

Unit

03

BIODIVERSITY

Q.1. What is biodiversity? Explain distribution and importance of biodiversity?

Ans. The term biodiversity has been derived from bio and diversity. Bio means life and diversity means variety within and among species.

Definition

“Biodiversity is a measure of the variety of organisms present in different ecosystems”.

Dependence of biodiversity

Plants and animals (flora and fauna) diversity depends on:

- (i) Climate
- (ii) Altitude
- (iii) Soil
- (iv) Presence of other species

Distribution of biodiversity

Biodiversity is not distributed evenly on Earth.

1. Tropical regions

Biodiversity is the richest in the Tropics.

2. Temperate regions

Temperate regions also have many species.

3. Polar Regions

Fewer species are present in Polar Regions.

Biodiversity found on Earth today is the result of 4 billion years of evolution. All life consisted of bacteria and similar unicellular organisms.

Importance of Biodiversity

Source of Food

Biodiversity provides food for humans.



Figure 3.1: Variety of plant life in a tropical (left) and temperate (right) region

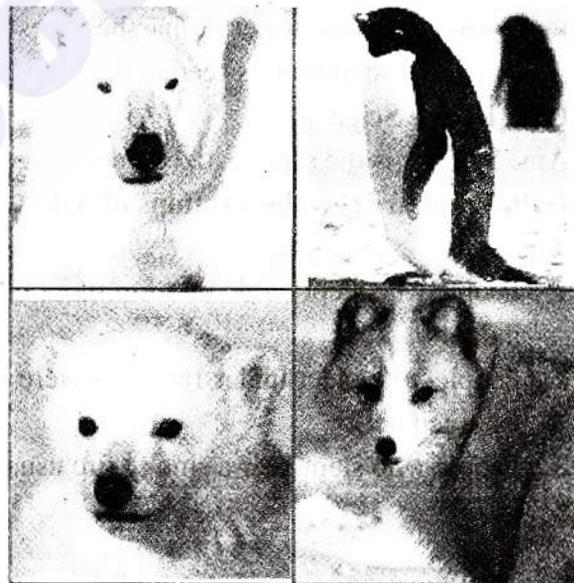


Figure 3.2: Variety of animal life in Polar Regions

Source of Drugs

A significant proportion of drugs are derived directly or indirectly, from biological sources.

Source of Industrial Materials

A wide range of industrial materials e.g. building materials, fibres, dyes, resins, gums, adhesives, rubber and oil are derived directly from biological resources.

Maintenance of Ecosystem

Biodiversity plays an important role in making and maintaining ecosystems. It plays a part in regulating the chemistry of our atmosphere and water supply.

Recycling of Nutrients

Biodiversity is directly involved in recycling nutrients and providing fertile soils.

Q.2. What is classification? Describe the aims and the basis of classification.

Ans. Definition

The arrangement of organisms into groups and subgroups on the basis of similarities and differences is called classification.

Known Number of animals and plant species:

Over 1.5 million types of animals and over 0.5 million types of plants are known to biologists.

Size

They range in complexity from small and simple bacteria to large and complex human beings.

Habitat

Some of the organisms live in sea, some on land, some walk, others fly and still others are stationary.

Need of classification:

Each species has its own way of life. When there are so many kinds of organisms, biologists classify the organisms to study such a large collection in an easy way.

Taxonomy

The branch of biology which deals with scientific naming and classification of organisms is called taxonomy.

Systematics

The branch which deals with classification and also traces the evolutionary history of organisms is known as systematics.

Aims of Classification: The main aims of classification are:

- (i) To determine similarities and differences among organisms so that they can be studied easily.
- (ii) To find the evolutionary relationships among organisms.

Basis of Classification: Classification is based on relationship among organisms and such relationship is got through similarities in the form or structure.

These similarities are seen in:-

1. Structures (both external and internal)
2. Biochemistry
3. Modern Genetics

These similarities suggest that all organisms are related to one another at some point in their evolutionary histories. However, some organisms are more closely related than others. For example; sparrows are more closely related to pigeons than to insects. It means sparrows and pigeons have common evolutionary histories.

Q.3. What is taxonomic hierarchy?

Ans. Taxa

The groups into which organism are classified are known as taxonomic categories or taxa.

Taxonomic Hierarchy

The taxa form a ladder called taxonomic hierarchy.

All the organisms are divided into five kingdoms. So kingdom is the largest taxon. On the basis of similarities, each kingdom is further divided into smaller taxa in the following way:

Phylum: A phylum is a group of related classes.

