

ZOO507 M.C.Qs Past Papers

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Regards VUWAYS Team

Welcome To All New Members

- 1) Endotherms produced their own body heat through..... Mechanism, **Internal**
- 2) Hibernating animals possess..... **low metabolic rate**
- 3) Human eye can detect electromagnetic radiations of wavelength range..... **380-760nm**
- 4)is used an ecological indicators to evaluate natural biodiversity. **Species composition**
- 5) Tropical rainforest are the regions of species of..... **more than 50%**
- 6) The completion within the species..... **Intraspecific**
- 7) Foliose is an example of..... **Lichens**
- 8)is a kind of association in which one organisms called parasite lives on the expense of host. **Parasitism**
- 9) Some animals protect themselves by using prominent..... **coloration**
- 10) Grassland biome is an example of..... **terrestrial biome**
- 11) Sulfur circulates in..... **Sulfur cycle**
- 12) Chemically interactive nitrogen gas makes up..... Of the volume of atmosphere. **78%**
- 13) El-nino effect which occurs every..... **2-7 years**
- 14) A protective layer in the atmosphere that protects the life on earth from harmful effects of UV radiation from sun is..... **ozone layer**
- 15) Physical location of a gene..... **locus**
- 16) Use or defence of a resource by one individual that reduce the availability of resources to other individuals. **competition**
- 17) The term ecosystem coined by Tansley in..... **1935**
- 18) Abiotic components includes..... **Temperature**
- 19) A community is made up of many..... Interact in an area. **population**
- 20) The ecological niche is an important concept of..... **Structure. community**
- 21) Cockroaches are present on earth since..... **350 million years**
- 22) Invasive species is also called..... **Alien species**
- 23) A certain range of value within tolerance range is called the range of..... **optimum**
- 24) Is a process that starts an ecological food web. **photosynthesis**
- 25) Spiders and insects are..... **(Secondary consumer)**
- 26) Example of key stone species..... **(bees, butterflies, hummingbirds, bats, alligator, wolf, leopard, lion, and**
- 27) Food making processes called **(Photosynthesis)**
- 28) Invasive species are also called..... **(Alien Species)** 29) Percentage of nitrogen in environment **(78%)**
- 30) Hibernation is occur in large animal called **(Winter Sleep)** 31) Ozone is denoted **(O₃)** as
- 32) Mychryza is association between..... **(Fungus & plant)**
- 33) Living and non. Living things includes ----. **(ecosystem)**
- 34) Non. Renewable sources such as aluminium and _____. **(copper)**
- 35) comunity of different _ interact each other. **(Population)**
- 36) organisms are divided into _ types. **(3)**
- 37) viola tricolor live in _ environment **(grasslands, wastelands, mainly on acidic or neutral soils. It is also found on the banks and in the alluviums)**
- 38) ecological niche is important for the study of____. **(Ecosystem)**
- 39) blind indus dolphin belong to _ specie. **(Endangered)**

- 40) ___ process start ecological food web. ()
- 41) ___ Factor helpful to regulate the population? ()
- 42) ___ %age of water that cover the earth surface. (71%)
- 43) ___ zone contain mountain head water streams. (Transition)
- 44) Ectotherm organisms regulate their body temperature through ___. (Environment)
- 45) CFCs stand for. (Chloroflouro carbons)
- 46) ___ is basic unit of life and responsible for the trait inherited. (Gene)
- 47) PAR stand for ____. (Periodic Automatic Replenishment)
- 48) mRNA is furthur translated into ____. (Protein)
- 49) human affected environment __%. (40%)
- 50) sulphur circulate through ___ cycle. (Sulphur)
- 51) commensalism. ()
- 52) foliose is growth form of __. (lichen grow on leaf like structure)
- 53) grass land biomes is example of ____. (Temprate) 54)

1. Aestivation 2 marks

Aestivation or summer sleep is a period of inactivity and low metabolic rate in animals in response to high temperature and dry season.

Aestivation is common in many invertebrates, reptiles, and amphibians. **Aestivation** is a kind of adaptation in some animals that helps them to survive in extended periods of drying. The animal usually enters a burrow as its environment begins to dry. It generally does not eat or drink and emerges again after moisture returns.

The Australian burrowing frog, *Cyclorana alboguttatus*, in its burrow and water-retaining skin.

