



DEPARTMENT OF CIVIL ENGINEERING

Date	8 th Jan 2024	Maximum Marks	50
Course Code	CV232AT	Duration (minutes)	90
Sem	III Semester	CIE – I (Scheme & Solution)	
Environment and Sustainability			

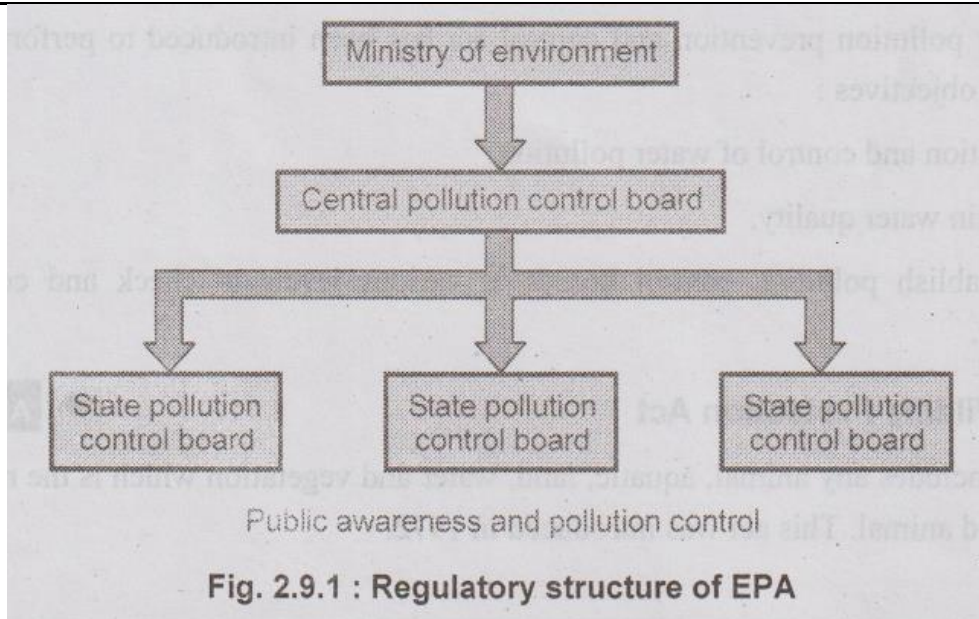
No.	Questions	M	BT	CO
1 ANS	<p>a) Define the terms i) Environment ii) Ecology iii) Bio-Diversity</p> <p>i) Environment can be defined as a sum total of all the living and non-living elements and their effects that influence human life. While all living or biotic elements are animals, plants, forests, fisheries, and birds, non-living or abiotic elements include water, land, sunlight, rocks, and air.</p> <p>ii) Ecology is the branch of biology that deals with the relations of organisms to one another and to their physical surroundings.</p> <p>iii) Bio-diversity is the variety of plant and animal life in the world or in a particular habitat, a high level of which is usually considered to be important and desirable.</p> <p style="text-align: right;">2 marks each</p>	6	1	1
ANS	<p>b) Materials flow in eco system is cyclic and Energy flow is unidirectional justify.</p> <p>Energy Flow</p> <p>It is by far considered one of the major processes in an ecosystem. It is obtained initially from the Sun and then moves through the food chain. At each stage, the consumer only retains a fraction of the energy it takes in. The remaining energy is dissipated as heat and cannot be recycled further. It is considered an open system concerning energy as it depends on continued energy flow and loses energy in the process.</p> <p>Material Flow</p> <p>After energy, the other major process in an ecosystem is the cycling of material in the form of nutrients. Unlike energy, the material is not entered into an ecosystem from any external source. Rather, it is chemically transformed. No material is lost in the cycle. It is also considered as a closed system concerning material flow. The movement of elements of an ecosystem such as carbon, phosphorus and nitrogen through the ecosystem is known as biogeochemical energy.</p> <p>Energy and nutrient availability constraint an ecosystem's productivity. In the ocean, light is plentiful at the surface but becomes scarce deep down. Nutrients also become scarce, so productivity is limited. These are certain considerations included while discussing an ecosystem in brief. At all levels, no resource will be equally distributed.</p> <p style="text-align: right;">2 marks each</p>	4	2	1
2. ANS	<p>Classify different types of ecosystems. Explain in brief any two ecosystems with their structure and composition.</p> <p>Terrestrial ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Tundra ecosystem.</p> <p>Aquatic ecosystem: Freshwater ecosystem, Marine ecosystem, Estuarine ecosystem.</p> <p style="text-align: right;">Classification 2 marks, explanation of any 2: 3 marks each</p>	10	2	2