Class: A class is a group of related orders.

Order: An order is a group of related families.

Family: A family is a group of related genera.

Genus: A genus is a group of related species.

Species: A species consists of similar organisms.

Table 3.1 Simple classification of two organisms

Taxa	Human	Pea
Kingdom	Animalia	Plantae
Phylum / Division	Chordata	Magnoliophyta
Class	Mammalia	Magnoliopsida
Order	Primates	Fabales
Family	Hominidae	Fabaceae
Genus	<i>Homo</i>	<i>Pisum</i>
Species	<i>H. sapiens</i>	<i>P. sativum</i>

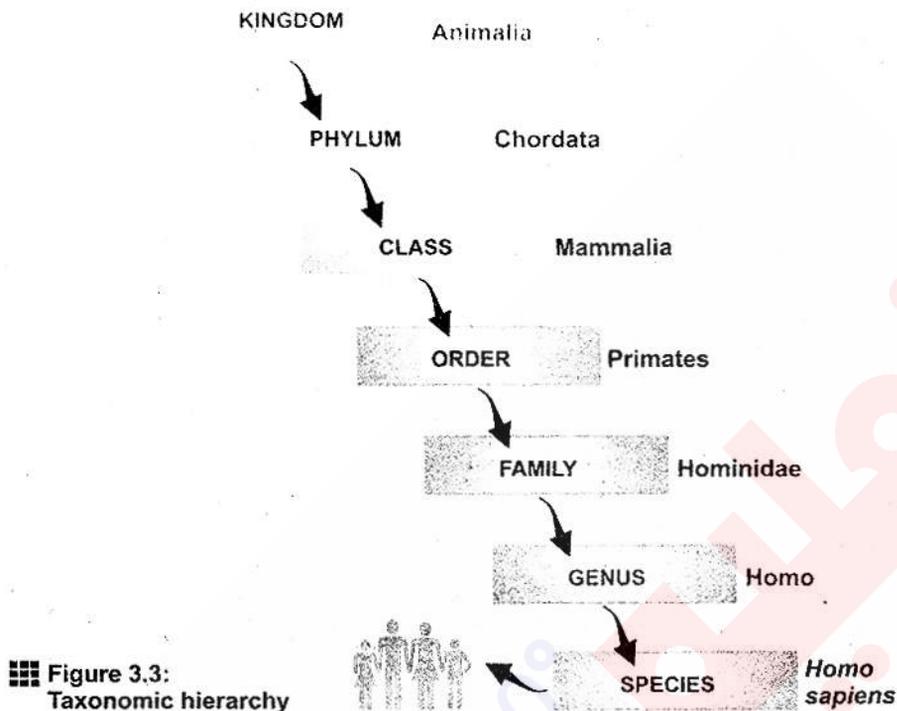


Figure 3.3:
Taxonomic hierarchy

Q.4. Define Species. Give two exceptions for the species concept.

Ans. Species-the basic unit of classification

“A species is a group of organisms which can interbreed freely among them and produce fertile offsprings but are reproductively isolated from all other such groups in nature”. Each species has its own distinct structural, ecological and behavioural characteristics.

Two Exceptions for the species concept

(i) Artificial Cross Breeding

In the definition of species we must emphasize in nature because two organisms related to two different but closely related species can cross breed under artificial conditions. In such unnatural crosses, they produce infertile offspring. A cross between a male donkey and a female horse produces an infertile offspring, the mule.



Figure 3.4: Infertile Mule

(ii) Organisms with asexual reproduction

The criteria of interbreeding cannot be used for species recognition in organisms who reproduce asexually and don't interbreed with one another e.g, many unicellular organisms.

Q.5. Describe the history of classification system.

Ans. History of classification system

Aristotle: The earliest known system of classification of organisms comes from the Greek philosopher Aristotle who classified organisms into two groups, 'plantae' and 'animalia'.

i. Abu Usman Umer Aljahiz

In 700s, Abu Usman Umer Aljahiz described the characteristics of 350 species of animals in his book. He wrote a lot about the life of ants.

ii. Ibn Rushd: In 1172, Ibn Rushd (Averroes) translated Aristotle's Book "De Anima" (on the soul) into Arabic.

iii. Andrea Caesalpino (1519-1603 AD)

He was an Italian botanist and proposed the first methodical arrangement of plants. He divided plants into fifteen groups called "Genera."

iv. John Ray (1627-1705 AD)

An English naturalists, John Ray published important works on plants' classification.

v. Augustus Rivinus (1652–1723 AD)

He introduced the taxon of order:

vi. Tournefort (1656 – 1708 AD)

He introduced the taxa of "class and species".

vii. Carolus Linnaeus (1707 – 1778 AD) (Lahore board 2012 G II)

Modern classification has its root in the work of Linnaeus who grouped species according to the similar physical characteristics. He divided nature into three kingdoms: mineral, vegetable and animal. He also used five ranks in classification.