2. Exploitation 2 marks

The diversity of interactions between herbivores and plants, between predators and prey, and between parasites, parasitoids, pathogens, and hosts can be grouped under the heading of exploitation--interactions between species that enhance the fitness of one individual at the expense of another.

3. Global warming 2 marks

The average temperature of earth surface is increasing day by day due to increase in concentration of greenhouse gases in the atmosphere. Human activities are main cause of it.

The earth is gradually heating up due to rise in temperature. This phenomenon is called **Global warming**. It is causing serious problems to the health of plants and animals and also the surrounding environment.

4. Counter shading 3 marks

Counter shading is a type of color pattern in animals in which there is a dark pigmentation on the upper surface of body and light pigmentation on the lower surface of body.

Counter shading helps an animal to blend in with its surrounding environment.

Counter shading is a kind of camouflage common in frog and toad eggs.

These eggs are darkly pigmented on top and lightly pigmented on the bottom. When a bird or other predator views the eggs from above, the dark of the top side hides the eggs from detection against the darkness below.

On the other hand, when fish view the eggs from below, the light undersurface blends with the bright air-water interface.

Penguins are another example that exhibit phenomenon of counter shading.

5. Solid waste 3 marks

Solid wastes refer to everything that goes out in trash. Municipal solid wastes are wastes from homes, offices, stores, schools, hospitals, etc., that are collected and disposed by the municipality.

Solid waste is usually disposed of in **landfills**. Landfills take up space and, if not properly contained, can leach toxins into the soil and poison groundwater.

In countries with limited space, solid waste is burned at high temperatures that creates very hazardous ash, and pollutes the air with toxic chemicals

Hospitals generate hazardous wastes that contain disinfectants and other harmful chemicals, and also pathogenic micro-organisms. Such wastes also require careful treatment and disposal. The use of incinerators is crucial to disposal of hospital waste.

Irreparable computers and other electronic goods **are known as electronic wastes (Ewastes)**. E-wastes are buried in landfills or incinerated.

Recycling involves manual participation thus exposing workers to toxic substances present in e-wastes

Solid waste management

All waste that we generate can be categorized into three types,

1. Recyclable
2. Bio-degradable,
3. Non-biodegradable.

6.Overexploitation 3 marks

Overexploitation of resources (or using resources at an unsustainable rate) is a critical problem in conservation.

The overexploitation or non-sustainable use of wildlife is closely linked and plays an increasing role in the loss of biodiversity

Overharvesting, non-sustainable use, and the illegal trade in some species are threatening not only their continued survival but also that of ecosystems and the livelihoods of communities and local economics that depend upon them.

Unsustainable hunting, fishing, logging, or gathering of wild populations leads to their commercial, ecological or global extinction.

Overexploitation can be divided into two major categories:

Direct exploitation ranges from commercial activities such as logging operations or trade in endangered species to subsistence hunting.

Indirect exploitation:

Indirect exploitation encompasses the unintentional mortality of non target species such as fish or turtles killed as by-catch in fishery operations. Both endanger species around the world.

7 . Primary succession with example 5 marks

The process by which a new community is propagated or initiated in an area where previously no life forms exist is **termed as primary succession**. Primary succession takes thousands of years to develop by the gradual accumulation of nutrients. Communities begin to establish in areas which are devoid of life.

The first community to become established in an area is called the **pioneer community**.

The organisms that develop this pioneer community are called **pioneers**.

Examples are lichens and mosses whose seeds or spores are distributed by the wind and carried by animals.

Death, decay, and additional nutrients add to the community. Over thousands of years nutrients accumulate, and the characteristics of the ecosystem changes.

Seral stage

Each successional stage is called a **seral stage**.

The entire successional sequence is termed as a **sere**.

Biomass increases, nutrients are conserved more efficiently, and productivity declines in the course of succession.

Climax community

The relatively stable and uniform community developed by the pioneers through different successional stages is named as **climax community**. It is a final and mature stage of any community.

Primary succession on a sand dune. Beach grass is the first species to become established. It stabilizes the dune so that shrubs, and eventually trees, can grow.

8.Ozone layer depletion and its effects 5 marks

Ozone gas is continuously formed by the action of UV rays on molecular oxygen, and also degraded into molecular oxygen in the stratosphere. There should be a balance between production and degradation of ozone in the stratosphere.

This balance is disrupted due to ozone degradation by **Chlorofluorocarbons (CFCs)**.

CFCs are released by refrigerants. CFCs discharged in the lower part of atmosphere move upward and reach into stratosphere.

