

ZOO405 – ECOLOGY

FINAL TERM MOST IMPORTANT QUESTIONS

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Q-1 What is difference between Ecosystem, Population and Ecology?

ECOSYSTEM:

An ecosystem is a self-contained, interactive community of living organisms (plants, animals, microorganisms) and their physical environment, functioning as a unit where energy, nutrients, and materials are exchanged and circulated.

POPULATION:

A population refers to a group of organisms of the same species that live in the same area and can potentially interbreed, influencing the dynamics of that species within their habitat.

ECOLOGY:

Ecology is the scientific study of the relationships and interactions between organisms and their environment. It examines how living organisms and their surroundings influence each other and how these interactions shape ecosystems, populations, and the overall balance of nature.

Q-2 Explain Food Chain.

Food chain is a linear sequence of organisms through which nutrients and energy pass as one organism eats other. At the base of the food chain lie the primary producers. The primary producers are autotrophs, and are most often photosynthetic organisms (such as plants, algae, or cyanobacteria). The organisms that eat the secondary consumers are called **tertiary consumers**. These are carnivore eating carnivores, like eagles or big fish. Some food chains have additional levels, such as **quaternary consumers** (carnivores that eat tertiary consumers). Organisms at the very top of a food chain are called the **apex consumers**.

Q-3 Differentiate between igneous and sedimentary rocks.

IGNEOUS ROCKS:

Igneous rocks – igneous rocks are formed by the cooling of hot molten rock also known as magma. When the hot magma cools it begins to harden meaning once it had fully cooled it create what is known to be an igneous rock.

SEDIMENTARY ROCKS:

Sedimentary rocks – sedimentary rocks are formed from pre-existing rocks. When rocks erode and mix with other dirt, clay and particles then settle together the mix together to form a sedimentary rock.

Q-4 Write a note on Ozone layer depletion.

Ozone depletion refers to the gradual thinning of the ozone layer in Earth's stratosphere. The ozone layer plays a crucial role in absorbing and blocking harmful ultraviolet (UV) radiation from the sun, which can cause various health issues and ecological disturbances, including skin cancer, cataracts, and disruptions in ecosystems.

The primary cause of ozone depletion is the release of certain human-made chemicals called ozone-depleting substances (ODS), such as chlorofluorocarbons (CFCs), halons, and other similar compounds. These substances were widely used in refrigeration, air conditioning, aerosol propellants, and foam-blowing agents.

When ODS molecules are released into the atmosphere, they eventually rise to the stratosphere. There, they are broken down by ultraviolet light, releasing chlorine and bromine atoms. These atoms then react with ozone molecules, causing a chemical chain reaction that leads to the destruction of ozone molecules.

Q-5 Define Uniform and Random dispersion.

UNIFORM DISPERSION:

Uniform dispersion refers to organisms that live in a specific territory. One example would be penguins. Penguins live in territories, and within those territories the birds space themselves out relatively uniformly.

RANDOM DISPERSION:

Random dispersion refers to the spread of individuals such as wind-dispersed seeds, which fall randomly after traveling.

Q-6 How to prevent from water pollution?

To prevent water pollution:

1. Dispose of waste properly.
2. Reduce plastic use.
3. Maintain sewage systems.
4. Control industrial and agricultural runoff.
5. Protect riparian zones.
6. Educate the public
7. Enforce regulations
8. Monitor water quality
9. Support conservation factors
10. Invest in green infrastructure

Q-7 Write objectives of Pakistan Environmental Act 1997.

The Pakistan Environmental Protection Act of 1997 outlines several objectives aimed at safeguarding the environment and promoting sustainable development. Some of its key objectives include:

- 1. Environmental Conservation and Improvement**
- 2. Sustainable Development**
- 3. Pollution Prevention and Control**
- 4. Public Awareness and Participation**
- 5. Environmental Impact Assessment (EIA)**
- 6. Conservation of Natural Resources**
- 7. Promotion of Cleaner Production**
- 8. Waste Management**
- 9. Legal Framework**
- 10. Cooperation and Coordination**
- 11. Research and Monitoring**
- 12. Environmental Institutions**

Q-8 Write importance of Desert Ecosystem.