Q.6. Describe the two Kingdom system of classification. (Lahore board 2011 G I)

Ans. It is the oldest system and classifies all organisms into two Kingdoms i.e, plantae and animalia.

Plantae: All organisms that can prepare food from simple inorganic materials and thus can store energy are autotrophs. According to this system bacteria, fungi and algae were included in kingdom plantae.

Animalia: The organisms that cannot synthesize their food and depend on autotrophs or others are heterotrophs and are included in kingdom animalia.

Objection/Drawbacks

(i) Some taxonomists found this system unworkable because many unicellular organisms like Euglena have both plant-like (Presence of Chlorophyll) and animal-like (Heterotrophic mode of nutrition in darkness and lack cell wall) characters. So, there should be a separate kingdom for such organisms.

(ii) This system also ignores the difference between organisms having prokaryotic and those having eukaryotic cells.

Q.7. Describe the three Kingdom Classification System.

Ans. In 1866, Ernst Hackel solved the first objection and proposed a third kingdom, protista, for the placement of Euglena like organisms. He included a kingdom protista. In this system, fungi were still in the kingdom plantae.

Objection/Drawbacks

- (i) This system did not clear the difference between prokaryotes and eukaryotes.
- (ii) Some biologists disagreed about the position of fungi in kingdom plantae. Fungi resemble plants in many ways but are not autotrophs. They are special form of heterotrophs that get their food by absorption. They do not have cellulose in their cell walls rather possess chitin.

Q.8. Describe the five kingdom system of classification.

Ans. Work of E-Chatton

In 1937, E-Chatton suggested the term “Procariotique” to describe bacteria and “Eucariotique” to describe animals and plant cells.

Work of Robert Whittaker

In 1967, Robert Whittaker introduced the five-kingdom classification system. This system is based on:

- (i) **The levels of cellular organizations:** i.e., prokaryotic, unicellular eukaryotic and multicellular eukaryotic.
- (ii) **The principal modes of nutrition:** i.e. photosynthesis, absorption and ingestion.

On this basis, organisms are classified into five kingdoms: named, monera, protista, fungi, plantae and animalia.

Modification of the five Kingdom Classification System

In 1988, Lynn Margulis and Karlene Schwartz modified the five kingdom classification of Whittaker by considering genetics along with cellular organization, mode of nutrition, in classification.

The Five Kingdom Classification system:-

The general characteristics of five kingdoms are as follows:

Kingdom Monera (Lahore board 2012 G I)

- (i) It includes prokaryotic organisms i.e. they are made of prokaryotic cells.
- (ii) Moneras are unicellular, although some type form chains, clusters or colonies of cells.
- (iii) Prokaryotic cells are radically different from eukaryotic cells.
- (iv) They are heterotrophic but some perform photosynthesis because they have chlorophyll in their cytoplasm.
- (v) In this kingdom, there are two different kinds of organisms i.e. bacteria and cyanobacteria.

Kingdom Protista:

It includes eukaryotic unicellular and simple multicellular organisms.

There are three main types of Protists:-

- (i) **Algae:** They are unicellular, colonial or simple multicellular. Simple multicellular means that they do not have multicellular sex organs and do not form embryos during their life cycles.

(ii) Protozoans resemble animals whose cells lack chlorophyll and cell walls.

(iii) Fungi like Protists: Some protists are like the fungi.

Kingdom Fungi

(i) It includes eukaryotic multicellular heterotrophs e.g., mushrooms.

(ii) Fungi are heterotrophic organisms that are absorptive in their nutritional mode.

(iii) Most fungi are decomposers.

(iv) They live on organic materials, secrete digestive enzymes and absorb small organic molecules formed by the digestive enzymes.

Kingdom Plantae

(i) It includes Eukaryotic multicellular autotrophs.

(ii) Plants are autotrophic in nutritional mode, making their own food by photosynthesis.