In stratosphere, UV rays act on them releasing chlorine (Cl) atoms. Cl degrades Ozone releasing molecular oxygen.

So CFCs have permanent and continuing affects on Ozone levels.

This increase in release of Chlorofluorocarbons (CFCs) has created a large area of thinned ozone layer in Antarctic region, commonly called as the ozone hole.

Effects of Ozone depletion

- Skin cancer
- Snow-blindness (inflammation of cornea by UV-rays)
- Cataract
- Low crop production

9.Resource depletion & biodiversity 5 marks

Humans are either *directly* or *indirectly* exploiting about 40% of the earth's net primary production.

It involves converting natural areas to agricultural uses, frequently substituting less efficient crop plants for native species.

The main threats to biological diversity arise from habitat destruction by expanding human populations. Habitat loss displaces thousands of native plants and animals. Some of the most important threatened natural areas include,

o **Tropical rain forests** o **Coastal wetlands** o **Coral reefs**

Of these, tropical rain forests have probably received the most attention.

Tropical rain forests cover only 7% of the earth's land surface, but they contain more than 50% of the world's species.

Tropical rain forests are being destroyed rapidly, mostly for agricultural production. About 76,000 Km² (an area larger than *Costa Rica*) is being cleared each year. Clearing of tropical rain forests achieves little, because the thin, nutrient-poor soils of tropical rain forests are exhausted within two years

10.Effects of global warming 10 marks

Some major effects are

Rise in temperature

- Rise in Sea Level
- Climate change
- Extinction
- Droughts
- Loss of biodiversity

Rise in Temperature:

The intense heat waves and rising temperatures are becoming more common as greenhouse gases are trapped in the atmosphere. The greenhouse effect thus leads to a rise in temperature, and as it becomes stronger, more heat is trapped within the planet. **Rise in Sea Level:**

Warm surface temperatures cause glaciers, polar ice to melt. This in turn increases the amount of water in the world's oceans thus contributing to a rise in sea levels.

It threatens populations of coastal areas because of their higher vulnerability to flooding.

Climate change:

Gradual increase in temperature has also severely influenced the climate pattern of the earth surface. *El nino effect* is an example of changing climate due to Global warming. **Extinction:**

The polar bear is considered to be an endangered species whose numbers are falling because of their inability to adapt to the volatile temperature changes in the Polar Regions. **Droughts:**

A warmer climate will cause shortage of water supply and ultimately crop failure. If these water shortages are persistent it will cause a lot of disruptions in global food production by affecting agriculture and thus leading to situations such as starvation . **Loss of biodiversity:**

Global warming causes drastic and irreversible changes both in the upper atmosphere and within the planet thus affecting it's every component including land, water, air etc. It makes the organisms unable to survive in their native environments.

11. Biodiversity.2 marks

The term **biodiversity** was used by *Edward Wilson* to describe the combined diversity at all the levels of biological organization. **Biodiversity** is a vital renewable resource. In our biosphere immense diversity or heterogeneity exists not only at the species level but at all levels of biological organization ranging from macromolecules within cells to biomes.

Biological diversity, or biodiversity, is the variety of all life forms on the earth.

The variety of life on Earth at all its levels, from genes to ecosystems, and the ecological and evolutionary processes that sustain it.

Scientists have identified about 1.8 million species, and every year, thousands of new species are identified.

The identified species include almost a million species of insects, 270,000 plant species, and 45,000 vertebrate animal species.

12. Bio magnification.2

When wastes and poisons enter food webs, organisms at the highest trophic levels usually suffer the most. The accumulation of matter in food webs is **called biological magnification.**

A particularly troubling characteristic of these pollutants is their ability to persist over long time frames and spread over large areas.

A phenomenon called bio magnification is well known for mercury and DDT.

A few toxic substances, often present in industrial waste waters, can undergo biological magnification (Bio magnification) in the aquatic food chain.

Bio magnification refers to increase in concentration of the toxicant at successive trophic levels

13. Name of energy quality type.2

It determines the ability of an energy source to do useful work. Energy manifest itself in several forms such as heat, mechanical, electrical, magnetic, kinetic (in motion), potential, etc. Some types of energy are more useful than the others. Two types of energy on the base of energy Quality,

1. High quality energy
2. Low quality energy

High quality energy

High-quality energy is concentrated form of energy and has a high capacity to do useful work. Examples are,

- Very high-temperature heat
- Nuclear fission
- Concentrated sunlight
- High-velocity wind
- Energy released by burning natural gas, gasoline, or coal.