3. ANS	<p>a) Recall the concept of ecological succession and classify the same</p> <p>Ecological succession is the process by which natural communities replace (or “succeed”) one another over time. For example, when an old farm field in the midwestern U.S. is abandoned and left alone for many years, it gradually becomes a meadow, then a few bushes grow, and eventually, trees completely fill in the field, producing a forest.</p> <p>Each plant community creates conditions that subsequently allow different plant communities to thrive. For example, early colonizers like grasses might add nutrients to the soil, whereas later ones like shrubs and trees might create cover and shade. Succession stops temporarily when a “climax” community forms; such communities remain in relative equilibrium until a disturbance restarts the succession process. There are two major types of ecological succession: primary succession and secondary succession.</p> <p>Primary succession happens when a new patch of land is created or exposed for the first time. This can happen, for example, when lava cools and creates new rocks, or when a glacier retreats and exposes rocks without any soil. During primary succession, organisms must start from scratch. First, lichens might attach themselves to rocks, and a few small plants able to live without much soil might appear. These are known as “pioneer species.”</p> <p>Gradually, the decomposition of those plants contributes to soil formation, and more and larger plants begin to colonize the area. Eventually, enough soil forms and enough nutrients become available such that a climax community, like a forest, is formed. If the site is disturbed after this point, secondary succession occurs.</p> <p>Secondary succession happens when a climax community or intermediate community is impacted by a disturbance. This restarts the cycle of succession, but not back to the beginning—soil and nutrients are still present. For example, after a forest fire that kills all the mature trees on a particular landscape, grasses might grow, followed by shrubs and a variety of tree species, until eventually the community that existed before the fire is present again.</p> <p style="text-align: right;">5 marks</p>	5	1	1
ANS	<p>b) Discuss the approaches of conserving the biodiversity</p> <p>Biodiversity refers to the variability of life on earth. It can be conserved in the following ways:</p> <ul style="list-style-type: none"> • In-situ Conservation • Ex-situ Conservation <p>In-situ Conservation</p> <p>In-situ conservation of biodiversity is the conservation of species within their natural habitat. In this method, the natural ecosystem is maintained and protected.</p> <p>The in-situ conservation has several advantages. Following are the important advantages of in-situ conservation:</p> <ol style="list-style-type: none"> 1. It is a cost-effective and convenient method of conserving biodiversity. 	5	2	1

	<p>2. A large number of living organisms can be conserved simultaneously.</p> <p>3. Since the organisms are in a natural ecosystem, they can evolve better and can easily adjust to different environmental conditions.</p> <p>Certain protected areas where in-situ conservation takes place include national parks, wildlife sanctuaries and biosphere reserves.</p> <p>National Parks</p> <p>These are small reserves maintained by the government. Its boundaries are well demarcated and human activities such as grazing, forestry, habitat and cultivation are prohibited. For eg., Kanha National Park, and Bandipur National Park.</p> <p>Wildlife Sanctuaries</p> <p>These are the regions where only wild animals are found. Human activities such as timber harvesting, cultivation, collection of woods and other forest products are allowed here as long as they do not interfere with the conservation project. Also, tourists visit these places for recreation.</p> <p>Biosphere Reserves</p> <p>Biosphere reserves are multi-purpose protected areas where the wildlife, traditional lifestyle of the inhabitants and domesticated plants and animals are protected. Tourist and research activities are permitted here.</p> <p>Ex-situ Conservation</p> <p>Ex-situ conservation of biodiversity involves the breeding and maintenance of endangered species in artificial ecosystems such as zoos, nurseries, botanical gardens, gene banks, etc. There is less competition for food, water and space among the organisms.</p> <p>Ex-situ conservation has the following advantages:</p> <p>The animals are provided with a longer time and breeding activity.</p> <p>The species bred in captivity can be reintroduced in the wild.</p> <p>Genetic techniques can be used for the preservation of endangered species.</p> <p style="text-align: right;">5 marks</p>			
4. ANS	<p>a) Highlight the salient features of various hotspots of biodiversity in India</p> <p>1. It has two of the 25 identified biodiversity centres termed as hot spots, viz., Eastern Himalaya and Western Ghats. Hot spots are extremely rich in species and have high degree of endemism. They are under constant threat of loss of biodiversity, thus, need immediate conservation and protection.</p> <p>2. India is also considered as one of the 12 centres of origin of agriculture.</p> <p>3. The number of plants species in India is estimated to be over 45,000, representing about 7 per cent of world's flora. These are categorized in different taxonomic divisions including over 1,500 flowering plants. Estimates for the lower plants are 64 gymnosperms, 2,483 bryophytes, 1,012 pteridophytes, 1,940 lichen, 12,480 algae and</p>	5	1	1