(iii) They have multicellular sex organs and form embryos during their life cycles.

(iv) Mosses, Ferns and flowering plants are included in this kingdom.

Kingdom Animalia

(i) It includes eukaryotic multicellular consumers.

(ii) Animals live mostly by ingesting food and digesting it within specified cavities.

(iii) They lack cell wall and show movements.

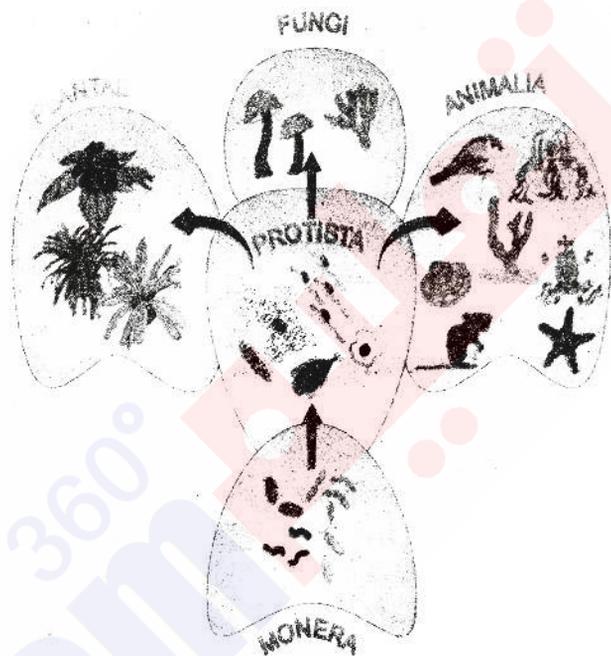


Figure 3.5: The Five kingdoms of classification

Table 3.2 Distinguishing characteristics of five kingdoms of life

Kingdom	Cell Type	Nuclear Envelope	Cell Wall	Mode of Nutrition	Multi Cellularity
Monera	Prokaryotic	Absent	Non-cellulose (polysaccharides and amino acids)	Autotrophic or heterotrophic	Absent
Protista	Eukaryotic	Present	Present in some forms, various types	Photosynthetic or heterotrophic	Absent in most forms

				or combination	
Fungi	Eukaryotic	Present	Chitin	Absorptive heterotrophs	Present in most forms
Plantae	Eukaryotic	Present	Cellulose	Photosynthetic	Present in all forms
Animalia	Eukaryotic	Present	Absent	Ingestive heterotrophs	Present in all forms

Q.9. What do you about the status of viruses? Describe briefly about the prions and viroids also.

Ans. Status of Viruses (Lahore board 2011 G II)

Viruses are acellular i.e. they do not possess cellular organizations yet show some characters of living things. Due to their crystalline structure, they are considered as non-living. They are not considered as organisms and thus are not included in five Kingdom Classification System. The branch of biology in which we study viruses is called virology.

Structure

Viruses contain either DNA or RNA normally encased in protein coat and reproduce only in living cells where they cause a number of diseases.

Prions

Prions are composed of protein only and act as infectious particles in plants. These are acellular particles and are not included in five Kingdom Classification System.

Viroids

Viroids are acellular in nature and composed of circular RNA only and act as infectitious particles and cause diseases in certain plants. They are not included in five Kingdom Classification System.

Q.10. What is meant by binomial nomenclature? Describe its rules and significance.

Ans. Introduction of binomial nomenclature.

It was introduced by Swedish biologist Carolus Linnaeus (1707-1778). His system spread rapidly. It became popular. Many of his names are in use today.

Definition: Binomial nomenclature is the method of giving scientific names to living organisms.

Explanation: The scientific names of a species consist of two names:

Genus: The first is the genus name.

Species: The second one is the name of the species.

Rules of Binomial Nomenclature:-

- (i) Scientific names are usually printed in italics, such as *Homo sapiens*. When handwritten, they should be underlined as Homo sapiens.
- (ii) The first term (generic name) always begins with capital letter while the species name is never capitalized (even when derived from a proper name).
- (iii) The scientific name should generally be written in full when it is first used but when several species from the same genus are being listed, it may then be abbreviated by just using an initial for genus. For example, *Escherichia coli* becomes *E. coli*.

Significance of binomial nomenclature

Problems caused by common names

Common names cause many problems.