Low quality energy

A dispersed form of energy that has a little capacity to do useful work.

Heat energy of moving water molecules is of low quality because it is dispersed in water molecules that lowers its temperature.

The total amount of heat stored in the Atlantic ocean is greater than the amount of high quality chemical energy stored in all the oil deposits of Saudi Arabia. But wide dispersion of this ocean's heat energy makes it unable to do useful work.

14.Name three source of enegy.3

Organisms use one of three main sources of energy:

- light
- inorganic molecules
- organic molecules

15.Why species act as biological indicator.3

Because they evaluate the change in biodiversity.

16.Noice pollution leading source.3

Transportation (cars, trains, airplanes, shipping) and industry (construction or factory) are the leading sources of noise pollution. *Animals rely on hearing to,*

- Communicate
- Avoid predators
- Obtain food

17.Three steps of water cycle.5

The **hydrologic cycle**, or **water cycle**, collects, purifies, and distributes the earth's fixed supply of water.

Water is an amazing substance which makes the water cycle critical to life on earth. The water cycle is a global cycle because there is a large reservoir of water in the atmosphere as well as in the hydrosphere, especially the oceans.

The water cycle is powered by energy from the sun and involves three major processes,

1. **Evaporation**
2. **Transpiration**
3. **Precipitation** Evaporation:

Evaporation changes liquid water into water vapor in the atmosphere. Incoming solar energy causes evaporation of water from the oceans, lakes, rivers, and soil.

About 84% of water vapor in the atmosphere comes from the oceans, which cover almost three-fourths of the earth's surface; the rest comes from land.

Transpiration:

Over land, about 90% of the water that reaches the atmosphere evaporates from the surfaces of plants through a process called **transpiration**.

Precipitation:

Precipitation returns the water back to earth's surface. Most precipitation becomes surface runoff that flows into streams and lakes and eventually in to the oceans. From oceans it can evaporate to repeat the water cycle.

Some precipitation is converted to ice that is stored. Some precipitation sinks to underground layers of rock, sand, and gravel called *aquifers*, where it is stored as groundwater.

A small amount of the earth's water is absorbed by roots of plants. Some of this water is used to make food for consumers by photosynthesis, while most of water is evaporated through process of transpiration.

Consumers get their water from their food or by drinking it.

18. Autogenic and allogenic succession.5

Autogenic succession

In autogenic succession the successional processes controlled by living or biotic component of an ecosystem

Allogenic succession

The entire successional process is controlled by non living or abiotic components of ecosystem.

Ecological succession is a process of gradual changes that causes the plants, animals, fungi and microorganism to become established in an area.

19. What is competition

Competition: use or defense of a resource by one individual that reduces the availability of the resource to other individuals

20. What is water cycle

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21. Define allele. 2 marks

- **Allele:** one of the genes at a particular locus.

22. Define Industrial ecology. 2 marks

- The design of the **industrial infrastructure** such that it consists of a series of interlocking "technological ecosystems" interfacing with global natural ecosystems.
- **Industrial ecology** takes the pattern and processes of natural ecosystems as a design for sustainability. It represents a shift in paradigm from conquering nature to becoming nature.

23. Factors of water cycle

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24. Aposomatic coloration

Some animals protect themselves by being dangerous or distasteful to predators by using *prominent coloration*. These color patterns are **known as warning or aposomatic coloration**. The sharply contrasting white stripes of a skunk and bright colors of poisonous snakes give similar messages

They flash a warning: "*Eating me is risky*". Examples are brilliantly colored poisonous frogs is another example. When a bird such as a blue jay eats a foul-tasting monarch butterfly it usually vomits and learns to avoid them.

Biologist **Edward O. Wilson** Described two rules, based on coloration. These rules evaluate possible danger from an unknown animal species we encounter in nature.

- First, if it is small and strikingly beautiful, it is probably poisonous.
- Second, if it is strikingly beautiful and easy to catch, it is probably deadly.

25. Chemical warfare

Chemical warfare is another common strategy to escape from predators.

Chemical warfare refers to use of chemical substance as a weapon for defence purpose.

Some predators use chemical warfare to attack their prey. **For example**, spiders and poisonous snakes use venom to paralyze their prey and to deter their predators.

Some prey species discourage predators with chemicals that are poisonous (oleander plants) and irritating (stinging nettles and bombardier beetles).

