) avoid of deforestation (or) methods of conservation of forest** • New plants of more or less the same variety should be planted to replace the trees cut down

	for timber. • Use of wood for fuel should be discouraged. • Forest pests can be controlled by spraying pesticides by using aeroplanes. • Forest fire must be controlled by modem techniques. • Over grazing by cattle must be controlled. • Steps should be taken by the government to discourage the migration of people into the islands from mainland. • Education and awareness programmes must be conducted. • Strict implementation of law of Forest Conservation Act (2 M)
2	**What are the measures recommended for conservation of natural resources? (7 M) (A.U. June 2005, Jan 2006, A.U. Apr 2010, Dec 2013)** BTL2 **Answer : Page : 5.76 – 5.80 - A. Ravikrishnan** **Measures recommended for (Role of Individual)conservation of natural resource** **Conservation of Energy** • Switch off lights, fans and other appliances when not in use. • Use solar heater for cooking your food on sunny . days, which will cut down your LPG expenses. • Dry the clothes in sunlight instead of driers. • Grow trees near the houses and get a cool breeze and shade. This will cut off your electricity charges on AC and coolers. • Use always pressure cooker. • Ride bicycle or just walk instead of using car and scoot (2 M) **Conservation of water** • Use minimum water for all domestic purposes. • Check for water leaks in pipes and toilets and repair them promptly. • Reuse the soapy water, after washing clothes, for washing off the courtyards, drive ways, etc., • Use drip irrigation to improve irrigation efficiency and reduce evaporation. • The wasted water, coming out from kitchen, bath tub, can be used for watering the plants. • Build rainwater harvesting system in your house (2 M) **Conservation of soil** • Grow different types of plants, herbs, trees and grass in your garden and open areas, which bind the soil and prevent its erosion. • While constructing the house don't uproot the trees as far as possible. • 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, which will protect the soil. • Use mixed cropping, so that some specific soil nutrients will not get depleted (1 M) **Conservation of Food Resources** • Eat only minimum amount of food. A void over eating. • Don’t wastes the food instead gives it to someone before getting spoiled. • Cook only required amount of the food. • Don't cook food unnecessarily.

	• Don't store large amounts of food grains and protect them from damaging insects (1 M) **Conservation of Forest** • Use non-timber products. • Plant more trees and protect them. • Grassing, fishing must be controlled. • Minimise the use of papers and fuel wood. • Avoid of executing developmental work like dam, road, construction in forest areas (1 M)
3	**What are the effects, causes of soil erosion and the methods of preventing it? (7 M)(A.U. Dec 2005,11)** BTL3 **Answer : Page : 5.70 – 5.73 - A. Ravikrishnan** **Soil erosion-** Damage or removal of top soil renders the soil infertile. Erosion may occur in many ways **Effects of soil erosion** (1M) **Causes of (factors causing) soil erosion** Water ; wind; biotic agents; landslides; construction (1 M) **Control of soil erosion (Soil conservation practices)** • Conservation of till farming or no-till-farming (1 M) • Contour farming (1 M) • Terracing (1 M) • Alley cropping or agro forestry (1 M) • Wind breaks or shelter belts (1 M) Decreasing soil pollution is also a method which helps in soil conservation
5	**Discuss briefly on the consequences of overdrawing of ground water. (13 M) (A.U. Dec 2006)** BTL2 **Answer : Page : 5.19 – 5.21 - A. Ravikrishnan** **Decrease of Ground Water :** Due to increased usage of ground water, the ground water level decreases. Reason (a) The erratic and inadequate rainfall results in reduction in storage of water in reservoirs. (b) The building construction activities are sealing the permeable soil zone, reducing the area for percolation of rain water and increase in surface runoff (2 M) **Ground subsidence** When the ground water withdrawal is more than the recharge rate, the sediments in the aquifer get compacted which results in sinking of over lying land surface. This process is known as ground subsidence. (2M) **Lowering of water table** Over utilization of ground water in arid and semi-arid regions for agriculture disturbs the state of equilibrium of the reservoir (disturb the hydrological cycle) in the region. This causes following problems. (1 M) **Intrusion of salt water** In coastal areas, over exploitation of ground water would lead to rapid intrusion of salt water from sea.(2M) **Earthquake and landslides** Over-utilization of ground leads to decrease in water level, which cause earth quake, landslides

	and famine (2M) **Drying up of wells** As a result of over utilization of ground water, the level of ground water getting depleted at much faster rates than they can be regenerated. This leads to drying up of dug as well as bore wells. (2M) **Pollution of water** When ground water level near the agricultural land decreases, water, containing the nitrogen as nitrate fertilizer, percolates rapidly into the ground and pollute the ground water (2M)
6	**Write a brief note on changes caused by agricultural and overgrazing. (7 M) (A.U May 2007, Dec 2014)** BTL2 **Answer : Page : 5.36 – 5.38 - A. Ravikrishnan** **Overgrazing:** Process of, "eating away the forest vegetation without giving it a chance to regenerate" **Agriculture**: An art, science and industry of managing the growth of plants and animals for human use. (1 M) **Effects (or) impacts of overgrazing** **Land degradation** ✓ Overgrazing removes the cover of vegetation over the soil and the exposed soil gets compacted. ✓ So the roots of plant cannot go much deep into the soil and the adequate soil moisture is not available. ✓ Thus, overgrazing leads to organically poor, dry, compacted soil, this cannot be used for further cultivation. (1 M) **Soil erosion** ✓ Due to overgrazing by livestock, the cover of vegetation gets removed from the soil. ✓ The roots of the grass are very good binders of the soil. ✓ The soil becomes loose by the action of wind and rainfall. (1 M) **Loss of useful species** ✓ Overgrazing also affects the composition of plant population and other regeneration capacity. ✓ When livestock grazes the grasses heavily, the root stocks, which carry the food reserve gets destroyed. (1 M) **Traditional agriculture:** ✓ It involves small plot, simple tools, surface water, organic fertilizers and a mix of crops. ✓ They produce enough and a mix of crops. They produce enough food for their families and to sell it for their income **Effects (or) impacts of Traditional agriculture** **Deforestation:** ✓ Cutting and burning of trees in forests to clear the land for cultivation results in loss of forest cover. **Soil erosion:** ✓ Clearing of forest cover exposes the soil to wind and rainfall, resulting in loss of top fertile soil layer. **Loss of nutrients:** ✓ During cutting and burning of trees, organic matter in the soil gets destroyed and most of

	the nutrients are taken up by the crops within a short period (each 1M)
7	**Explain how the alternate energy sources play an important role in environmental impact.(8 M) (A.U. May 2007)** BTL4 **Answer : Page : 5.63 – 5.64 - A. Ravikrishnan** **Need of Alternate (Renewable) Energy Sources (or) Role of Alternate (Renewable) Energy sources in environmental impact** 1. The importance of solar energy can be emphasized particularly in view of the fact that fossil fuels and other conventional sources are not free from environmental implications. 2. Energy sources which have least pollution, safety and security snags and are universally available have the best enhance of large scale utilization in future. 3. Hydro-electric power generation is expected to upset the ecological balance existing on earth. 4. Besides space heating, hydroelectric power plants critically pollute the aquatic and terrestrial biota 5. Radioactive pollutants released from nuclear power plants are chronically hazardous. The commissioning of boiling water power reactors (BWRS) have resulted in the critical accumulation of large number of long lived radionuclides in water. 6. The dangerous radiowaste cannot be buried in land without the risk of polluting soil and underground water. Nor the waste can be dumped into the rivers without poisoning aquatic life and human beings as well. 7. The burning of coal, oil, wood, dung cakes and petroleum products have well debated environmental problems. The smoke so produced causes respiratory and digestive problems leading to lungs, stomach and eye diseases. 8. The disposal of fly ash requires large ash ponds and may pose a severe problem considering the limited availability of land. So, the non conventional sources of energy needed (8 M)
8	**Discuss the effects of timber extraction, effects of dams on forests and tribal people. (7 M) (A.U. May 2008, Dec 2013)** BTL2 **Answer : Page : 5.11, 5.13 – 5.15 - A. Ravikrishnan** **Consequences (or) effects of timber extraction** 1. Large scale timber extraction causes deforestation. 2. Timber extraction leads to soil erosion, loss of fertility, landslides and loss of biodiversity. 3. Timber extraction also leads to loss of tribal culture and extinction of tribal people. 4. Timber extraction reduces thickness of forest (1M) **Effects of dam on Forest** 1. Thousands of hectares of forest have been cleared for executing river valley projects. 2. In addition to the dam construction, the forest is also cleared for residential accommodation, office buildings, storing materials, laying roads, etc., 3. Hydroelectric projects also have led to widespread loss of forest in recent years. 4. Construction of darns under these projects led to killing of wild animals and destroying aquatic life. 5. Hydroelectric projects provide opportunities for the spread of water borne diseases. **6.** The big river valley projects also cause water logging which leads to salinity and in tum reduces the fertility of the land. (3M) **Effects of dam on tribal people**

	1. The greatest social cost of big dam is the widespread displacement of tribal people, such a biodiversity cannot be tolerated. 2. Displacement and cultural change affects the tribal people both mentally and physically. They do not accommodate the modem food habits and life styles. 3. Tribal people are ill-treated by the modem society. 4. Many of the displaced people were not recognized and resettled or compensated. 5. Tribal people and their culture cannot be questioned and destroyed. **6.** Generally, the body conditions of tribal people (lived in forest) will not suit with the new areas and hence they will be affected by many diseases (3 M)
9	**(i) Discuss the problems of fertilizer and pesticide on modern agriculture. (7 M) (A.U. May 2008, Dec 2010)** BTL2 **(ii) List the desired qualities of pesticide. (2M)** BTL4 **(i) Answer : Page : 5.38 – 5.40 - A. Ravikrishnan** **Problems in using fertilizer** **(a) Micronutrient imbalance** ✓ Most of the chemical fertilizers, used in modem agriculture, contain nitrogen, phosphorus and potassium (N, P, K), which are macronutrients. ✓ When excess of fertilizers are used in the fields, it causes micronutrient imbalance. ✓ Examples: Excessive use of fertilizer in Punjab and Haryana has caused deficiency of the micronutrient zinc in the soil, which affects the productivity of the soil. (1M) **(b) Blue Baby syndrome (Nitrate pollution)** ✓ When Nitrogenous fertilizers are applied in the fields, they leach deep into the soil and contaminate the ground water. ✓ The nitrate concentration in the water gets increased. ✓ When the nitrate concentration exceeds 25 mg / lit, they cause serious health problem called "Blue Baby syndrome". ✓ This disease affects infants and leads even to death. (1M) **(c) Eutrophication.** ✓ A large proportion of N and P fertilizers, used In crop field is washed off by the runoff water and reaches the water bodies causing over nourishment of the lake. This process is known as Eutrophication. ✓ Due to eutrophication lake gets attacked by algal bloom. ✓ These algal species use up the nutrients rapidly and grow very fast. ✓ Since the time of algal species is less they die quickly and pollute the water, which in turn affect the aquatic life. (1M) **Problems in using pesticides** In order to improve the crop yield, lot of pesticides are used in the agriculture. (i) First generation pesticides - Sulphur, arsenic, lead or mercury are used to kill the pests. (ii) Second generation pesticides - DDT (Dichloro Diphenyl Trichloromethane) kill the pests. Although these pesticides protect our crops from huge losses due to pests, they produce number of side-effects.