(i) Many names for the same organisms

Various regions have different names for the same organisms e.g. The common name of Onion in Urdu is Piyaz, but in different regions of Pakistan it is also known as Ganda, Bassal or Vassal. In other countries, it has other sets of names. In science, it is known with a single name as *Allium cepa*.

(ii) Same names for many organisms

In some cases, several organisms are called by the same common name: For example; 'Black bird' is used for crow as well as for raven.

(iii) Common name without scientific basis

Common names have no scientific basis. e.g. a fish is vertebrate animal.

It has fins and gills. But there are several common names like 'silverfish', 'crayfish', 'Jellyfish' and 'Starfish'. They do not fit the biologist's definition of a fish.

Advantages

- (i) To avoid all these confusions, organisms are given scientific names by using binomial nomenclature.
- (ii) This system has great value and stability of its names. It has widespread use.
- (iii) Every species can be unambiguously identified by binomial nomenclature. It requires just two words.
- (iv) The same name can be used all over the world, in all languages. It avoids the difficulties of translation. e.g.

Examples:

Common Name	Scientific Names
Onion	<i>Allium cepa</i>
Common sea star(starfish)	<i>Asterias rubens</i>
House crow	<i>Corvus splendens</i>

Q.11. Describe conservation of biodiversity. Also write down impact of human beings on biodiversity.

Ans. Impact of human population on extinction

During the last century, loss of biodiversity has been increasingly observed. We now know that the most species that ever lived had gone extinct. In modern era, due to human actions, species and ecosystems are threatened with destruction to an extent rarely seen in Earth history.

Types of Species

(i) Extinct Species (Lahore board 2011 G I)

A species that no longer lives anywhere on Earth is said to be extinct.

Effect of Extinction of species

When the species of an ecosystem becomes extinct, the stability of ecosystem is harmed. Biologists warn that the global ecosystem collapse if it is further reduced in complexity.

(ii) Endangered Species

A species is called endangered if it is at the risk of extinction in near future.

Examples of extinct and endangered species

Many plant and animal species have become extinct in Pakistan. Examples of endangered and extinct animal species are lion, tiger, Asiatic Cheetah, Indian one horned rhinoceros, swamp deer, Indian wild ass, hangul, blackbuck etc.

Impact of Human beings on Biodiversity.

(Lahore board 2011 G I)

There were about 5 million people on earth in the beginning. Now we have 600 million people. To improve the living conditions, we are imposing serious threats to the survival of biodiversity.

Factors leading to loss of biodiversity

Following are the factors contributing the loss of biodiversity

- (i) Overpopulation
- (ii) Deforestation
- (iii) Overhunting
- (iv) Introduction or removal of new species,
- (v) Pollution and climate change.
- (vi) Habitat loss: It is probably the greatest threat to biodiversity on Earth today.

All these factors are secondary to over-population.

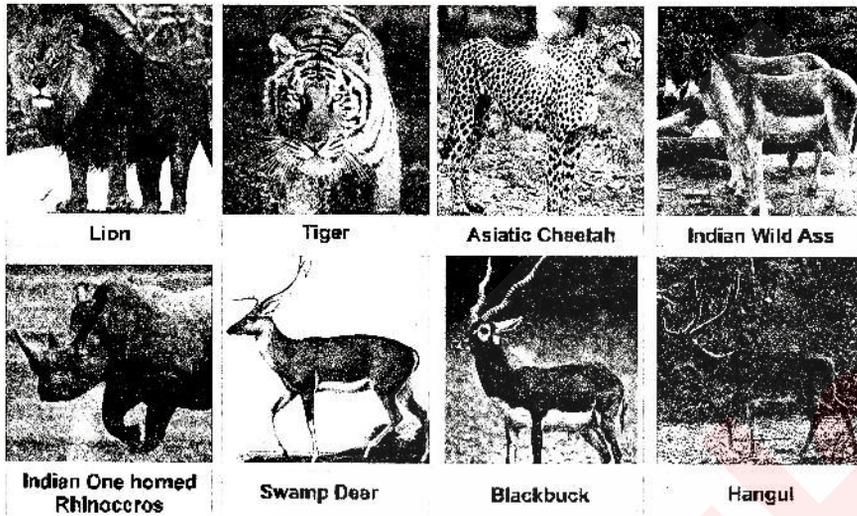


Figure 3.6: The animals that have gone extinct in Pakistan.