The desert ecosystem, often underestimated due to its harsh conditions, holds significant importance. Its unique biodiversity, adapted to survive extreme temperatures and limited water, offers insights into nature's resilience and adaptation strategies. Beyond their intrinsic value, desert ecosystems provide vital ecosystem services like soil stabilization, water filtration, and carbon sequestration, contributing to global ecological balance. Indigenous cultures cherish these landscapes for their cultural and spiritual significance, while responsible tourism supports local economies. Medicinal plants found here have traditional and potential modern applications. Additionally, desert research informs various scientific disciplines, aiding our understanding of survival mechanisms and climate change impacts. Conserving these ecosystems is imperative for safeguarding biodiversity, preserving cultural heritage, and ensuring sustainable interactions between humans and nature.

Q-9 Write names of processes involved in sulfur cycle.

Following are important steps of Sulfur cycle:

- i- Decomposition of organic compounds
- ii- Oxidation of Hydrogen Sulphide to Elemental Sulphur
- iii- Oxidation of Elemental Sulphur
- iv- Reduction of Sulphates

Q-10 Define Predator and Prey with examples.

A predator is an organism that consumes all or part of the body of another—living or recently killed— organism, which is its prey. "Living or recently killed" distinguishes predators from decomposers, such as fungi and bacteria that break down the leftover remains of organisms that have died. Examples are Lion, Cat, Tiger, Eagle, Snake etc.

Q-11 Define rangeland.

Rangeland, also called range, any extensive area of land that is occupied by native herbaceous or shrubby vegetation which is grazed by domestic or wild herbivores. The vegetation of ranges may include tallgrass prairies, steppes (shortgrass prairies), desert shrublands, shrub woodlands, savannas, chaparrals, and tundras.

Q-12 What is water pollution?

Water pollution happens when chemicals or dangerous foreign substances are introduced to water, including chemicals, sewage, pesticides and fertilizers from agricultural runoff, or metals like lead or mercury.

According to the Environmental Protection Agency (EPA), 44% of assessed stream miles, 64% of lakes and 30% of bay and estuarine areas are not clean enough for fishing and swimming.

Q-13 Write name of 3 compounds responsible for Ozone Depletion.

- i- Chlorofluorocarbons
- ii- Unregulated Rocket launches
- iii- Nitrogenous compounds
- iv- Natural causes

Q-14 Write effects of noise pollution.

Hypertension: It is a direct result of noise pollution which is caused due to elevated blood levels for a longer duration.

Hearing loss: Constant exposure of human ears to loud noise that are beyond the range of sound that human ears can withstand damages the eardrums, resulting in loss of hearing.

Sleeping disorders: Lack of sleep might result in fatigue and low energy level throughout the day affecting everyday activities. Noise pollution hampers the sleep cycles.

Cardiovascular issues: Heart-related problems such as blood pressure level, stress and cardiovascular diseases might come up in a normal person and a person suffering from any of these diseases might feel a sudden shoot up in the level.

Q-15 What are Autotrophs? Give some examples.

Autotrophs (“self-feeders”), can make their own food – that is, their own organic compounds.

Two basic types of autotrophs:

1. Photoautotrophs
2. Chemoautotrophs

Photoautotrophs:

Such as plants, use energy from sunlight to make organic compounds (sugars) out of carbon dioxide in photosynthesis. Other examples of photoautotrophs include algae and cyanobacteria.

Chemoautotrophs:

Chemoautotrophs use energy from chemicals to build organic compounds out of carbon dioxide (or similar molecules). This is called chemosynthesis.

Q-16 Define ecotone with its importance.

An ecotone is an area that acts as a boundary or a transition between two ecosystems. A common example could be an area of marshland between a river and its riverbank. Ecotones are of great environmental importance. Because the area is a transition between two ecosystems or biomes, it is natural that it contains a large variety of species of fauna and flora as the area is influenced by both the bordering ecosystems.

Examples of ecotones include marshlands (between dry and wet ecosystems), mangrove forests (between terrestrial and marine ecosystems), grasslands (between desert and forest), and estuaries (between saltwater and freshwater). Mountain ranges can also create ecotones due to the changes in the climatic conditions on the slopes.

Q-17 How rangeland is different from pastureland?

Rangelands are distinguished from pastureland by the presence on them of native vegetation, rather than of plants established by human societies, and by their management principally through the control of the number of animals grazing on them, as opposed to the more intensive agricultural practices of seeding, irrigation, and the use of fertilizers.

Q-18 What are causes and solutions of desertification?

In general, desertification is caused by variations in climate and by unsustainable land-management practices in dryland environments. By their very nature, arid and semiarid ecosystems are characterized by sparse or variable rainfall. Thus, climatic changes such as those that result in extended droughts can rapidly reduce the biological productivity of those ecosystems.