	i. <u>Death of non-target organisms</u> ✓ Some pest species usually survive even after the pesticide spray, which generates highly resistant generations. ✓ They are immune to all type of pesticides and are called super pests. (1 M) **i. Producing new pests** ✓ Some pest species usually survive even after the pesticide spray, which generates highly resistant generations. ✓ They are immune to all type of pesticides (1 M) **(c)Bio-magnification** ✓ Many of the pesticides are non-biodegradable and keep on concentrating in the food chain. ✓ This process is called bio-magnification. ✓ These pesticides in a bio-magnified form are harmful to the human beings. (1 M) (d)**Risk of cancer** ✓ Pesticides enhance the risks of cancer in two ways. ✓ It directly acts as carcinogens. ✓ It indirectly Suppress the immune system. (1 M) **(ii) Answer : Page : 5.40 - A. Ravikrishnan** **<u>Desired qualities of an ideal pesticide</u>** ✓ An ideal pesticide must kill only the target species. ✓ It must be a biodegradable. ✓ It should not produce new pests. ✓ It should not produce any toxic pesticide vapour. ✓ Excessive synthetic pesticide should not be used. ✓ Chlorinated pesticides and organophosphate pesticides are hazardous, so they should not be used (2 M)
10	**Explain the environmental impacts of mineral extraction (mining) and uses (7 M) (A.U. Dec 2009, Apr 2015)** BTL2 **Answer : Page : 5.29 – 5.31 and 5.24 – 5.26 - A. Ravikrishnan** **Mining:** Mining is the process of extraction of metals from a mineral deposit. **Types of mining** (a) **Surface mining:** Surface mining is the process of extraction of raw materials from the near surface deposits (b) **Underground mining**: The process of extraction of raw materials below the earth's surface. It includes, (c) **Open-pit mining**: Open-pit mining machines dig holes and remove the ores. Example: Iron, copper, limestone, and marble etc **Environmental damage, caused by mining activities** **Devegetation and defacing of landscape:** Topsoil as well as the vegetation are removed from the mining area. Large scale deforestation or devegetation leads to several ecological losses and also landscape gets badly affected**.** (1 M) **Groundwater contamination**: Mining disturbs and also pollutes the ground water. Usually sulphur, present as an impurity in many ores, gets converted into sulphuric acid due to microbial action, which makes the water acidic. Some heavy metals also get leached into groundwater (1 M)

	Surface water pollution: Drainage of acid mines often contaminates the nearby streams and lakes. The acidic water is harmful to many aquatic lives. Radioactive substances like uranium also contaminate the surface water and kill many aquatic animals.(1 M) **Air pollution:** Smelting and roasting are done to purify the metals, which emits enormous amounts of air pollutants damaging the nearby vegetation. The suspended particulate matter (SPM), SOx arsenic particles, cadmium, lead, etc., contaminate the atmosphere and public suffer from several health problems.(1 M) **Subsidence of land:** It is mainly associated with underground mining. Subsidence of mining area results in cracks in houses, tilting of buildings, bending of rail. (1 M) **Effects of over exploitation of Mineral resources** 1. Rapid depletion of mineral deposits. 2. Over exploitation of mineral resources leads to wastage and dissemination of mineral deposits. 3. Over exploitation of mineral resources causes environmental pollution. 4. Over exploitation needs heavy energy requirement (1 M) **Uses of mining** The extraction of metals and other materials from a mineral deposit by mining has verity of uses. 1. Development of industrial plants and machinery. Examples - Iron, aluminium, copper, etc., 2. Construction, housing, settlements. Example - Iron, aluminium, nickel, etc., 3. Jewellery – Example - Gold, silver, platinum and diamond 4. Generation of energy. Example – Coal, Lignite, Uranium etc 5. Designing of defence equipments, weapons, ornaments **6.** Agriculture purposes, as fertilizers, seed dressings and fungicides. Example Zineb – containing zinc and Maneb - containing manganese. (1 M)
11	**Explain the various food resources. (7 M) (A.U. Apr 2010, Apr 2015, Dec 2010)** BTL2 **Answer : Page : 5.33 – 5.36 - A. Ravikrishnan** **Food Resources** Food is an essential requirement for the human survival. Each person has a minimum food requirement. The main components of food are carbohydrates, fats, proteins, minerals and vitamin (1 M) **Types of Food Supply** Historically humans have dependent on three systems for their food supply. **1. Croplands:** It mostly produces grains and provide about 76% of the world's food. (1 M) Examples: Rice, wheat, maize, barley, sugarcane, potato, etc **2. Rangelands:** It produces food mainly from the grazing livestock and provide about 17% of the world's food. Examples: Meat, milk, fruits, etc., (1 M) **3. Oceans:** Oceanic fisheries supply about 7% of the world's food. Examples: Fish, prawn, crab, etc. (1 M) **Major Food Sources** Earth is provided with more than thousands of edible plants and animals. However only 15

	plants and 8 terrestrial animal species supply 90% of our global intake of calories. Examples: Rice, wheat, maize, potato, barley, sugarcane, pulses, fruits, vegetables, milk, meat, fish and sea food. Rice, wheat and maize are the major grains, provide more than 50% of the calories people consume.(2 M) **World food problem** (1 M)
13	**Explain the various conventional (nonrenewable) energy resources. (7 M) (A.U. Dec 2010)** BTL2 **Answer : Page : 5.56 – 5.60 - A. Ravikrishnan** Coal – (1 M), Petroleum – (2 M) LPG - (1 M) Natural gas - (1 M) Nuclear energy - (2 M)
12	**Discuss in detail the over-exploitation of forests. (7 M) (A.U. Dec 2010)** BTL2 **Answer : Page : 5.6 – 5.7 - A. Ravikrishnan** **Over Exploitation of Forest** • Due to overpopulation the materials supplied by the forest like food, medicine, shelter, wood and fuel is not sufficient to meet the people's demand. • Hence exploitation of forest materials is going on increasing day by day. • With growing civilization, the demand for raw materials like timber, pulp, minerals, fuel wood, etc., increases resulting in large scale logging, mining, road building and cleaning of forests (3 M) **Reason for over exploitation in India** It has been estimated that in India the minimum area of forests required to maintain good ecological balance is about 33% of total area. But, at present it is only about 22%. So over exploitation of forest materials occur. (2 M) **Causes of over exploitation** (a) Increasing agricultural production. (b) Increasing industrial activities. (c) Increase in demand of wood resources (2 M)
13	**Discuss any four factors responsible for land degradation. (8 M) (A.U. Dec 2010,May 11,Dec 2013, A.U. Dec 2014)** (BTL2 **Answer : Page : 5.69 – 5.70 - A. Ravikrishnan** **Causes of (or factors influencing) land degradation** 1. **Population:** As population increases, more land is needed for producing food, fibre and fuel wood. Hence there is more and more pressure on the limited land resources, which are getting degraded due to over exploitation. (2 M) 2. **Urbanization:** The increased urbanization due to population growth reduce the extent of agricultural land. To compensate the loss of agricultural land, new lands comprising natural ecosystems such as forests are cleared. Thus urbanization leads to deforestation, which intum affects millions of plant and animal species. (2 M) 3. **Fertilizers and pesticides:** Increased applications of fertilizers and pesticides are needed to increase farm output in the new lands, which again leads to pollution of land and water and soil degradation. (1 M) 4. **Damage of top soil:** Increase in food production generally leads to damage of top soil through nutrient depletion. (1 M) 5. Water-logging, soil erosion, salination and contamination of the soil with industrial wastes all cause land degradation. (2 M)

15	**What are the ecological services rendered by forests? Discuss. (7 M) (A.U. Dec 2010)** BTL2 and BTL1 **Answer : Page : 5.2 – 5.5 - A. Ravikrishnan** List the ecological uses of forest (1 M) **Ecological Uses or services rendered by forest** **Production of oxygen:** During photosynthesis trees produce oxygen which is essential for life on earth. (1 M) **Reducing global warming:** The main greenhouse gas carbon dioxide (CO_2) is absorbed by the trees (forests). Trees absorb the main greenhouse gas CO_2 which is a raw material for photosynthesis. Thus the problem of global warming, caused by greenhouse gas CO_2, is reduced. (1 M) **Soil conservation:** Roots of trees (forests) bind the soil tightly and prevent soil erosion. They also act as wind breaks. (1 M) **Regulation of hydrological cycle:** Watersheds in forest act like giant sponges, which absorb rainfall, slow down the runoff and slowly release the water for recharge of springs. (1 M) **Pollution moderators**: Forests can absorb many toxic gases and noises and help in preventing air and noise pollution. (1 M) **Wildlife habitat:** Forests are the homes of millions of wild animals and plants. (1 M)
16.	**What is land degradation? Explain the causes and effects land (soil) degradation. (7 M) (AU A.U. Dec 2010,May 11,Dec 2013, A.U. Dec 2014)** BTL2 **Answer : Page : 5.69 – 5.70 - A. Ravikrishnan** **Land degradation:** The process of deterioration of soil or loss of fertility of the soil (1 M) **<u>Causes of land degradation (or) factors responsible for land degradation</u>** **1. Population:** ✓ As population increases, more land is needed for producing food, fibre and fuel wood. ✓ Hence there is more and more pressure on the limited land resources, which are getting degraded due to over exploitation.(1M) **2. Urbanization:** ✓ The increased urbanization due to population growth reduce the extent of agricultural land. To compensate the loss of agricultural land, new lands comprising natural ecosystems such as forests are cleared. ✓ Thus urbanization leads to deforestation, which in turn affects millions of plant and animal species. (1M) 3. **Fertilizers and pesticides:** ✓ Increased applications of fertilizers and pesticides are needed to increase farm output in the new lands, which again leads to pollution of land and water and soil degradation. (1M) **4. Damage of top soil:** ✓ Increase in food production generally leads to damage of top soil through nutrient depletion. (1M) 5. Water-logging, soil erosion, salination and contamination of the soil with industrial wastes all cause land degradation (1M) **<u>Harmful effects of land (soil) degradation</u>** ✓ The soil texture and structure are deteriorated.