Bombardier beetle

Some possess foul smelling (skunks, skunk cabbages, and stinkbugs), or bad tasting (buttercups and monarch butterflies). Foul tasting monarch butterfly

When attacked, some species of squid and octopus emit clouds of black ink, allowing them to escape by confusing their predators.

26. Commensalism or mutualism (5)

Commensalism is a symbiotic relationship in which one member of the relationship benefits, and the second is neither helped nor harmed.

In tropical forests certain kinds of silverfish insects move along with columns of army ants to share the food obtained by the ants in their raids. The army ants receive no apparent harm or benefit from the silverfish.

Epiphytic plants such as certain types of orchids and bromeliads attach themselves to the trunks or branches of large trees in tropical and subtropical forests. These air plants benefit by getting a solid base on which they grow.

They also live in an elevated spot that gives them better access to sunlight, water from the humid air and rain, and nutrients falling from the tree's upper leaves and limbs. Their presence apparently does not harm the tree.

Mutualism

Mutualism is a symbiotic relationship that benefits both members. In mutualism, two species behave in ways that benefit both by providing each with food, shelter, or some other resource.

1. **For example**, honeybees, caterpillars, butterflies, and other insects feed on a male flower's nectar, picking up pollen in the process, and then pollinating female flowers when they feed on them.
2. In gut inhabitant mutualism, vast armies of bacteria in the digestive systems of animals help to break down (digest) their hosts' food. In turn, the bacteria receive a sheltered habitat and food from their host.
3. Oxpeckers or tickbirds feed on parasitic ticks that infest large, thick skinned animals such as the endangered black rhinoceros.
4. A clownfish gains protection and food by living among deadly stinging sea anemones and helps protect the anemones from some of their predators.

Some other forms of mutualism are,

○ Lichen (Algae & Fungus) ○

Mycorrhizae (Algae & Plant) ○

Root nodules

27. Mimicry

Mimicry (L. *mimus*, to imitate) occurs when a species resembles one, or sometimes more than one, other species and gains protection by the resemblance.

These **six species of Heliconius** are all distasteful to bird predators. A bird that consumes any member of the six species is likely to avoid all six species in the future.

Some butterfly species, such as the non-poisonous viceroy, gain protection by looking and acting like the monarch, a protective device known as mimicry.

Viceroy butterfly mimics monarch butterfly. Some moths have wings that look like the eyes of much larger animals. Hind wings of a moth resembles eyes of a much larger animal. When touched, snake caterpillar changes shape to look like head of snake

28. Interspecific competition and intraspecific competition 5

Interspecific competition

All organisms require space and food for their survival. Requirement of both space and food causes competition between the species as well as among the same species.

The competition between **different** species for purpose of space and food is called **Interspecific competition**.

While competition within the **same** species is known as **Intraspecific competition**.

When members of different species compete for resources, one species may be forced to move or become extinct, or the two species may share the resource and coexist.

Most studies have shown that competing species can coexist. Coexistence can occur when species utilize resources in slightly different ways.

Robert MacArthur studied five species of warblers that all used the same caterpillar prey. Warblers partitioned their spruce tree habitats by dividing a tree into preferred regions for foraging. Although foraging regions overlapped, competition was limited, and the five species

29. Greenhouse effects (10)

Small amounts of certain gases, including water vapor (H₂O), carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), in the atmosphere play a role in determining the earth's average temperatures and its climates.

These **greenhouse gases** allow mostly visible light and some infrared radiation and ultraviolet (UV) radiation from the sun to pass through the atmosphere. The earth's surface absorbs much of this solar energy and transforms it to longer-wavelength infrared radiation (heat), which then rises into the lower atmosphere.

Some of this heat escapes into space, but some is absorbed by molecules of greenhouse gases and emitted into the lower atmosphere as even longer-wavelength infrared radiation.

Some of this released energy radiates into space, and some warms the lower atmosphere and the earth's surface. This natural warming effect of the troposphere is called the **greenhouse effect**.

Causes of Greenhouse effect

Human activities such as, Burning fossil fuel. Deforestation Growing crops release carbon dioxide, methane, and nitrous oxide into the atmosphere

30 .Effects of water pollution 5

- Food chain imbalance
- Diseases
- Death of living organisms
- Loss of vegetation
- Habitat loss
- Ecosystem destruction

31. importance of biodiversity (5 marks)

Biodiversity performs important biological services.