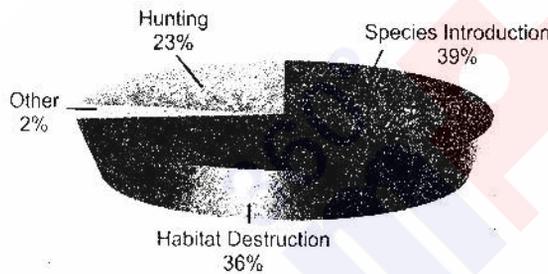
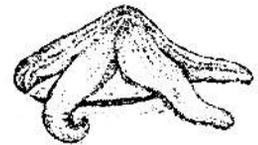


Figure 3.7: Known causes of species extinctions
(Source: World Conservation Monitoring Centre)

Q.12. What is the effect of removal of species.

Ans. Sea star eats mussels. If sea stars are removed from a region in ocean, mussels rapidly increase in number. Large number of mussels prey on small animals and become dangerous for their existence.



Sea Star

Q.13. What is the effect of introduction of species.

Ans. Introduction of species

Eucalyptus plants were imported from Australia and introduced in Pakistan. These plants consume more water and have disturbed the water table. In this way, they harm other small plants that grow near them.



Eucalyptus plants

Q.14. Define deforestation. Describe its causes and effect.

Ans. Deforestation means cutting down of trees for the conversion of a forest to non-forest land. There is destruction of significant areas of forest. It has degraded environment with reduced biodiversity.

Causes of Deforestation

(i) **Urban Development:** Sometimes, there is slow forest degradation. But sometimes, there is sudden and catastrophic cutting of trees for urban development.

(ii) **Cultivation:** Deforestation may be the result of deliberate removal of forests for wood, agriculture or urban development. e.g. houses, Roads, Buildings etc.

Effects of Deforestation

(i) **Degradation of Environment:** Deforestation has resulted in a degraded environment with reduced biodiversity.

(ii) **Amount of water and moisture:** Deforestation affects the amount of water and moisture in the atmosphere.

(iii) **Soil Erosion:** Trees keep the soil in place. When there are no trees to keep the soil in place, the soil becomes ripe for erosion.

(iv) **Source of Flood:** Due to deforestation, there is less protection from wind and rain. Heavy rainfall washes the soil into the rivers. Essential nutrients are washed out of the soil. Rivers become choked up with mud and silt, which can cause flood. This silted water gets stored in dams and it reduces their water storage capacity and life there is also harmed.

(v) **Reduction in the sources of Rains:** Deforestation decreases the transpiration which lessens cloud formation and humidity. This ultimately reduces the sources of rains.

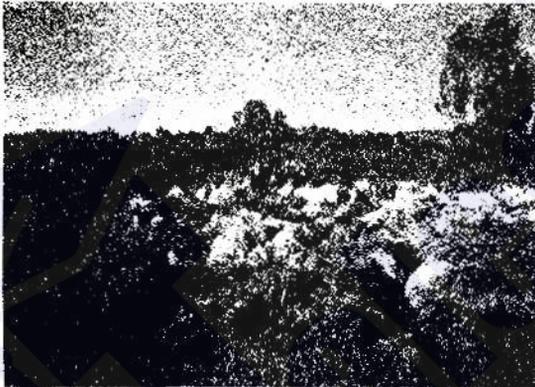


Figure 3.8: Soil erosion

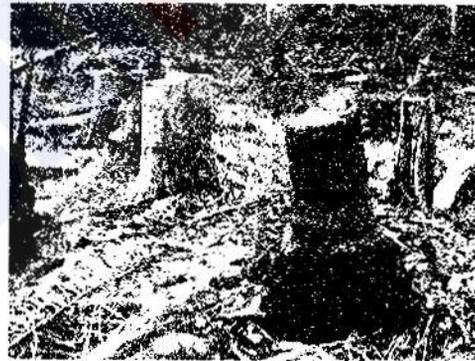


Figure 3.9: Chopping up of trees for the construction of road

Advantages of Forests

(i) Support to Biodiversity

Forests support considerable to biodiversity and provide valuable habitat for wild life.

(ii) Source of Medicinal Conservation

Forests act as medicinal conservation.

(iii) Utilization of forest's products

There is utilization of many forest products. There is use of timber and fuel wood. This use has played a key role in human societies. This is comparable to the roles of water and land.

(iv) Source of Timber

Today developed countries are using timber for building houses. They use the wood pulp for making paper. The forest products industry is a large part of the economy in both developed and developing countries.

(i) Loss of long term income: Short term economic gains made by conversion of forest to agriculture land often leads to loss of long-term income.