	✓ Loss of soil fertility, due to loss of invaluable nutrients. ✓ Increase in water logging, salinity, alkalinity and acidity problems. ✓ Loss of economic social and biodiversity. (1 M)
17.	**What is desertification? Describe the causes and effects of desertification. (7 M) (AU May 2015, Dec. 2016)** BTL2 **Answer : Page : 5.74 – 5.75 - A. Ravikrishnan** **Desertification:** A progressive destruction or degradation of arid or semiarid lands to desert (1M) **Causes of desertification (or) reason for desertification** **1. Deforestation:** ✓ The process of denuding and degrading a forest land initiates a desert. ✓ If there is no vegetation to hold back the rain water, soil cannot soak and groundwater level do not increases. ✓ This also increases, soil erosion, loss of fertility. **2. Over grazing:** ✓ The increase in cattle population heavily graze the grass land or forests and as a result denude the land area. ✓ The denuded land becomes dry, loose and more prone to soil erosion and leads to desert. **3. Water Management:** ✓ Over utilization of groundwater, particularly in coastal regions, resulting in saline water intrusion into aquifers, which is unfit for irrigation. **4. Mining and quarrying :** ✓ These activities are also responsible for loss of vegetal cover and denudation of extensive land area leading to desertification. **5. Climate change:** ✓ Formation of deserts may also take place due to climate change, ie., failure of monsoon, frequent droughts. 6. **Pollution:** ✓ Excessive use of fertilizers and pesticides and disposal of toxic water into the land also leads to desertification (Each 1 M; any 5 = 5 M) **Harmful effects of desertification** ✓ 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. (1 M)
18.	**Describe the following effects and their remedies on modern agriculture. (a) Water logging (b) Salinity. (7 M)** BTL2 **(a) Answer : Page : 5.40 - A. Ravikrishnan** **Water logging:**The land where water stand for most of the year. **Causes of water logging** ✓ Excessive water supply to the croplands. ✓ Heavy rain. ✓ Poor drainage. (1 M) **Problems (or) Effects in water logging** ✓ During water-logged conditions, 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. (1 M)

Remedy for water logging

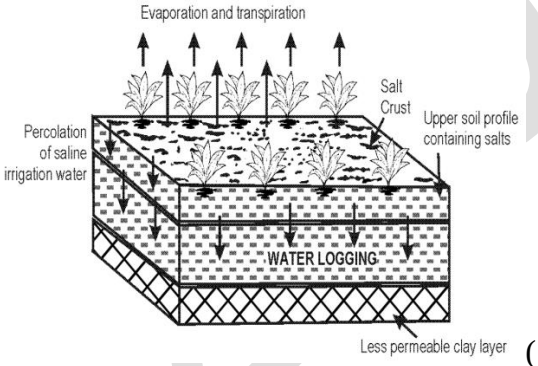
- ✓ Preventing excessive irrigation, sub surface draining technology and bio-drainage by trees like Eucalyptus tree are some method of preventing water logging. (1 M)

(b) Answer : Refer page : 5.41 - A. Ravikrishnan

Salinity: The water, not absorbed by the soil, undergo evaporation leaving behind a thin layer of dissolved salts in the topsoil**.** This process of accumulation of salts is called the salinity. (1 M)

Problems in Salinity

- ✓ Most of the water, used for irrigation comes only from canal or ground, which unlike rainwater contains dissolved salts. Under dry climates, the water gets evaporated leaving behind the salt in the upper portion of the soil.
- ✓ Due to salinity, the soil becomes alkaline and crop yield decreases. (1 M)



(1M)

Remedy for salinity

- ✓ The salt deposit is removed by flushing them out by applying more good quality water to such soils.
- ✓ Using sub-surface drainage system the salt water is flushed out slowly (1 M)

PART – C QUESTIONS

1

Discuss the world food problems in detail and how does it affects other resources. (15 M) (A.U. May2011) BTL4

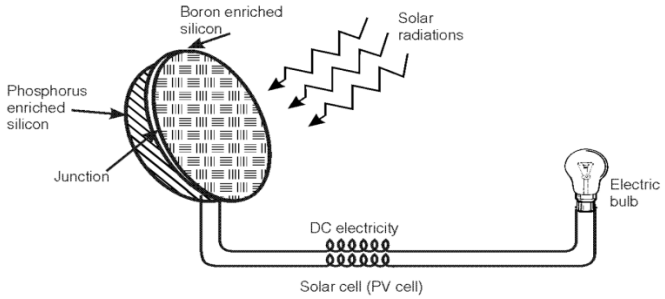
Answer : Page : 5.34 – 5.42 - A. Ravikrishnan

World Food problems

1. We know that 79% of the total area of the earth is covered with water. Only 21% of the earth surface is land, of which most of the areas are forest, desert, mountains, barren areas, only less percentage of the land is cultivated. So the food supplied from the rest of the land is not enough to feed all the people. The problem of population explosion has made it worse. The world population increases and cultivable land area decreases. Therefore world food problem arises.
2. Environmental degradation like soil erosion, water logging, water pollution, salinity, affect agricultural lands.
3. Urbanisation is another problem in developing countries, which deteriorates the agricultural lands.
4. Since the food grains like rice, wheat, com and the vegetable like potato are the major food

	for the people all over the world, the food problem raises. 5. A key problem is the human activity, which degrade most of the earth's net primary productivity which supports all life (5 M) **Effects (or) impacts of overgrazing** **1. Land degradation 2. Soil erosion 3. Loss of useful species**(3 M) **Effects (or) impacts of agriculture** **Effects (or) impacts of Traditional agriculture** **a.** Deforestation: Cutting and burning of trees in forests to clear the land for cultivation results in loss of forest cover. b. Soil erosion: Clearing of forest cover exposes the soil to wind and rainfall, resulting in loss of top fertile soil layer. c. Loss of nutrients: During cutting and burning of trees, organic matter in the soil gets destroyed and most of the nutrients are taken up by the crops within a short period (2 M) **Effects (or) impacts of modern agriculture (or) adverse effects of agricultural practices (or) Environmental effects of agriculture** (a) Micronutrient imbalance (b) Blue Baby syndrome (Nitrate pollution) (c) Eutrophication. d) Water logging e) Salinity (5 M)
2	**What are the natural resources availability in India and discuss any two of them. (15 M) (A.U. May2011)** BTL4 List the natural resources available in India (5M) Any two natural resources available in India (Each 5M)
3.	(i) **Relate the role-play of Environmental Issues in the modern world. (5 M) (ii) Generalize the different methods to propagate environmental awareness. (10 M)** BTL6 **Answer: Page: 5.76 - A. Ravikrishnan** The role-play of environmental issues (5M) Different methods to propagate environmental awareness (10M)
4.	**Discuss the different types of renewable energy resources.(15 M) (A.U. June 2006)** BTL2 **Answer : Page : 5.43 – 5.58 - A. Ravikrishnan** **Renewable energy resources (or) Non-Conventional energy resources** Natural resources which can be regenerated continuously and are inexhaustible. They can be used again and again in an endless manner. Examples: Solar energy, wind energy, tidal energy, etc. (1M) **Renewable energy resources (or) Non-Conventional energy resources** **1. Solar energy -** The energy that we get directly from the sun is called solar energy. The nuclear fusion reactions occurring inside the sun release enormous amount of energy in the form of heat and light. • **Solar cells**

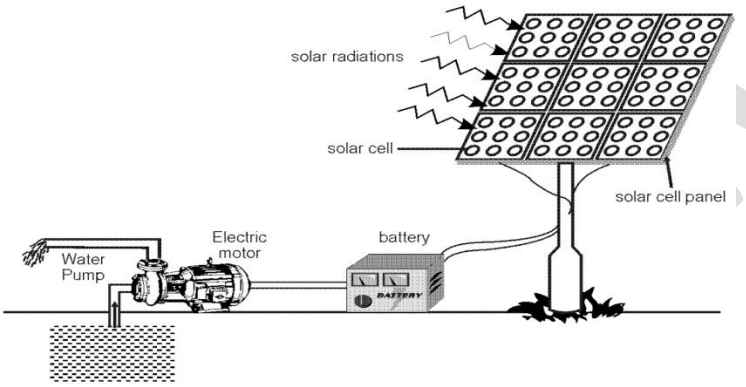
1. Solar cells (or) photovoltaic cells (or) PV cells



When solar energy falls on the P-type semiconductor, the electrons in the conduction band transferred to conduction band so that a potential difference is developed across the PN junction. Therefore a current is flowing across the junction. (2M)

- **Solar battery**

When solar cells are connected in series, a solar battery is formed. Using solar battery we can run electrical machines such as pump, fan, etc.



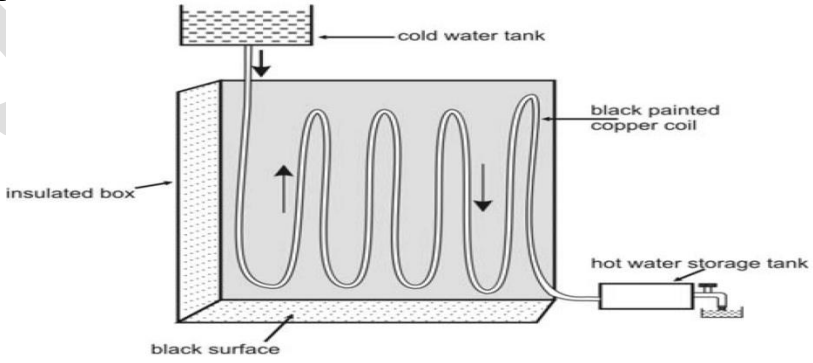
(2 M)

- **Solar Heat Collectors**

Solar heat collectors consist of natural materials like stones, bricks (or) materials like glass, which can absorb heat during the day time and release it slowly at night. (1M)

- **Solar water heater**

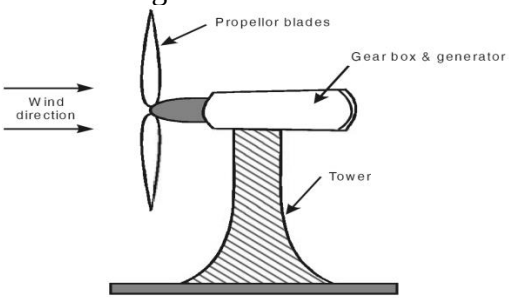
It consists of an insulated box inside of which is painted with black paint. It is also provided with a glass lid to receive and store solar heat. Inside the box it has black painted copper coil, through which cold water is allowed to flow in, wl1ich gets heated up and flows out into a storage tank. From the storage tank water is then supplied through pipes.



(2M)

2. Wind energy : Energy recovered from the force of wind (moving air) is wind energy

- **Wind mill:** When fast moving air strikes the wind mill blades, it starts to rotate. This rotational motion of the blades derives a number of machines like water pumps, flour mills and electric generators.



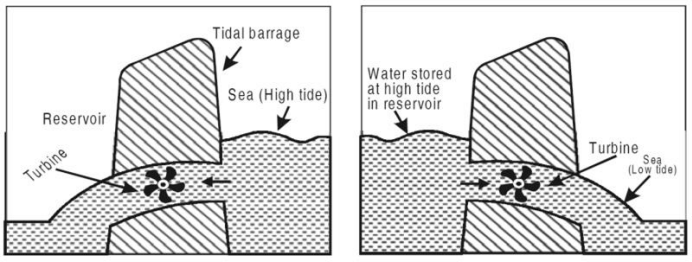
- **Wind Farms.**

When a large number of wind mills are installed and joined together in a definite pattern ir forms a wind farm. The wind farms, produce a large amount of electricity (2M)

3. Ocean energy

Ocean can also be used for generating energy of the following ways.