- > Regulation of Climate
- > Soil formation and protection
- > Water resources protection
- > Education and scientific value
- > Recreation and ecotourism
- > Pollution breakdown and absorption
- > Economic value

Regulation of Climate

Undisturbed forests maintain the rainfall in their immediate environment by contributing to the hydrological cycle.

Soil formation and protection

Biodiversity plays an important role in the formation of soil and the maintenance of soil structure and the retention of moisture and nutrient levels. **Water resources protection**

Natural vegetative cover in watersheds protects ecosystems from extreme events such as flood and drought, and regulates and stabilizes water runoff thereby maintaining water cycles and water quality.

Education and scientific value

The natural environment has been the basis for many books, television programs and movies produced for entertainment and educational purposes, as well as in scientific ecological observations.

Recreation and ecotourism

The natural environment is used for recreation through activities, such as hiking, bird watching, nature walks and SCUBA diving. Ecotourism, as an industry, is growing rapidly in many developing countries.

Pollution breakdown and absorption

Ecosystems and ecological processes play an important role in the breakdown and absorption of many pollutants created by humans and their activities. Some such pollutants are garbage sewage and oil spills.

Economic value

- Goods
- Food
- Wood and Forest Products

32. Camouflage, biome, pollution (3 marks)

Camouflage is a kind of coloration or patterns that help an animal to appear to blend with its surroundings.

Many prey species use the camouflage (the ability to change color) of certain shapes or colors or (chameleons and cuttlefish).

Cryptic coloration (L. crypticus, hidden) is a type of camouflage that occurs when an animal takes on color patterns in its environment to prevent the animal from being seen by other animals.

The color pattern of this tiger (*Panthera tigris*) provides effective camouflage that helps when stalking prey. Praying mantises sit in flowers of a similar color and ambush visiting insects.

Some insect species have shapes that make them look like twigs, bark, thorns, or even bird droppings on leaves. A leaf insect can be almost invisible against its background, as can an arctic hare in its white winter fur.

Biome A large regional community is known as biome. Each biome is differentiated from one another on the base of, Plants Animal Climate

33. Pollution

Pollution is anything in the environment that is harmful to the health, survival, or activities of humans or other organisms.

Pollution is any detrimental change in an ecosystem.

Most kinds of pollution are the results of human activities. Large human populations and demands for increasing goods and services contribute to pollution problems.

34. community and factors of genetic diversity

Genetic Diversity is the variety of genetic material within a species or a population. Each species is made up of individuals that have their own particular genetic composition. This means a species may have different populations, each having different genetic compositions.

35. define parasitism

Parasitism is a kind of association in which one organism called parasite lives on the expense of other organism, called a host. The host usually survives at least long enough for the parasite to complete one or more life cycles.

Unlike the typical predator, a parasite usually is much smaller than its host and rarely kills its host. Most parasites remain closely associated with their hosts. They draw nourishment from host, and may gradually weaken them over time.

36. Difference of landscape ecology , and urban ecology

"Landscape ecology is concerned with spatial patterns in the landscape and how they develop, with an emphasis on the role of disturbance, including human impacts" (Smith and Smith).

- It is a relatively new branch of ecology, that employs Global Information Systems.
- The goal is to predict the responses of different organisms to changes in landscape, to ultimately facilitate ecosystem management.

Urban ecology

For ecologists, urban ecology is the study of ecology in urban areas, specifically the relationships, interactions, types and numbers of species found in urban habitats. Also, the design of sustainable cities, urban design programs that incorporate political, infrastructure and economic considerations.

37. industrial ecology

- The design of the **industrial infrastructure** such that it consists of a series of interlocking "technological ecosystems" interfacing with global natural ecosystems.
- **Industrial ecology** takes the pattern and processes of natural ecosystems as a design for sustainability. It represents a shift in paradigm from conquering nature to becoming nature.

38. How domestic waste is collected and disposed

1. Domestic wastes are collected in small bins, which are then transferred to community bins by private or municipal workers. From these community bins, these are collected and carried to the disposable site.
2. At the site, garbage is sorted out and separated into biodegradable and nonbiodegradable materials.
3. Non-biodegradable materials such as plastic, glass, metal scraps etc. are sent for recycling. Biodegradable wastes are deposited in landfills and are converted into compost.
4. The waste if not collected in garbage bins, finds its way into the sewers. Some of it is eaten by cattle. Non-biodegradable wastes like polythene bag, metal scraps, etc. if swallowed by cattle can cost their lives.
5. All domestic wastes should be properly collected and disposed. The poor management causes health problems leading to epidemics due to contamination of ground water. It is especially hazardous for those who are in direct contact with the waste

40. Difference between hibernation and winter sleep

True hibernation occurs in small animals in which temperature substantially falls to remain alive in cold environment. Animals remain inactive for weeks or even for months.