(ii) Contribution to Biosphere Stability: Forests extract carbon dioxide and pollutants from the air thus contributing to biosphere stability.

(iii) Source of Beauty: Forests are also source of aesthetic beauty and tourist attraction.

Threat to Biodiversity

In Pakistan too, deforestation is a great threat to biodiversity. The closed canopy forests are shrinking at approximately 1% per year in the province Khyber Pakhtunkhwa.

Q.15. What do you know about over hunting?

Ans. Over hunting has been a significant cause of the extinction and endangerment of hundreds of species. Commercial hunting is the principal threat.

Q.16. Define conservation. Explain conservation of biodiversity.**Ans. Conservation**

Conservation means the protection of all those things that affect directly or indirectly on the life on earth. It includes:-

- (i) Maintenance of the environment
- (ii) Maintenance of the balance between human needs and resources.
- (iii) Providing protection to the wild life

Explanation

- (i) The conservation of biodiversity has become a global concern.
- (ii) Biologists urge the national policy makers to state a set of rules necessary to protect an individual species. They demand that the laws should define species, which are threatened by extinction and must be protected. Countries should be loyal to conserve biodiversity and should develop resources for its sustainability.

Threats to Biological Resources in Pakistan

Pakistan is rich in biodiversity but faces severe threats to its biological resources. The greatest concern is the continuous loss of species and natural habitats.

Causes of loss of species and habitats

- (i) Rapid growth in human population.
- (ii) Prevailing (means spreading) poverty in the rural areas of Pakistan.
- (iii) Low literacy rate
- (iv) Less Resources

IUCN & WWF-P

The International Union for the Conservation of Nature and Natural resources (IUCN) and the World Wild life Fund Pakistan (WWF-P) work in close coordination with Pakistan's Ministry of environment and other government and non-government institutions. The IUCN has prepared the first national Red List (List of endangered or threatened species)

Organizations/Projects work to conserve species and habitat:

- (i) **National Conservation Strategy:** In 1980's, the IUCN and the government of Pakistan formulated the National Conservation Strategy for Pakistan for the conservation of Pakistan's biodiversity.
- (ii) **UN Convention on Combating Desertification (CCD):** This is an international treaty against the damage and poverty in drylands. Pakistan signed this in 1997.
- (iii) **Himalayan Jungle Project (HJP):** It started in 1991 in the Palas Valley, Khyber pakhtunkhwa (KP). It aimed at protecting one of the richest areas of biodiversity in Pakistan.
- (iv) **Conservation of biodiversity of the Suleiman Range, Balochistan:** The Suleiman range of Chilghoza forest is the largest Chilghoza forest in the world. In 1992, the WWF-P started its conservation program.
- (v) **Northern Areas Conservation Project:** The northern areas of Pakistan serve as a habitat for a number of wildlife species. The survival of these species is under threat. The NACP is a project of WWF-P, which is successful in implementing a ban on the hunting of these species.
- (vi) **Conservation of migratory birds in Chitral, KP:** Chitral lies on the migratory route of several important bird species. These birds face enormous hunting pressure. WWF-P Pakistan initiated efforts to reduce the hunting pressure in 1992. These efforts proved successful.
- (vii) **Conservation of Chiltan Markhor:** Hazarganji National Park is located close to Quetta and is the only remaining habitat of Chiltan Markhor in the country. WWF-Pakistan developed the management plan of the park. Markhor is National animal of Pakistan.
- (viii) **Ban on games:** Foreigners visit the northern areas and play many games in which bears are used. WWF-Pakistan has been successful in imposing a ban on this illegal practice

Q.17. Write a note on Endangered species in Pakistan.

Ans. Indus Dolphin (Lahore board 2011 G D)

Introduction: The Indus river dolphin is a fresh water river mammal.

Habitat: It lives in Indus River.

Total Number. of Animals (Present Status)

According to WWF-P, only 600 animals of this species are left today in the Indus river in Pakistan.

Factors causing decline of species

- (i) Water pollution (ii) Poaching (iii) Destruction of habitat.

Marco Polo Sheep

Habitat

In Pakistan, they are mostly found in the Khunjerab National Park and adjoining areas.

Endangered Status

The sheep have an endangered status and their numbers have been rapidly decreasing in the last two decades.

Conservation

WWF-P has started projects for its conservation.

Houbara bustard

Migratory Bird

Houbara bustard are migratory birds that fly to Pakistan in winter season from former soviet territory.