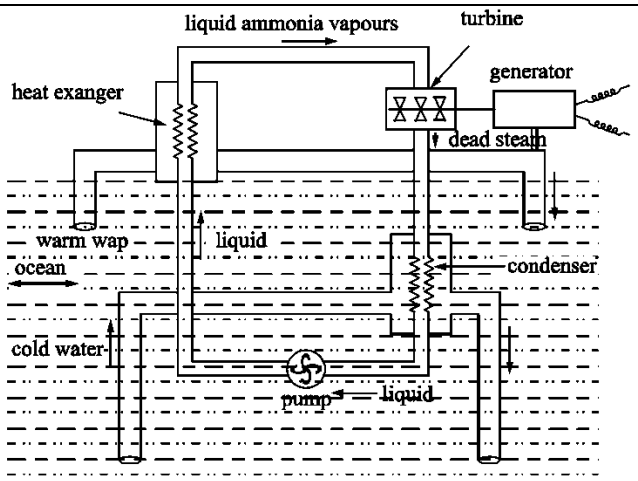
- **Tidal energy (or) Tidal power**
  - ✓ Ocean tides, produced by gravitational forces of sun and moon, contain enormous amount of energy.
  - ✓ The 'high tide' and 'low tide' refer to the rise and fall of water in the oceans.
  - ✓ The tidal energy can be harnessed by constructing a tidal barrage.
  - ✓ During high tide, the sea-water is allowed to flow into the reservoir of the barrage and rotates the turbine, which in turn produces electricity by rotating the generators.
  - ✓ During low tide, when the sea level is low, the sea water stored in the barrage reservoir is allowed to flow into the sea and again rotates the turbine.



(2M)

4. Ocean thermal energy (OTE)

Energy available due to the difference in temperature of water known as ocean thermal energy.



Warm surface water boils the liquid ammonia, thus high pressure steam is produced. This steam rotates the turbine which in turn produces electricity by a generator.

Dead steam passing through condenser condensed by the cold water at deep ocean. This liquid again pumped upwards using a pump. This process is repeated to produce the electricity using OTE. (3 M)

5.

Discuss the different types of nonrenewable energy resources.(15 M) (A.U. June 2006) BTL2

Answer : Page : 5.43 – 5.58 - A. Ravikrishnan

Non-renewable (Conventional) energy resources: Energy resources are natural resources, which cannot be regenerated once they are exhausted. They cannot be used again. Examples: Coal, petroleum, natural gas and nuclear fuels. (1M)

Non-renewable energy resources (or) Conventional energy resources

1. **Coal**

Coal is a fossil fuel formed as several stages as buried remains of land plants that lived 300-400 million years ago.

Various stages of coal formation

Wood → Peat → Lignite → Bituminous coal → Anthracite (1M)

The carbon content of Anthracite is 90% and its calorific value is 8700 k.cal. The carbon content of bituminous, lignite and peat are 80, 70 and 60% respectively.

Disadvantages of coal

- ✓ When coal is burnt it produces CO_2, causes global warming.
- ✓ Since it contains S, N, O, produces toxic gases during burning (1M)

2. **Petroleum**

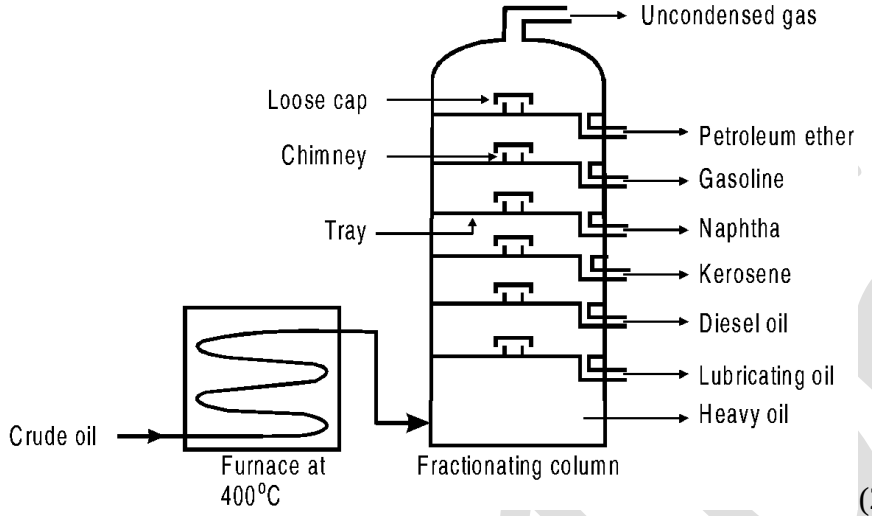
Petroleum or crude oil is a thick liquid contains more than hundreds of hydrocarbons with small amount of S, N, O as impurities.

Occurrence of petroleum

Petroleum or Coal is formed by decomposition of dead animals and plants that were buried under lake and ocean at high temperature and pressure for millions of years. (1M)

Fractional distillation of petroleum

From petroleum various hydrocarbons are separated by purifying and fractionating using fractionating coloumn. (Fig.)



(2 M)

3. LPG

- ✓ Petroleum gas, obtained during cracking and fractional distillation, can be easily converted into liquid under high pressure as LPG.
- ✓ LPG is colourless and odourless gas.
- ✓ But during bottling some mercaptans is added, which produces bad odour, thereby any leakage of LPG from the cylinder can be detected instantaneously. (1M)

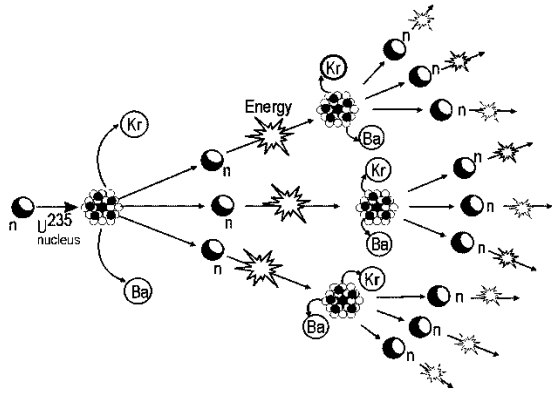
4. Natural gas

- ✓ Natural gas is found above the oil in oil well.
- ✓ It is a mixture of 50-90% methane and small amount of other hydrocarbons.
- ✓ Its calorific value ranges from 12,000-14,000 k .cal/m3 (1M)

5. Nuclear energy

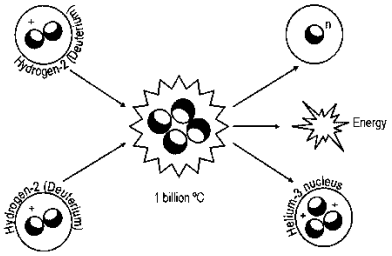
Energy released by nuclear fission or nuclear fusion.

Nuclear Fission: When a heavier nucleus split up in to two lighter nucli by bombardment of a fast moving neutron releases neutrons and tremendous energy.



(1 M)

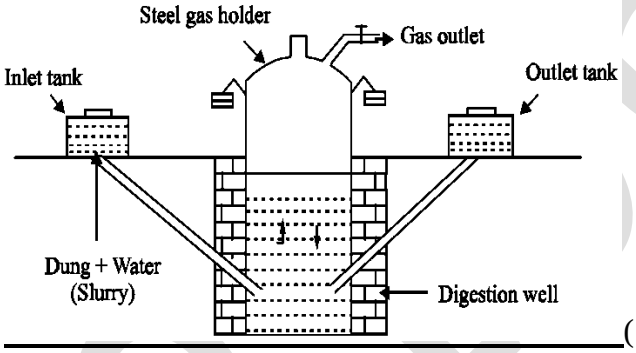
Nuclear Fusion: When two lighter nuclei combined together to form a heavier nucleus at very high temperature releases tremendous energy and neutrons.



Nuclear reactions are effectively used in nuclear power plants. (1M)

6. **Bio gas or Gobar Gas:** Mixture of various gases formed by anaerobic degradation of biological matter in the absence of oxygen. (1 M)

Production of bio gas



(1M)

Bio-gas plant or Gobar gas plant consists of a well like under ground tank (called digester) covered with dome shaped roof with a gas out let pipe. The dome of the digester acts as gas holder. On the left hand side of the digester there is a sloping inlet chamber through which cattle dung + water slurry is introduced. On the right hand side, there is a outlet chamber, through which spent dung slurry gets collected. (1M)

Working

- ✓ Slurry (animal dung + water) is fed into the digester through the inlet chamber. The slurry, in the digester, is left for about two months for fermentation.
- ✓ Anaerobic micro-organisms are responsible for this action. As a result of anaerobic fermentation, bio-gas is collected in the dome.
- ✓ When sufficient amount of bio-gas is collected in the dome, it exerts a large pressure on the slurry and this in turn forces the spent slurry to the over flow tank through the outlet chamber.

(1M)

Uses of Bio Gas

	1. Bio-gas is used for cooking food and heating water. 2. It is used to run engines. 3. It is also used as an illuminant in villages. 4. It is used for running tube-well and water pump-set engines. 5. It is directly used in gas turbines and fuel cells for producing electricity. (1M)
5.	**Discuss the following case studies on** **(a) Deforestation (2 M)** **(b) Mining (8 M)** **(c) Food resources (3 M)** **(d) Renewable and Non-renewable energy resources (2 M)** BTL4 **Answer : Page : 5.10, 5.31, 5.42, 5.64 - A. Ravikrishnan** **(a)** Deforestation (2 M) (b) Mining (8 M) (c) Food resources (3 M) (d) Renewable and Non-renewable energy resources (2 M)

UNIT - IV SOCIAL ISSUES AND THE ENVIRONMENT	
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 – Climate Change, Global Warming, Acid Rain, Ozone Layer Depletion, Nuclear Accidents and Holocaust, Case Studies. – Wasteland Reclamation – Consumerism and Waste Products – Environment Production Act– Air (Prevention And Control Of Pollution) Act – Water (Prevention And Control Of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Enforcement Machinery Involved in Environmental Legislation- Central and State Pollution Control Boards- Public Awareness.	
Q. No.	**PART – A**
1	**Define the term sustainable development. (NOV/DEC 2005, NOV/DEC 2007, NOV/DEC 2009, APR/MAY 2011)** BTL1 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 rain water harvesting? (MAY/JUNE 2008)** BTL1 Reduction in the use of current for pumping water. • Mitigating the effects of droughts and achieving drought proofing. • Increasing the availability of water from well. • Rise in ground water levels. • Minimizing the soil erosion and flood hazards. • Upgrading the social and environmental status. • Future generation is assured of water.
3	**List the objectives of watershed management. (NOV/DEC 2009)** BTL4 • To minimize the risks, of floods, drought and landslides. • To develop rural areas in the region with clear plan for improving the economy of the region. • To manage the watershed for developmental activities like domestic water supply, irrigation, hydropower generation etc., • To generate huge employment opportunities in the backward rain- fed areas to ensure livelihood security. • 5. To promote social forestry and horticultural activity on all suitable areas of land.
4.	**Define the term environmental ethics. (NOV/DEC 2011, NOV/DEC 2013)** BTL1 Environmental ethics refers to the issues, principles and guidelines relating to human interactions with their environment.
5.	**State a few drawbacks of pollution related acts. (NOV/DEC 2008)** BTL1 • The penalties in the act are very small when compared to the damage caused by the big industries due to pollution. • A person cannot directly file a petition in the court. • Litigation, related to environment is expensive, since it involves technical