Hibernation in large animals like bears is termed as winter sleep. Body temperature does not falls substantially and sleeping animals can wake and active quickly. It lasts for short period of time. Large animals have more energy reserves that enables them to survive in winter.

41. phosphorus cycle

Phosphorus circulates through water, the earth's crust, and living organisms in the phosphorus cycle.

In contrast to the cycles of water, carbon, and nitrogen, the phosphorus cycle does not include the atmosphere. The major reservoir for phosphorous is phosphate salts containing phosphate ions (PO_4^{3-}) in terrestrial rock formations and ocean bottom sediments. The phosphorus cycle is slow compared to the water, carbon, and nitrogen cycles.

Phosphorous is a component of biologically important molecules such as,

1. Nucleic acids
2. Energy transfer molecules (ADP and ATP)
3. Vertebrate bones and teeth.

As water runs over exposed phosphorus containing rocks, it slowly erodes away inorganic compounds that contain phosphate ions (PO_4^{3-}). The dissolved phosphate can be absorbed by the roots of plants and by other producers.

Phosphate can be lost from the cycle when it washes from the land into streams and rivers and is carried to the ocean. In oceans it can be deposited as marine sediment and remain trapped for millions of years.

Someday, geological processes may uplift and expose these seafloor deposits, from which phosphate can be eroded to start the cycle again.

Because most soils contain little phosphate, it is often the limiting factor for plant growth on land unless phosphorus (as phosphate salts mined from the earth) is applied to the soil as an inorganic fertilizer

42. define cryptic coloration

Cryptic coloration (L. *crypticus*, *hidden*) is a type of camouflage that occurs when an animal takes on color patterns in its environment to prevent the animal from being seen by other animals.

The color pattern of this tiger (*Panthera tigris*) provides effective camouflage that helps when stalking prey. Praying mantises sit in flowers of a similar color and ambush visiting insects.

Some insect species have shapes that make them look like twigs, bark, thorns, or even bird droppings on leaves. A leaf insect can be almost invisible against its background, as can an arctic hare in its white winter fur.

43. What is El-nino effect?

Another type of short-term climate change is the so-called *El Nino effect*, which occurs every 2 to 7 years around Christmas time, when the typical weather pattern in the Pacific Ocean breaks down.

The trade winds weaken, and low pressure establishes itself in the central Pacific. It causes the winds to blow into the Pacific Basin from the west. This change causes warm surface water to move toward South and Central America, reversing the directions of some currents and placing warm water along the coasts.

The warm water produces heavy rain over the coastal deserts, subjecting them to disastrous flooding and erosion. The western United States also experiences major flooding events as a result of El Nino.

1. This temporary influx of rain on arid and semiarid regions creates the conditions for disastrous down slope movements in the form of mud slides, destroying entire villages.
2. One result of this temporary climate change is the occurrence of major brush fires, which destroy not only vegetation but also wild and domestic animals
3. Shifts in warm water in the southern Pacific and Indian Oceans cause cooler water to move along the coast of Australia, resulting in decreased rainfall.
4. The warm water El Nino brings to the coasts of North and South America substantially reduces the upwelling of cold, deep water, adversely affecting the cold water fisheries.

44. Name two types of symbiosis. (2)

○ Commensalism ○

Mutualism

45. Difference between biodegradable and non degradable pollutants. (5)

- **Biodegradable pollutants** are harmful materials that can be broken down by natural processes. **Examples** are human sewage and newspapers.
- **Non-degradable pollutants** are harmful materials that natural processes cannot break down. **Examples** are toxic chemical elements such as lead, mercury, and arsenic

46. What are the causes of loss in genetic diversity ? 10 marks

Two ways of losing gene diversity in small populations,

- Changes in the **natural distribution** of genetic diversity among populations (artificial isolation and mixing)
- **Population size critical factor**,
- Census population size (N_c) vs. Effective population size (N_e), Usually N_e is much smaller than N_c (10 to 30%)