ANS	<p>23,000 fungi.</p> <p>4. About 4,900 species of flowering plants are endemic to the Indian subcontinent. Among the endemic species, 2,532 species are found in the Himalaya and adjoining areas, followed by 1,782 species in peninsular India. About 1,500 endemic flowering species are facing varying degrees of threats of extinction.</p> <p>5. The faunal species of India are estimated to be about 81,000, representing about 6.4 per cent of world's fauna. It includes 5,000 molluscs and about 57,000 insects. Besides other invertebrates, there are about 2,546 fish species, 204 amphibians, 428 reptiles, 1,228 birds and 372 mammals. The endemism is very high, which is about 62 per cent.</p> <p>6. The ancient practice of domesticating of animals has resulted in diverse livestock, poultry and other animal breeds. This accounts for significant percentage of world's domestic animals. India's eight breeds of buffalo represent entire range of genetic diversity of buffalos in the world. Besides, there are 26 breeds of cattle, 40 of sheep, 20 of goat, eight of camel, six of horse, two of donkey and 18 types of poultry.</p> <p>7. Presently, India is characterized by 14 biosphere reserves of which three are in the world network of biosphere reserve, viz., Sunderban, Gulf of Mannar and Nilgiri.</p> <p>8. Besides, there are about 100 national parks and 500 bird sanctuaries, representing different biogeographic regions of Indian subcontinent as per Government of India reports.</p> <p style="text-align: right;">5 marks</p> <p>b) Briefly discuss the causes, effects and preventive measures of water pollution.</p> <p>Water pollution is an adverse result of contaminated substances and other toxic elements entering water bodies such as rivers, streams, ponds, etc.</p> <p>The common causes of water pollution include sewage disposal, chemical release from industries, agricultural runoff, etc. The effects of these causes include aquatic life disturbance, neurological and psychological errors in human beings, loss of flora and fauna, etc.</p> <p style="text-align: right;">2 marks</p> <p>Effects: Climate change, water scarcity, global warming, ozone layer depletion, loss of genetic pool, are some of the future effects of water pollution, if not controlled.</p> <p style="text-align: right;">1 marks</p> <p>Preventive Measures: Effluent sewage treatment, proper incineration, reducing the use of chemical fertilizers, reusing the water, if possible, are some of the simple and standard measures to control water pollution.</p> <p style="text-align: right;">2 marks</p>	5	2	2
5. ANS	<p>Briefly describe the various Environmental protection acts in India.</p> <ul style="list-style-type: none"> • Environment Protection Act (EPA) is introduced to make provisions for controlling the pollution. In 1980 the Government of India established an independent department. <p style="text-align: right;">2 marks</p> <ul style="list-style-type: none"> • The prime function of this department is to generate environmental awareness amongs the public so as to reduce the environmental pollution. • Number of laws are implemented to control pollution and protect environment. Under the Ministry of Environement and Forest, various pollution control boards at central and state levels are setup. <p>The regulatory structure and hierarchy of implementing EPA is shown in Fig.</p>	10	2	2



3 marks

Some important regulations under EPA and the year of implementations are given below :

1. The Air (Prevention and control of pollution) Act 1981.
2. The Water (Prevention and control of pollution) Act 1974.
3. Wild life protection Act 1972.
4. Forest conservation Act 1980.

1. Air (Prevention and Control of Pollution) Act

- Air pollution means presence of any air pollutant in the atmosphere. The air pollutant can be solid, liquid or gaseous substances.
- The concentration of such substance when exceeds, it becomes injurious to human beings or other living creatures. This act was introduced in 1981.

Objectives of Air Act

- The air pollution prevention and control act has been introduced to perform following important objectives :
1. Prevention and control of air pollution.
 2. Maintain air quality.
 3. To establish pollution control boards at various levels to check and control air quality.

2. Water (Prevention and Control of Pollution) Act

- Water pollution is defined as any changes in physical, chemical, biological properties of water or discharge of waste water which is injurious to
 - * Ecological system
 - * Public health/safety
 - * Domestic or agricultural use.
- This act was introduced in 1974.

Objectives of Water Act

- The water pollution prevention and control act has been introduced to perform following important objectives :
1. Prevention and control of water pollution.
 2. Maintain water quality.
 3. To establish pollution control boards at various levels to check and control water



	<p>quality.</p> <p>3. Wildlife Protection Act</p> <ul style="list-style-type: none"> Wildlife includes any animal, aquatic, land, water and vegetation which is the natural home of any wild animal. This act was introduced in 1972. <p>Objectives of Wildlife Protection Act</p> <ul style="list-style-type: none"> The objectives of wildlife protection act as follows. <ol style="list-style-type: none"> To maintain essential ecological processes and life supporting systems. To pressure the biodiversity. To protect wildlife. <p>4. Forest Conservation Act</p> <ul style="list-style-type: none"> Forest is a biotic community composed of trees, shrubs and woody climbers. Timber, charcoal, oil, resin, lac, gum. Seeds are forest produce. Silk, sandal-wood, rocks and other plants used for Pharmaceutical purpose are important forest produce. Forest conservation act was introduced in 1972. <p>Objectives of Forest Conservation Act</p> <ul style="list-style-type: none"> The prime objectives of forest conservation act are as follows. <ol style="list-style-type: none"> Protection and conservation of forest. To ensure proper use of forest produce. <p style="text-align: right;">5 marks</p>			
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BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

Marks Distribution	Particulars		CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
	Test	Max Marks	25	25	--	-	16	34	-	-	-	-