	Knowledge. • For small unit it is very expensive to install Effluent Treatment – Plant • The position of chairman of the boards is occupied by political appointee. Hence it is difficult to implement the act without political interference.
6.	**What is meant by ISO 14000? (NOV/DEC 2008)** BTL1 ISO 14000 is the environmental management standards which exist to help Organizations minimize how their operations negatively affect the environment and Comply with applicable laws and regulations.
7	**What are the objectives of public awareness?** BTL1 • To create awareness among people of rural and city about ecological imbalances, local environment, technological development and various development plants. • To organize meetings, group discussion on development, tree plantation programmers, exhibitions. • To focus on current environment problems and situations • To train our planners, decision – makers, politicians and administrators. • To eliminate poverty by providing employment that overcome the basic environmental issues. • To learn to live simple and eco-friendly manner
8.	**What are the objectives of environmental impact assessment (EIA)?** BTL1 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. Objectives of EIA • To identify the main issues and problem of the parties. • To identify who is the party. • To identify what are the problems of the parties. • To identify why the problems are arise.
9.	**Define urbanization. (NOV/DEC 2010)** BTL1 Urbanization is the movement of human population from rural area to urban area for the want of better education, communication, health and employment.
10	**How can global warming be controlled? (NOV/DEC 2010, APR/MAY 2011)** BTL2 • By reducing the use of fossil fuels. • Utilize renewable resources such as wind, solar and hydropower. • Plant more trees. • Stabilize population growth. • Remove atmospheric CO_2 by utilizing photo synthetic algae.
11	**Mention any four fundamental rights of the individual. (NOV/DEC 2010)** BTL1 • Human right to freedom. • Human right to property. • Human right to religion. • Human right to culture and education. • Human right to equality.
12.	**What is E-Waste? (NOV/DEC 2011)** BTL2 The waste of electronic equipment like computers, printers and mobile phones, Xerox

	machines, calculators, etc. are e-waste.
13.	**What do we mean by environment refugees? (NOV/DEC 2011)** BTL2 Environmental refugee is a person displaced due to environment causes, especially land loss, and degradation and natural disaster.
14.	**List the objectives of Forest Conservation act. (NOV/DEC 2013)** BTL1 • To protect and conserve the forest • To ensure judicious use of forest
15.	**What are the objectives of water act? (NOV/DEC 2014)** BTL1 • 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.
16	**Define consumerism and disaster. (NOV/DEC 2015)** BTL2 Consumerism refers to the interrelationship between sellers and buyer. Disaster is a geological process and is defined as an event concentrated in time and space, in which a society or sub-division of a society undergoes severe danger and causes loss of its members and physical property.
17	**What are landslides? (MAY/JUNE 2008, NV/DEC 2014)** BTL2 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.
18	**What are the harmful effects of landslides?** BTL2 • Landslides block the roads and diverts the passage • Erosion of soil increases. • Sudden landslides damage the houses, crop yield, live stock etc.
19.	**Define the term Tsunami.** BTL2 A tsunami is a large wave that is generated in a water body when the sea floor is deformed by seismic activity. This activity displaces the overlying water in the ocean.
20	**Give comprehensive definition for air pollution. (NOV/DEC 2010, APR/MAY 2011)** BTL2 The presences of one are more contaminants like dust, smoke, mist and dour in the atmosphere, which are injurious to human beings, plants and animal.
21	**Mention four causes of floods. (NOV/DEC 2010)** BTL2 • Heavy rain, rainfall during cyclone causes flood. • Sudden snow melt also raises the quantity of water in streams and causes flood. • Clearing of forests for agriculture has also increased severity of floods. • Reduction in the carrying capacity of the channel, due to accumulation of Sediments cause floods.
22	**List the objectives of Forest Conservation Act. (NOV/DEC 2013)** BTL1 • Illegal non-forest activity within a forest area can be immediately stopped under this act. • Provides conservation of all types of forests. Non forest activities include clearing of forest land for cultivation of any types of crops.
23	**What are the important aspects of sustainable development?** BTL2 • Inter – generational equity

	It states that we should hand over a safe, healthy and resourceful environment to our future generations. • Intra – generational equity It states that the technological development of rich countries should support the economic growth of the poor countries and help in narrowing the wealth gap and lead to sustainability
24	**Explain the need for water conservation.** BTL2 • Though the resources of water are more, the quality and reliability are not high due to changes in environmental factors. • Better lifestyles require more fresh water. • As the population increases, the requirement of water is also more. • Due to deforestation, the annual rainfall is also decreasing. • Over exploitation of ground water, lead to drought. • Agricultural and industrial activities require more fresh water.
25	**Define the term environmental ethics. (NOV/DEC 2011, NOV/DEC 2013)** BTL2 "Environmental ethics refers to the issues, principles and guidelines relating to human interactions with their environment".
26	**What is meant by environmental audit? (NOV/DEC 2008)** BTL2 Environmental audits 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 indicators of such Performance and position.
27.	**What is consumerism? List any two objectives of consumerism.** BTL1 The consumption of resources by the people is known as consumerism. Objectives It improves the rights and powers of the buyer It forces the manufacturer to reuse and recycle the product after usage.
28.	**What is Eco-mark?** BTL1 Environmentally friendly products are generally indicated by the symbol called Eco-mark. Eco-mark is a certification mark issued by the Bureau of Indian Standard (BIS) to the environmental friendly products.
	PART – B
1	**What are the salient features of the Air pollution act, Water pollution act and Environment protection Act? Give the reason for why do we prefer environmental protection act as an Umbrella act. (13 M) (MAY/JUNE 2005, NOV/DEC 2005, JAN 2006, NOV/DEC 2006, NOV/JUNE 2007, NOV/DEC 2009, NOV/DEC 2010, MAY/JUNE 2011, NOV/DEC 2013, DEC 2014)** BTL4 **Answer : Refer : 6.34 – 6.38 - A. Ravikrishnan** • Objectives and features of environment protection act (5 M) • Objectives and features of air pollution act (4 M) • Objectives and features of water pollution act (4 M)
2	**Explain in detail the strategies adopted for conservation of water. (6 M) (NOV/DEC 2009, APR/MAY 2010, NOV/DEC 2010, APR/MAY 2011, NOV/DEC 2014)** BTL2 **Answer : Refer : 6.7 – 6.8 - A. Ravikrishnan** • Reducing evaporation loss (1 M) • Reducing irrigation loss (1 M)

	• Re-use of water (1 M) • Preventing wastage of water (1 M) • Decreasing run-off losses (1 M) • Avoid discharge of sewage (1 M)
3	**Discuss in detail about Wild life protection act 1972 and Forest conservation act 1980. (13 M) (NOV/DEC 2010, NOV/DEC 2014)** BTL4 **Answer : Refer : 6.38 – 6.40 - A. Ravikrishnan** • Objectives of Wildlife protection act (2 M) • features of wildlife protection act (4 M) • Objectives of Forest conservation act (2 M) • Features of Forest conservation act (5 M)
4	**Explain the following** **(a) Sustainable development (6 M)**BTL2 **(b) Urban problems related to energy. (7 M) (NOV/DEC 2005, NOV/DEC 2006, MAY/JUNE 2007, NOV/DEC 2010, NOV/DEC 2011, MAY/JUNE 2013)** BTL2 **i. Answer : Refer : 6.21 – 6.6 - A. Ravikrishnan** Sustainable development : • World summit (Agenda) (2 M) • Aspects (2 M) • Concept and significance (2 M) **ii. Answer : Refer : 6.21 – 6.6 - A. Ravikrishnan** Urban problems related to energy : • Definition of urbanization (2 M) Urbanization is the movement of human population from rural areas to urban areas for the want of better education, communication, health, employment, etc. • Energy demanding activities (3 M) • Solution for urban energy problem (2 M)
5	**Discuss the phenomenon of global warming and the factors contributing to it. (13 M)** BTL4 • Explanation of phenomenon of global warming (7 M) • Contributing factors (6 M)
6	**Give a note on nuclear accidents and holocausts. (6 +7 M) (MAY/JUNE 2013, NOV/DEC 2013)** BTL4 **Answer : Refer : 6.24 – 6.26 - A. Ravikrishnan** • Nuclear energy and nuclear accidents (2 M) • Types of nuclear accidents (4 M) • Effect of nuclear holocaust (4 M) • Control measures of holocausts (3 M)
7.	**State the 12 principles of green chemistry. (7 M)** BTL1 **Answer : Refer : - A. Ravikrishnan** • **Prevention.** It is better to prevent waste than to treat or clean up waste after it is formed. • **Atom Economy.** Synthetic methods should be designed to maximize the incorporation of all materials used in the process into the final product.