Factors responsible for genetic diversity loss

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Four factors responsible for genetic diversity loss in small populations :

- Genetic drift
- Founder effect
- Demographic bottleneck
- Inbreeding

Genetic drift

- " Random change in gene frequency within a population" (Meffe et al.),
- Not necessarily adaptive, Stronger in small populations **Founder effect**
- "The establishment of a new population by a few original founders which carry only a small fraction of the total genetic variation of the parental population." (Ernst Mayr), Alleles may be lost, Differentiation from the parental population, **Example:** Irish Potato Famine

Demographic bottleneck

- Population suffers reduction in size and then recovers, Random losses of genetic diversity,
- Usually associated with catastrophic events or diseases,
- Genetic variation doesn't rebound from a decrease as quickly as population size. **Inbreeding**
- *Inbreeding is breeding between close relatives*
- Leads to a reduction in genetic diversity (**inbreeding depression: reduced health and fitness**),
- The *primary problem* with inbreeding is that two closely related individuals are likely to have very similar genomes, and if one individual has a gene for a given negative trait, then the other is likely to have it as well., Inbreeding increases homozygosity (therefore decreases heterozygosity) **The other way to loss genetic diversity:**

Changes in the natural distribution of genetic diversity among populations is related with the geographical distribution of the species and therefore with landscape management issues **Artificial isolation**

Avoids genetic flux among populations due to barriers such as highways, dams, etc **Artificial mixing**

Enhances genetic flux among populations where that flux was not possible due to natural barriers (examples: bridges, tunnels)

Allelic richness

Allelic richness is the number of alleles in a sample (population), **Rare alleles**

- are important during extreme environmental events,
- Loss of allelic richness is perhaps more serious than loss of quantitative variation because alleles are lost forever while quantitative variation can be recovered,
- Rare alleles are more important than their frequency in the population
- Example: Peppered moth and pollution in Manchester, Small sized populations are more prone to lose allelic richness

48.Genetic drift 2

" Random change in gene frequency within a population" (Meffe et al.),

Not necessarily adaptive, Stronger in small populations

49.Growth forms of Lichens 3

1. Crustose
2. Foliose 3.
- Fr
uticose

Crustos

e:

A type of lichen that form a flat crust on the substratum and firmly attached to substratum.

Foliose:

This type of lichens have flat leaf like structures and are attached to substratum by thread like structures

Fruticose:

This type of lichens have erect filamentous like outgrowths and possess vertical pattern of growth.

50 .Effects of Air pollution 5

- Acid rain
- Greenhouse effect
- Global warming
- Ozone layer destruction **Acid rain or deposition**

Burning fossil fuels releases sulfur dioxide(SO_2) and nitrogen oxides(NO_x) into the atmosphere. Sulfur dioxide and water combine to produce sulfuric acid(H_2SO_4), which falls as acid deposition. Acid deposition lowers the pH of lakes.

Greenhouse effect

Carbon dioxide released from burning fuels accumulates in the atmosphere and prevent the escape of heat coming from earth. This effect is termed as Greenhouse effect.

Global warming

Carbon dioxide reflects solar radiation back to the earth. This reflection of solar radiation is predicted to cause an increase in world temperature, polar ice caps to melt, and ocean levels to rise.

Ozone layer destruction

The release of chlorinated fluorocarbons from aerosol cans, air conditioners, and refrigerators contributes to the depletion of ozone layer (the earth's ultraviolet filter). It will increase the chance of skin cancer.

51.Keystone species 2

A **keystone species** is a species that has a disproportionately large effect on community structure relative to its biomass or abundance.

- **Keystone species** differ from foundation species in two main ways: they are more likely to belong to higher trophic levels (to be top predators), and they act in more diverse ways than foundation species, which tend to modify their environment.
- Different sources use different definitions for keystone and foundation species. In some sources, foundation species are viewed as a subcategory of keystone species.

52.Invasive species

Species whose populations have expanded dramatically and out-compete or displace native species, potentially threatening the structure and function of intact ecosystems.

When alien species are introduced unintentionally or deliberately for whatever purpose, some of them turn invasive, and cause decline or extinction of indigenous species.

The Nile perch introduced into Lake Victoria in east Africa led eventually to the extinction of an ecologically unique assemblage of more than 200 species of cichlid fish in the lake.

The recent illegal introduction of the African catfish (*Clarias gariepinus*) for aquaculture purposes is posing a threat to the indigenous catfishes in our rivers.