Such changes may be temporary, lasting only a season, or they may persist over many years and decades. On the other hand, plants and animals are quick to take advantage of wetter periods, and productivity can rapidly increase during these times.

Solutions for Desertification:

- i- Rising awareness of the problem
- ii- Planting indigenous trees and shrubs
- iii- Developing sustainable agricultural practices
- iv- Controlled grazing
- v- Crop rotation
- vi- Proper land management
- vii- Soil and water management
- viii- Introduction of proper technologies
- ix- Manage dry land resources
- x- Tree planting schemes to reduce soil erosion

Q-19 Define competition.

Competition is a relationship between organisms in which one is harmed when both are trying to use the same resource related to growth, reproduction, or survivability. Competition stems from the fact that resources are limited. There are simply not enough of some resources for all individuals to have equal access and supply. Competition can occur between organisms of the same species, or between members of different species. Competition between species can either lead to the extinction of one of the species, or a decline in both of the species. However, this process can often be interrupted by environmental disturbances or evolution, which can change the rules of the game. Competition is often involved when species are limited in their range, often by direct competition from other organisms.

Q-20 Explain Nitrogen Fixation.

NITROGEN FIXATION:

It is the initial step of the nitrogen cycle. Here, Atmospheric nitrogen (N_2) which is primarily available in an inert form, is converted into the usable form -ammonia (NH_3). During the process of Nitrogen fixation, the inert form of nitrogen gas is deposited into soils from the atmosphere and surface waters, mainly through precipitation. The entire process of Nitrogen fixation is completed by symbiotic bacteria, which are known as Diazotrophs. Azotobacter and Rhizobium also have a major role in this process.

Q-21 What is importance of Ecology?

Ecology helps us to understand how our actions affect the environment. It shows the individuals the extent of damage we cause to the environment.

Lack of understanding of ecology has led to the degradation of land and the environment. It has also led to the extinction and endangerment of certain species. For eg., dinosaurs, white shark, mammoths, etc. Thus, the study of the environment and organisms helps us to protect them from any damage and danger.

With the knowledge of ecology, we are able to know which resources are necessary for the survival of different organisms. Lack of ecological knowledge has led to scarcity and deprivation of these resources, leading to competition. All organisms require energy for their growth and development.

Lack of ecological understanding leads to the over-exploitation of energy resources such as light, nutrition and radiation, leading to its depletion. Proper knowledge of ecological requirements prevents the unnecessary wastage of energy resources, thereby, conserving energy for future purposes.

Q-22 Write uses of desalination water in agriculture.

In the past, the high cost of desalinating and the energy required have been major constraints on large-scale production of freshwater from brackish waters and seawater.

However, desalinated water is becoming more competitive for urban uses because desalinating costs are declining and the costs of surface water and groundwater are increasing.

In spite of this development, the costs of desalinated water are still too high for the full use of this resource in irrigated agriculture, with the exception of intensive horticulture for high-value cash crops, such as vegetables and flowers (mainly in greenhouses), grown in coastal areas (where safe disposal is easier than in inland areas).

For agricultural uses, RO is the preferred desalination technology because of the cost reductions driven by improvements in membranes in recent years.

Spain provides a significant example of the application of desalinated water in irrigation. Spain has more than 300 treatment plants (about 40 percent of the total number of existing plants) and 22.4 percent of the total desalinated water is used for agriculture.

Q-23 Differentiate between food chain and food web.

A food chain and a food web are both concepts used to describe the flow of energy and nutrients through ecosystems, but they represent different levels of complexity and detail.

1. Food Chain:

A food chain is a linear sequence that depicts the transfer of energy and nutrients as organisms feed on one another. It represents a simplified pathway of energy flow from one organism to another. A typical food chain consists of three main trophic levels: producers (plants), consumers (herbivores and carnivores), and decomposers (organisms that break down dead organic matter). Each level depends on the one below it for energy. For example, a basic terrestrial food chain might look like this:

Grass (Producer) -> Rabbit (Primary Consumer) -> Fox (Secondary Consumer) -> Decomposers

2. Food Web:

A food web is a more complex representation of the interactions between multiple interconnected food chains within an ecosystem. It accounts for the fact that organisms in ecosystems often have multiple food sources and predators. In a food web, different food chains overlap and interact, creating a network of relationships. This more accurately reflects the intricate interactions and interdependencies in ecosystems. For instance, the rabbit in the earlier example might also be part of another food chain involving a different predator, and the fox might eat other animals in addition to rabbits. A food web incorporates all these interconnections and is a more realistic depiction of how energy flows through an ecosystem.