	• **Less Hazardous Chemical Synthesis.** Whenever practicable, synthetic methodologies should be designed to use and generate substances that possess little or no toxicity to human health and the environment. • **Designing Safer Chemicals**. Chemical products should be designed to preserve efficacy of the function while reducing toxicity. • **Safer Solvents and Auxiliaries**. The use of auxiliary substances (solvents, separation agents, etc.) should be made unnecessary whenever possible and, when used, innocuous. • **Design for Energy Efficiency.** Energy requirements should be recognized for their environmental and economic impacts and should be minimized. Synthetic methods should be conducted at ambient temperature and pressure • **Use of Renewable Feed stocks.** A raw material or feedstock should be renewable rather than depleting whenever technically and economically practical. • **Reduce Derivatives.** Unnecessary derivatization (blocking group, protection/deprotection, temporary modification of physical/chemical processes) should be avoided whenever possible . • **Catalysis**. Catalytic reagents (as selective as possible) are superior to stoichiometric reagents. • **Design for Degradation**. Chemical products should be designed so that at the end of their function they do not persist in the environment and instead break down into innocuous degradation products. • **Real-time Analysis for Pollution Prevention**. Analytical methodologies need to be further developed to allow for real-time in-process monitoring and control prior to the formation of hazardous substances. • **Inherently Safer Chemistry for Accident Prevention**. Substance and the form of a substance used in a chemical process should be chosen so as to minimize the potential for chemical accidents, including releases, explosions, and fires (7 M)
8.	**What is rain water harvesting? What are the purposes survived by it? (7 M)** BTL2 **Answer : Refer : 6.8 - A. Ravikrishnan** **Rain water harvesting :** A technique of capturing and storing of rain water for further utilization (1 M) **Objective:** • To meet increasing demands of water • Raise water table by recharging ground water • Reduce ground water contamination from salt water intrusion • To reduce the surface run-off losses • To reduce storm water and soil erosion • To increase hydrostatic pressure to stop land subsidence • To reduce water crises and water conflicts (1 M) **Roof top rainwater harvesting** • Involves collecting water that falls on roof of house • Rainwater from roof top, road surface, playground diverted to surface tank. Explanation (2 M) • Diagram (2 M)

	Advantages of rainwater harvesting • Increases the well water availability § Raise ground water level • Minimizes soil erosion and flood hazards • Upgrading the environmental and social status • Reduction in the use of current for pupping water • Future generation is assured for water (1 M)
9.	**What is wasteland? Mention its types and sources. Explain the objectives and methods of wasteland reclamation. (7 M)** BTL2 **Answer : Refer : 6.28 - A. Ravikrishnan** The land which is not in use is named as wasteland. Types: 1. Uncultivable wasteland 2. Cultivatable wasteland (1 M) Causes of wasteland (1 M) Objectives of wasteland reclamation (1 M) Methods of wasteland reclamation (4 M)
10.	**List the traditional rights of seller and buyer. Describe the objectives of consumerism and factors affecting consumerism. (7 M)** BTL2 **Answer : Refer : 6.31 - A. Ravikrishnan** Traditionally favourable rights of seller (1 M) Traditional buyer rights (1 M) Objectives of consumerism (3 M) Factors affecting comsumerism (2 M)
11.	**What is biomedical waste? Describe types and the various steps involved in management of biomedical waste. (7 M)** BTL2 **Answer : Refer : 6.41 - A. Ravikrishnan** Waste generated from health care activities. (1 M) Types of biomedical waste (3 M) Three steps involved in management of biomedical waste (3 M)
12.	**Define watershed and watershed management? Explain the concept of watershed management in detail. (13 M)** BTL2 **Answer : Refer : 6.11 - A. Ravikrishnan** Watershed – The land area from which water drains under the influence of gravity into a stream, lake, reservoir or other body of surface water, (1 M) Watershed management – The management of rainfall and resultant runoff is called watershed management. (1 M) Factors affecting watershed management (1 M) Objectives of watershed management (2 M) Watershed management techniques (2 M) Components of integrated watershed management (6 M)
	PART–C
1	**What is an earthquake? Write about its causes, effects and measures to face the earthquake. (15 M) (APR/MAY 2008, NOV/DEC 2008, NOV/DEC 13, NOV/DEC 2014)** BTL4 **Answer : Refer : 6.58 – 5.58 - A. Ravikrishnan** •Definition: An earthquake is a sudden vibration caused on the earth's surface due to the

	sudden release of tremendous amount of energy stored in the rocks under the earth's crust. (2 M) • Causes (4 M) • Effects (4 M) • Preventive measures (5 M)
2	**Give a note on** **(d) Floods** **(e) Cyclone** **(f) Landslides** **(15 M)** BTL2 **Answer : Refer : 6.52 – 6.57 - A. Ravikrishnan** •Definition of flood: 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 (1 M) • Causes and effects (2 M) • Preventive measures of floods (2 M) • Definition: Cyclone is a meteorological phenomenon, intense depressions forming over the open oceans and moving towards the land. On reaching the shores, it move into the interior of the land or along the shore lines. (1 M) • Causes and effects (2 M) • Preventive measures of cyclone (2 M) •Definition: 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. (1 M) • Causes and effects (2 M) • Preventive measures of landslides (2 M)

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 / AIDS – Women and Child Welfare – Role of Information Technology in Environment and Human Health – Case Studies.

Q. No.	PART-A
1.	**Define immigration and emigration. (Coim A.U. Dec 2009)**BTL1 **Immigration -** Arrival of individuals from neighbouring population. **Emigration -** Dispersal of individuals from the original population to new areas
2.	**Define population and population density. (Coim A.U. Dec 2009, Chen A.U. Apr 2011)**BTL1 **Population**-Group of Individuals belonging to the same species, which live in a given area at a given time. **Population density**-Number of individuals of the population per unit area (or) unit volume
3.	**Define birth rate and death rate.** BTL1 **Birth rate or Natality**-No. of live birth per 1000 people in a population in a given year **Death rate or Mortality**-No. of deaths per 1000 people in a population in a given year
4.	**Define doubling time with reference in population growth. (Chen A.U. Dec 2008, 2013)**BTL1 Time required for a population to double its size at a constant annual rate. $Doubling\ time = Td = \frac{70}{r}$Where, r -Annual growth rate. If a nation has 2% annual growth; its population will double in the next 35 year.

5.	**What are the reasons behind the increased population growth in the less developed nations compared with developed nations? (Chen AU Dec 2007)**BTL1 • Due to decrease in the death rate and increase in the birth rate • The availability of antibodies, immunization, increased food production, clean water and air decreases the famine-related deaths and infant mortality. • In agricultural based countries, children are required to help parents in the fields.
6.	**Write population equation. (Coim. A.U. Dec 2008)**BTL1 $Pt + 1 = Pt + (B - D) + (I - E)$ Where Pt and Pt+1 = sizes of population in an area at two different point s in time t and t+1; B-Birth rate I-Immigration; D-Death Rate; E-Emigration.
7.	**List the characteristics of population growth.** BTL4 • Exponential growth • Doubling time • Infant mortality rate • Total fertility rates (TFR) • Replacement level • Male-Female Ratio • Demographic transition
8.	**Mention the various problems of population growth.** BTL4 • Increasing demands for food and natural resources • Inadequate housings and health services • Loss of agricultural lands • Unemployment and socio-political unrest • Environmental pollution
9.	**What is population explosion? (Chen AU Jun 2007, May 2008, TCY A.U. Dec 2008, Dec 2009, Dec2010, Apr 2015)**BTL1 The enormous increase in population due to low death rate and high birth rate.
10.	**What are the effects of population explosion? (Chen A.U. Dec 2009)**BTL1 • Poverty • Environmental degradation • Over exploitation of natural resources • Renewable resources like forests, grass lands are also under threat • Will increase disease, economic inequity and communal war • Leads to development of slums • Lack of basic amenities like water supply and sanitation, education, health, etc • Unemployment and low living standard of people
11.	**How the age structure of population can be classified?** BTL4 • Pre-productive population (0-14 years) • Reproductive population (15-44 years) • Post reproductive population (Above 45 years)
12.	**State the reasons of population explosion.** BTL1 • Invention of modern medical facilities; Illiteracy • Decrease in death rate and increase in birth rate

	• Availability of antibiotics, Food, clean water, air, etc. • Decreases the famine-related deaths and infant mortality • In agricultural based countries- Children are required
13.	**What is family welfare programme?** BTL1 Programme implemented by the government of India. An integral part of overall national policy of growth covering human health, maternity, family welfare, child care and women's right, education, nutrition, health, employment, shelter, safe drinking water
14.	**Define population stabilization ratio.** BTL1 Ratio of crude death rate to crude birth rate.
15.	**What are the objectives of family welfare programme? (TNV A.U. Dec 2009)**BTL1 • Slowing down the population explosion by reducing the fertility • Pressure on the environment due to over exploitation of natural resources is reduced
16.	**List the factors influencing family size.** BTL4 • Reduce infant mortality rate to below 30 per 1000 infant • Achieve 100% registration of births, deaths, marriage and pregnancy • Encourage late marriage, late child-bearing, breast feeding • Enables to improve women's health, education and employment • Prevent and control of communicable disease and AIDS/HIV • Promote vigorously the family norms • Making school education up to age 14 free and compulsory
17.	**What is meant by NIMBY syndrome? (Chen A.U. Dec 2008)**BTL1 NIMBY-**N**ot **I**n **M**y **B**ack **Y**ard. Describes the opposing of residents to the nearby location of something they consider undesirable, even clearly a benefit for many
18.	**List the factors influencing human health.** BTL4 • Nutritional Factors • Biological Factors • Chemical Factors • Psychological Factors
19.	**What is meant by human rights?** BTL1 The fundamental rights which are possessed by all human beings irrespective of their caste, nationality, sex and language. These cannot be taken away by any legislature. Every citizen must enjoy certain rights and also has certain duties towards the country.
20.	**List the features of draft declaration of human rights**. BTL4 • Human rights to freedom • Human rights to property • Human rights to freedom of religion • Human rights to culture and education • Human rights to constitutional remedies • Human rights to equality • Human rights against exploitation • Human rights to food and environment • Human rights to good health
21.	**What is education? List its types.** BTL1

	Education-learning through which knowledge about the particular thing can be acquired **Types of Education** • **Formal Education**-Self related. Will read, write, get jobs and tackle the problems • **Value Education**–Instrument to analyse our behavior and provide proper direction to youth. Teaches distinction between right and wrong, helpful, loving, etc. • **Value-based environmental education**-Provide knowledge on principles of ecology, fundamentals of environment and biodiversity
22.	**Write the importance of value education. (Chen A.U. Dec 2008, 2013)**BTL2 • Improve the integral growth of human being • Create attitudes and improvement towards sustainable lifestyle • Increase awareness about our national history, cultural heritage, constitutional rights, national integration, community development and environment • Create and develop awareness about the values, role and their significance
23.	**What is role playing element of value education?** BTL1 Acting out the true feelings of the actors by taking the role of another person but without the risk of reprisals.
24.	**Mention the types of values imported through value education.** BTL1 • Universal Values or Social Values • Cultural Values • Individual Values • Global Values • Spiritual Values
25.	**Define the term HIV/AIDS.** BTL1 **HIV-H**uman **I**mmunodeficiency **V**irus; **AIDS-A**cquired **I**mmuno **D**eficiency **S**yndrome; a condition in humans in which the immune system begins to fail, leading to life-threatening opportunistic infections.
26.	**What are the factors which do not influence transmission of HIV?** BTL1 Tears, food, air, cough, handshake, mosquito, flies, insect bites, urine, saliva during kissing, sharing of utensils, cloths, toilet, bathroom etc.
27.	**Mention some effects of HIV/AIDS. (Chen A.U. Dec 2008, 2011, 2014)** BTL1 • Large number of death occurs, which affect environment and natural resources • Loss of labour and level of production decreases • Required more water for maintaining hygiene in AIDS affected locality • People affected by HIV, cannot perform work well, due to lack of energy and frequent fever and sweating
28.	**What are the major precautions to avoid AIDS? (Chen AU May 2008)**BTL1 • Avoid indiscriminate sex and encourage the use of condoms and also avoid the use of sharing razors needles and syringes • Prevention of blood borne HIV transmission • Aids awareness programmes should be encouraged • Counseling services should be provided • Drug treatment
29.	**State the role of information technology in Environment. (Coim A.U. Dec 2009, Chen AU Jan 2006)**BTL4

