

FINAL EXAMINATION

TIME: THREE HOURS

ATTEMPT ALL THE QUESTIONS

QUESTION 1. (20 Marks)

Discuss what you understand by the following terms:

- I. Environmental management – This refers to a goal or vision, to attempts to steer a process, to the application of a set of tools, to a philosophical exercise seeking to establish new perspectives towards the environment and human societies.
- II. Ethics - moral principles that govern a person's behavior or the conducting of an activity. Fundamentally grounded in values, ethics are a moral sense of right and wrong.
- III. Ecology - Ecology is the study of the relationships between living organisms, including humans, and their physical environment; it seeks to understand the vital connections between plants and animals and the world around them. Ecology also provides information about the benefits of ecosystems and how we can use Earth's resources in ways that leave the environment healthy for future generations. Ecology is a branch of knowledge, and it is not synonymous with environmentalism.
- IV. Ecosystem - An ecosystem is any geographic area that includes all of the organisms and non-living parts of their physical environment. An ecosystem can be a natural wilderness area, a suburban lake or forest, or a heavily used area such as a city. The more natural an ecosystem is, the more ecosystem services it provides. These include cleansing the water (wetlands and marshes) and air (forests), pollinating crops and other important plants (insects, birds, bats), and absorbing and detoxifying pollutants (soils and plants). The ecosystem is the structural and functional unit of ecology where the living organisms interact with each other and the surrounding environment.
- V. Biodiversity - Short for biological diversity, biodiversity is the range of variation found among micro-organisms, plants, fungi, and animals. Some of this variation is found within species, such as differences in shapes and colours of the flowers of a

- single species of plants. Biodiversity also includes the richness of species of living organisms on earth.
- VI. Environment - The environment is the surroundings of an organism including the physical and chemical environment, and other organisms with which it comes into contact. This term is most frequently used in a human context, often referring to factors affecting our quality of life.
 - VII. Natural Resources - Natural resources are living and non-living materials in the environment that are used by humans. There are two types: renewable resources (e.g., wildlife, fish, timber, water) and non-renewable resources (e.g., fossil fuels and minerals).
 - VIII. Ecological succession – this is the process by which a community changes over time, especially following a disturbance. In many instances, an ecosystem will change from a simple level of organization with a few dominant pioneer species to an increasingly complex community with many interdependent species. Restoration often consists of initiating, assisting, or accelerating ecological successional processes, depending on the severity of the disturbance. Following mild to moderate natural and anthropogenic disturbances, restoration in these systems involves hastening natural successional trajectories through careful management.
 - IX. Habitat fragmentation – This describes spatial discontinuities in a biological system, where ecosystems are broken up into smaller parts through land-use changes (e.g., agriculture) and natural disturbance. This both reduces the size of the population and increases the degree of isolation. These smaller and isolated populations are more vulnerable to extinction. Fragmenting ecosystems decreases the quality of the habitat.

QUESTION 2. (10 Marks)

State THREE main causes identified for the loss of biological diversity:

- I. Habitat loss, fragmentation and modification;
- II. Overexploitation of resources; and
- III. Chemical compounds e.g., fertilizers, pesticides and oil pollution.

QUESTION 3. (10 Marks)

State and briefly explain the TWO available types of eco systems

- I. Terrestrial Ecosystem
- II. Aquatic Ecosystem

Terrestrial Ecosystems

Terrestrial ecosystems are exclusively land-based ecosystems. There are different types of terrestrial ecosystems distributed around various geological zones. They are Forest Ecosystems, Grassland Ecosystems, Tundra Ecosystems and Desert Ecosystem

Aquatic Ecosystem

Aquatic ecosystems are ecosystems present in a body of water. These can be further divided into two types, namely; Freshwater Ecosystem and Marine Ecosystem

QUESTION 4. (20 Marks)

Discuss Three differences Between Environment and Ecology

Environment

- Environment refers to the interaction between the physical, chemical and biological components.
- The environmental issues include pollution, deforestation, global warming, and other broader issues.
- Studies the internal and external factors affecting the environment.

Ecology

- Ecology is the study of relationship between organisms and their environment
- The ecological issues include population size, diversity, distribution of organisms, and also the competition between them.
- Aims to understand life process, distribution, adaptation and biodiversity.

QUESTION 5. (20 Marks)

The structure of an ecosystem is characterized by the organization of both biotic and abiotic components. This includes the distribution of energy in our environment. It also includes the climatic conditions prevailing in that particular environment. Discuss.

The biotic and abiotic components are interrelated in an ecosystem. It is an open system where the energy and components can flow throughout the boundaries.

Biotic Components refer to all life in an ecosystem. Based on nutrition, biotic components can be categorised into autotrophs, heterotrophs and saprotrophs (or decomposers) as is further discussed below.

- **Producers** include all autotrophs such as plants. They are called autotrophs as they can produce food through the process of photosynthesis. Consequently, all other organisms higher up on the food chain rely on producers for food.
- **Consumers** or heterotrophs are organisms that depend on other organisms for food. Consumers are further classified into primary consumers, secondary consumers and tertiary consumers.
 - *Primary consumers* are always herbivores that they rely on producers for food.
 - *Secondary consumers* depend on primary consumers for energy. They can either be a carnivore or an omnivore.
 - *Tertiary consumers* are organisms that depend on secondary consumers for food. Tertiary consumers can also be an omnivore.
 - *Quaternary consumers* are present in some food chains. These organisms prey on tertiary consumers for energy. Furthermore, they are usually at the top of a food chain as they have no natural predators.
- **Decomposers** include saprophytes such as fungi and bacteria. They directly thrive on the dead and decaying organic matter. Decomposers are essential for the ecosystem as they help in recycling nutrients to be reused by plants.

Abiotic Components are the non-living component of an ecosystem. It includes air, water, soil, minerals, sunlight, temperature, nutrients, wind, altitude, turbidity, etc.

QUESTION 6. (20 Marks)

There are many reasons to restore ecosystems. State any SIX:

- I. Restoring natural capital such as drinkable water or wildlife populations
- II. Helping human communities and the ecosystems upon which they depend adapt to the impacts of climate change (through ecosystem-based adaptation)
- III. Mitigating climate change (e.g., through carbon sequestration)
- IV. Helping threatened or endangered species
- V. Aesthetic reasons
- VI. Moral reasons: human intervention has unnaturally destroyed many habitats, and there exists an innate obligation to restore these destroyed habitats
- VII. Regulated use/harvest, particularly for subsistence
- VIII. Cultural relevance of native ecosystems to Native people
- IX. The environmental health of nearby populations