	• Plays a vital role in the field of environmental education. • Means collection, processing, storage and dissemination of information. • Numbers of software have been developed to study about the environment. • The internet facilities, information through satellites, World Wide Web, and geographical information systems provide us up-to-date information on various aspects of environment and weather.
30.	**What is value education? Give its significance. (NOV/DEC 2013)**BTL4 An instrument used to analyse our behavior and provide proper direction to our youths. Teaches them the distinction between right and wrong, to be compassionate, helpful, loving, generous and tolerant. So that a youth can move towards the sustainable future.
31.	**What do you mean by Doubling Time? (NOV/DEC 2013)** BTL1 Period of time required for a quantity to double in size or value. Generally applied to denote the population growth.
32.	**State the role of Information Technology in health protection.**BTL1 • Health organization turning to package solution of IT for streamlining services oriented work in effective manner. • Health service technology such as finance and accounting, pathology, patient administration • Helps the doctor to monitor the health of the people effectively • Online help of expert doctors can be used for the patient • The outbreak of epidemic diseases can be conveyed easily • Effective function of a hospital • Drugs and its replacement can be administered efficiently • The data regarding birth and death rate, immunization and sanitation programmes can be maintained accurately with the help of computers
33.	**What is environmental impact assessment?** BTL1 Formal process of predicting the environmental consequences of any development projects. Used to identify the environmental, social and economic impacts of the project prior to decision making.
34.	**What is GIS?** BTL1 Graphical Information System (GIS) acts as a technique of superimposing various thematic maps with the use of digital data on a large number of inter-related aspects. Considered to be an effective tool in environmental management.
35.	**List out the benefits of EIA.** BTL4 • Reduce the cost and time • Performance of the project improved • Waste treatment and cleaning expenses are minimized • Usages of resources are decreased • Biodiversity is maintained • Human health is improved (
36.	**Mention the key element of EIA.** BTL1 • **Scoping** – To identify the key issues of the concern in the planning process at early stage, aid site selection and identify any possible alternatives. • **Screening -**To decide whether an EIA is required or not.

	• **Identifying and evaluating alternatives**-Knowing alternative sites and techniques and their impacts. • **Mitigation measures dealing with uncertainty**-Action taken to prevent adverse effect of a project. • **Environmental statements**-Final stage of EIA process which reports the findings of the EIA.

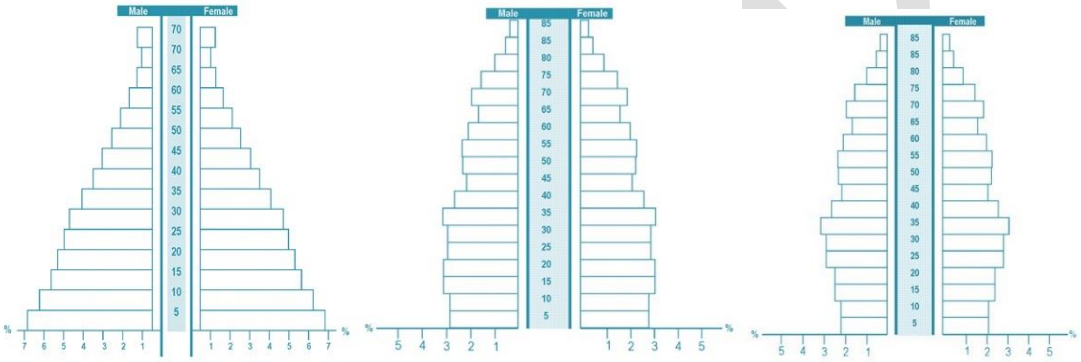
37.	**What is child welfare? Mention the schemes towards child welfare.** BTL1
	Child Welfare
	• Children occupy 40% of the total population.
	• Out of 21 Million Children born every year in India, 20 Million are estimated to be working as Child Labour in hazardous industries
	Organizations towards Child Welfare
	• UN Conventions on Rights of Child or International Laws
	• Rights of child
	  • …Right to Survival
	  • …Right to Participation
	  • …Right to Development
	  • …Right to Protection
	• Ministry of HRD
	• Centre for Science and Environment (CSE)
	• Environment degradation and child welfare
	So it is essential to keep our environment clean to children for better and healthy life Poverty

38.	**What is women welfare? List the various organization function towards women welfare.** BTL1 Welfare to improve the status of the women by providing opportunities in education, employment and economic independence (1M) **Organizations Towards Women Welfare** • NNWM (National Network for Women and Mining): Fighting for the "Gender Audit" of India's mining companies • UNDW (United Nations Decade for Women): Women welfare related issues on international agenda • CEDAW (Convention on Elimination of all forms of Discrimination against Women) • NGO's as MahilaMandals • Ministry for Women and Child Welfare (1M)
	PART – B
1.	
	(i) Can you recall population characteristics & variations among nations? (7M) BTL1 **(ii) What is population explosion and state the views on population growth. (6M)**BTL2 **(i) Answer: Page:** 7.3 – 7.8**-A. Ravikrishnan** **Characteristics of population growth** • Exponential growth • Doubling time

- Infant mortality rate
- Total fertility rates
- Replacement level
- Male-Female ratio
- Demographic transition(3M)

Variation of population among nation based on age structure

- Pre-productive population (0-14 years)
- Reproductive population (15-44 years)
- Post Reproductive population (above 45 years)
  - Pyramid shaped variation of population (Increase)
  - Bell shaped variation of population (Stable)
  - Urn shaped variation of population (Decrease)(2M)



- Diagrams (2M)

(ii) Answer: Page: 7.8 – 7.11**-A. Ravikrishnan**

Population explosion–Enormous increase in population due to low death rate and high birth rate is termed as population explosion. (1M)

Causes of population explosion

- Invention of modern medical facilities; Illiteracy
- Decrease in death rate and increase in birth rate
- Availability of antibiotics, Food, clean water, air, etc.
- Decreases the famine-related deaths and infant mortality
- In agricultural based countries- Children are required(3M)

Effect of Population Explosion

Poverty; Environmental degradation; Unsustainable environment; Over exploitation of natural resources; Renewable resources become under threat; Increase disease, economic inequity and communal war; development of slums; lake of basic amenities; Unemployment.(2M)

2.

(i) How would you explain the family welfare programs (8M)BTL2

(ii) Show family planning in Indian context.(5M)BTL2

(i) Answer: Page: 7.11 – 7.14-A. Ravikrishnan.

Family welfare programme

	• An integral part of overall national policy of growth covering human health, maternity, family welfare, child care and women's right, education, nutrition, health, employment, shelter, safe drinking water (1M) **Objectives of family welfare programme** • Slowing down the population explosion by reducing the fertility • Pressure on the environmentis reduced(1M) **Objectives of family planning** • Reduce infant mortality rate to below 30 per 1000 infant • Achieve 100% registration of births, deaths, marriage and pregnancy • Encourage late marriage and late child-bearing. • Encouraging breast feeding • Enables to improve women's health, education and employment • Making family planning available to all women who wanted do • Constrain the spread of AIDS/HIV • Prevent and control of communicable disease • Promote vigorously the family norms • Making school education up to age 14 free and compulsory (3M) **Methods of family planning** • Traditional method • Modern method • Temporary method (3M) **(ii) Answer: Page: 7.14-A. Ravikrishnan.** (BTL2) **Family planning in India** • It was started in the year 1952 • In 1970's Indian government forced family planning campaign all over the country • In 1977, national family programme and ministry of health and family welfareredesigned • In 1978, the government legally raised the minimum age of marriage for men from 18 to 21 and for women 15 to 18 • In 1981, census report showed thatthere was no drop in population. Since then funding for family planning programmes has been increased further • The first country that implemented the family welfare programme at government level • Centrally sponsored programme. For this, the states receive 100% assistance from central government • The ministry of health and family welfare have started the operational aims and objectives of family welfare o To promote the adoption of small family size norm, on the basis of voluntary acceptance o To ensure adequate supply of contraceptives to all eligible couples within easy each o Extensive use of public health education for family planning (5M)
3.	
	Discuss the influence of environmental parameters and pollution on human growth. (13M)BTL2

Answer: Page: 7.14 – 7.17-A. Ravikrishnan

Factors influencing human health-A state of complete physical, mental, social and spiritual well-being and not merely the absence of disease or infirmity."The Ability To Lead A Socially And Economically Productive Life."

- Nutritional factors
- Biological factors
- Chemical factors
- Psychological factors (3M)

Holistic concept of health-Recognizes the strength of social, economic, political and environmental influences on health

Determinants of health- Heredity, Health and family welfare services, Environment, Life-styleSocio-economic conditions. Disease result from complex interaction between manand the environment.

Disease-"Maladjustment of the human organism to the environment". (2M)

Environmental degradation due to population explosion

- All that which is external to man is the environment
- The concept of environment is complex
- The external environment or the Macro-environment to be responsible for millions of preventable diseases originating in it (1M)

Environmental hazards

- **Physical:** Air, water, soil, housing, climate, geography, heat, light, noise, debris, radiation, etc. and their health effects
- **Biological**: bacteria, viruses, parasites, microbial agents, insects, rodents, animals and plants, etc. and their health effects
- **Chemical**: Combustion of fossil fuel liberates SO_2, NO_2, CO_2 ; Industrial effluents; Pesticides; Heavy metals; Chlorofluoro carbons and their health effects
- **Psychosocial**: Cultural values, customs, beliefs, habits, attitudes, morals, religion, education, lifestyles, health services, social and political organization and their health effects(7M)

4.

(i) Write short notes on human rights. (5M) BTL4

(ii) Discuss the salient features of draft declaration of Human Rights and environment. (8M)BTL2

(i) Answer: Page: 7.17-7.19 A. Ravikrishnan.

Human rights

- The fundamental rights which are possessed by all human beings irrespective of their caste, nationality, sex and language
- These cannot be taken away by any legislature or an government act
- Seen as belonging to men and women by their very nature
- India is a democratic country
- Aim of India is to ensure happiness to all the citizens with equal rights, opportunities and comforts
- Every citizen must enjoy certain rights and also has certain duties towards the country

- Include civil and political rights, such as the right to life and liberty, freedom of expression, and equality before the law; and social, cultural and economic rights, including the right to participate in culture, the right to food, the right to work, and the right to education.
- All human beings are born free and equal in dignity and rights
- They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood (5 M)

(ii) Answer: Page: 7.17-7.19-**A. Ravikrishnan.**BTL2

Features of draft declaration of human rights

- Human rights to freedom
- Human rights to property
- Human rights to freedom of religion
- Human rights to culture and education
- Human rights to constitutional remedies
- Human rights to equality
- Human rights against exploitation
- Human rights to food and environment
- Human rights to good health (8M)

5.

Summarize the objectives, concepts, types of values and elements of value education? How can the same be achieved? (13M) BTL3

Answer: Page: 7.20 – 7.24-A. Ravikrishnan

Education-learning through which knowledge about the particular thing can be acquired

Types of Education

- Formal Education-Self related
- Value Education–Instrument to analyse our behavior and provide proper direction to youth
- Value-based environmental education-Provide knowledge on principles of ecology, fundamentals of environment and biodiversity (1M)

Objectives of value education

- To improve the internal growth of human beings.
- To create attitudes and improvement towards sustainable life style.
- To increase awareness on national history, our cultural heritage, constitutional rights, national integration, community development and environment.
- To create and develop awareness about the values and their significance and role.
- To understand about our natural environment in which land and, air and water are interlinked. (2M)

Concepts of value education

- Why and how can we use less resources and energy?
- Why do we need to keep our surrounding clean?
- Why should we use less fertilizers and pesticides?
- Why it is important for us to save water and keep our water sources clean?
- Separate our garbage into degradable and non-degradable types before disposal (2M)

Types of values

	• **Universal Values or Social Values**: Expresses the human nature reflected as joy, compassion, tolerance, service, truth, etc • **Cultural Values:** To reflect true and the false behaviour of human beings in language, aesthetics, education, law, economics, etc • **Individual Values:** Parents and Teachers shape individual values to a greater extent • **Global Values:** To reduce disturbance of Harmony leading to ecological imbalance • **Spiritual Values:**To become more self-disciplined (3M) **Elements of value education–How the objectives can be achieved** • Telling Modeling • Role playing • Problem solving • Studying biographies of great man (5M)
6.	
	Explain the objectives, benefits and key elements of EIA (13M) (TNV AU Dec. 2009) BTL2 **Answer: Page:7.32 – 7.34-A. Ravikrishnan** **Objectives of EIA** • To identify the main issues and problems of the parties • To identify who is the party • To identify what are the problems of the parties • To identify why are the problems arise(2M) **Benefits of EIA** • Reduce the cost and time • Performance of the project improved • Waste treatment and cleaning expenses are minimized • Usages of resources are decreased • Biodiversity is maintained • Human health is improved (2M) **Key element of EIA** • **Scoping** – To identify the key issues of the concern in the planning process at early stage, aid site selection and identify any possible alternatives. (2M) • **Screening** -To decide whether an EIA is required or not. (2M) • **Identifying and evaluating alternatives**-Knowing alternative sites and techniques and their impacts. (1M) • **Mitigation measures dealing with uncertainty**-Action taken to prevent adverse effect of a project.(2M) • **Environmental statements**-Final stage of EIA process which reports the findings of the EIA. (2M)
7.	
	Explain in details about women welfare and child welfare. (13M) BTL2 **Answer: Page: 7.28 – 7.32-A. Ravikrishnan** **Women welfare**

Welfare to improve the status of the women by providing opportunities in education, employment and economic independence(1M)

Need for Women Welfare

- As women suffer Gender Discrimination
- Due to physical and mental torture given to them
- Violation of Human Rights to Women.
- Neglecting of Women in Policy making and decision making (2M)

Objectives of Women Welfare

- To provide Education
- To impart Vocational Training
- To generate awareness about the environment
- To improve employment opportunities
- To restore Dignity, Status and Equality (2M)

Objectives National Commission for Women by Government of India

- To examine constitutional and human rights for women.
- To review existing legislations.
- To sensitize the enforcement and administrative machinery to women's causes (1M)

Organizations Towards Women Welfare

- NNWM (National Network for Women and Mining): Fighting for the "Gender Audit" of India's mining companies
- UNDW (United Nations Decade for Women): Women welfare related issues on international agenda
- CEDAW (Convention on Elimination of all forms of Discrimination against Women)
- NGO's as MahilaMandals
- Ministry for Women and Child Welfare (2M)

Child Welfare

- Children occupy 40% of the total population.
- Out of 21 Million Children born every year in India, 20 Million are estimated to be working as Child Labour in hazardous industries (1M)

Reason for Child Labour

- Poverty
- Want of Money (1M)

Organizations towards Child Welfare

- **UN Conventions on Rights of Child or International Laws**-Formulated a set of International Standards to promote and protect the wellbeing of Children in our society
- **Rights of child**
  - …Right to Survival
  - …Right to Participation
  - …Right to Development
  - …Right to Protection
- **Ministry of HRD**-Concentrates on child's health, education, nutrition, clean and safe drinking water, sanitation and environment
- **Centre for Science and Environment (CSE)**-Scientific report says that "Children

	consume more water, food and air than adults and hence more susceptible to environmental contamination • **Environment degradation and child welfare**-Children are more affected due to environmental pollution. So it is essential to keep our environment clean to children for better and healthy life Poverty (3M)
8.	
	Write a note on Indian constitution. (13M) BTL1 **Answer: Page: 7.19 – 7.20-A. Ravikrishnan** **Indian constitution; Article 14-30 .** • Article 14: Provides Equality before Law • Article 15: Prohibits Discrimination • Article 16: Provides Equal Opportunity • Article 19: Provides Freedom of Speech and Expression • Article 20: Provides Protection from Conviction • Article 22: Lays down the Rights of a person in Custody • Article 23: Prohibits forms of Forced Labour • Article 24: Prohibits appointment of Child Labour • Article 25: Provides Freedom to Practice any Religion • Article 26: Right to establish Charitable Institutions • Article 27: Prohibits Tax for Promoting Religion • Article 28: Guarantees Secular Character in Education • Article 29: Right to conserve their Language for Minorities • Article 30: Right of Minority to run Educational Institutions • Article 32: Right to Constitutional Remedies for enforcement of Rights by proceeding in Supreme Court (13M)
PART-C	
1.	

	(i) Narrate the role of information technology in environment protection (TNV AU Dec.2008 Dec. 2009, June 2013, Nov. 2011) (8M)BTL4
	(ii) Describe the case studies on role of IT in environment protection. (7M) BTL5
	
	Answer: Page: 7.34 – 7.37-A. Ravikrishnan
	(i) Role of IT in environment
	Software for environment education
	• **Remote Sensing**-Gather information about an object without contact with it
	  • In agriculture
	  • In forestry
	  • In land cover
	  • Water resources Remote sensing(2M)
	• **Data base**
	  • The ministry of environment and forest
	  • National Management Information System (NMIS)

	• Environment Information System (ENVIS)(1M) • **Geographical Information System (GIS) –**Superimposing various thematic maps • Water resources, soil type, forest land • Interpretations of polluted zones, degraded lands • Check unplanned growth and environmental problems (1M) • **Satellite data** • Forest cover information • Information on monsoon, ozone layer depletion, smog etc. • Discovery of new reserves of oils, minerals, etc.(1M) • **World Wide Web** • Online learning centers • Provides the current and relevant information on principles, queries, and applications of environmental science. • Stores all digital files related to teaching(1M) • **General applications** • Easily Accessible around The World • Disaster Management-Suitable warning system, disaster preparedness • Opened up a large number of scientific and technological resources and skills to reduce disaster risk. • Internet • Aerial sensor technologies to detect and classify objects on earth. • To capture, store, manipulate, analyse, manage and present geographical data. • Store books, pictures and other data that reduces paper waste that helps us in saving trees. • E-bills has significantly increased, which also contribute in saving trees.(2M) **(ii) Answer: Page: 7.38 – 7.39-A. Ravikrishnan** **Case studies on Role of IT in environment** • Study on polluted back waters of Kerala • Ocean study monitor (OCM) to study phytoplanktons • GIS for forest management • National Emission Data System (NEDS) • Environment Information System (ENVIS) (7M)
2.	
	(i) **Explain the role of IT in protection of human health. (10 M) (AU June 2013, Dec. Nov. 2009)(10M)**BTL4 **(ii) Explain the case study on role of IT in human health protection. (5M)**BTL5 **(i) Answer: Page: 7.39–7.40-A. Ravikrishnan** **Role of IT in human protection** • Health service technology- Finance and accounting, pathology, patient administration. • Helps the doctor to monitor the health of the people effectively. • Online help of expert doctors can be used for the patient. • The outbreak of epidemic diseases can be conveyed easily.

	• Effective function of a hospital. • Drugs and its replacement can be administered efficiently. • The data maintenance- birth and death rate, immunization and sanitation programmes • Spreading awareness about diseases and preventive measures to be taken. • Reduces panic and provides information about prevention and treatment options. • Airports-Screened passengers for high temperature and other symptoms • Robots that emulate or simulate living biological organisms. • Nano-Robots act as delivery systems within the organism • e-Health for healthcare practice. • Gaining momentum in academic research as well as in psychology, clinical work, and mental health counselling. • Statistics about diseases like malaria, fluorosis, AIDS, etc. • DNA databases about population, medical records, fingerprints, etc • Saves lives in critical care and emergency situations. • Bioinformatics for drug discovery and thus contributing to human health. • Provide a great support in maintaining individual fitness.(10M) (ii) **Answer: Page: 7.40–7.41-A. Ravikrishnan** **Case study** Health services on New south wales (3 M) National Institute of Occupational health (2M)
3.	
	Explain HIV/AIDS, its sources, diagnosis, mode of transmission of HIV infection and control and preventive measures.(15M) BTL2 **Answer: Page:** 7.24 – 7.28**-A. Ravikrishnan** **HIV-H**uman **I**mmunodeficiency **V**irus; **AIDS-A**cquired **I**mmuno**D**eficiency **S**yndrome; a condition in humans in which the immune system begins to fail, leading to life-threatening opportunistic infections.(2M) **Sources of HIV infection.** • AIDS has spread from Africa. • HIV has transferred to human from African monkey or Chimpanzees. • HIV contaminated polio vaccine, prepared from monkey's kidney. • Spread through hepatitis-B viral vaccine in Los Angels New York. • Spread through small pox vaccine programme of Africa. (2 M) **Symptoms or diagnosis of HIV/AIDS** **Minor symptoms** • Persistent cough for more than one month • General skin disease • Viral infection • Fungus infection in mouth and throat • Frequent fever, headache, fatigue **Major symptoms** • Fever for more than one month

- Diarrhea for more than one month
- Cough and TB for more than six months
- Fall of hair from the head
- 10% of body weight get reduced within a short period.(4M)

Mode of transformation of HIV.

- Sexual transmission, presence of STD increases likelihood of transmission.
- Exposure to infected blood or blood products.
- Use of contaminated clotting factors by hemophiliacs.
- Sharing contaminated needles.
- Transplantation of infected tissues or organs.
- Certain body fluids from an HIV-infected person-Blood, Semen, Rectal fluids, vaginal fluids, Breast milk.
- Having unprotected sex with someone who has HIV.
- Receiving blood transfusions, blood products, or organ/tissue transplants that are contaminated with HIV.
- Contact between broken skin, wounds, or mucous membranes and HIV-infected blood or blood-contaminated body fluids.
- Women are more vulnerable to HIV. Transmission of HIV to their new born babies happen easily.
- Women around 18-20 years are at risk, since their cervical tissue is more vulnerable to invading HIV. (5M)

Control and preventive measure

- Education
- Prevention of blood borne HIV transmission
- Primary health care
- Counselling services
- Drug treatment (2M)