Settlement and Decline of the bird

Large number of these birds settles down in Cholistan and Thar deserts. The decline in the number of Houbara bustard is due to hunting by foreigners and destruction of its habitats.



Figure 3.10: Indus Dolphin, Houbara and Marco Polo Sheep – the endangered species

Multiple Choice Questions

1. Genus of Pea is;
 - (a) Homo
 - (b) Amanita
 - (c) Escherichia
 - (d) Pisum
 2. Three kingdom Classification system was proposed in:
 - (a) 1866
 - (b) 1937
 - (c) 1688
 - (d) 1788
 3. Which is composed of only protein?
 - (a) Viruses
 - (b) Prions
 - (c) Viroids
 - (d) 'b' and 'c'
 4. Important cause of species extinctions is:
 - (a) Habitat loss
 - (b) Deforestation
 - (c) Over population
 - (d) Both 'a' and 'b'
 5. Which one is the national bird of Pakistan?
 - (a) Pigeon
 - (b) Ostrich
 - (c) Crow
 - (d) Chakor
 6. Cutting down of trees is known as:
 - (a) Habitat loss
 - (b) Deforestation
 - (c) Extinction
 - (d) None of these
 7. Which one is acellular?
 - (a) Bacteria
 - (b) Fungi
 - (c) Cyanobacteria
 - (d) Viruses
 8. Cell wall of fungi is made up of:
 - (a) Cellulose
 - (b) Amino acid
 - (c) Chitin
 - (d) 'a' and 'b'
 9. Basic unit of classification is:
 - (a) Genus
 - (b) Order
 - (c) Family
 - (d) Species
- (Lahore board 2011 G II)
10. Classification means the grouping of organisms on the basis of:
 - (a) How they feed
 - (b) The features they have in common
 - (c) How they respire
 - (d) How they can survive
 11. The kingdom protista includes:
 - (a) Unicellular and simple multicellular organisms with membrane bounded nucleus
 - (b) True multicellular organisms with no distinct membrane bounded nucleus.
 - (c) True multicellular organisms with membrane bounded nucleus.
 - (d) Unicellular organisms with no distinct membrane bounded nucleus.
 12. Viruses are not classified in any kingdom because:
 - (a) They are too poorly understood
 - (b) They are too small
 - (c) Their genetics cannot be determined
 - (d) They are not considered organisms
 13. Viruses are assigned to the kingdom:
 - (a) Monera
 - (b) Protista
 - (c) Fungi
 - (d) None of above
 14. A related group of genera comprises:
 - (a) An order
 - (b) A family
 - (c) A class
 - (d) A phylum
 15. In which kingdom, would you classify unicellular eukaryotes?
 - (a) Fungi and Protists
 - (b) Fungi and Monera
 - (c) Only Protista
 - (d) Only Fungi

16. In binomial nomenclature, the first letter of the _____ name is capitalized.
- (a) Family (b) Class
(c) Species (d) Genus
17. Which one of the following sequences shows the correct hierarchy of classification, going from the smaller to the bigger group?
- (a) Kingdom, Phylum, Order, Class, Family, Genus, Species
(b) Kingdom, Phylum, Class, Order, Family, Genus, Species
(c) Genus, Species, Kingdom, Phylum, Order, Class, Family
(d) Species, Genus, Family, Order, Class Phylum, Kingdom.
18. Which of the following may be the correct way of writing the scientific name of an organism?
- (a) *Canis lupis* (b) Saccharum
(c) Grant's gazelle (d) E. Coli
19. A certain organism is multicellular, adapted for photosynthesis and has multicellular sex organs. To which kingdom does it belong?
- (a) Animalia (b) Fungi
(c) Plantae (d) Protista
20. Species that are in same _____ are more closely related than species that are in the same _____.
- (a) Phylum....Class
(b) Family.....Order
(c) Class.....Order
(d) Family....Genus
21. When a last member of a particular species dies, the species is said to be _____.
- (a) Established (b) Extinct
(c) Threatened (d) Endangered
(Lahore board 2011 G I)
22. In which season Houbara bustard migrates to Pakistan and settles here?
- (a) Summer (b) Spring
(c) Autumn (d) Winter
23. Who published important work on plants classification?
- (a) John Ray
(b) Andrea Caesalpino
(c) Tournefort
(d) Augustus Rivinus
24. What is the greatest threat to biodiversity on this planet?
- (a) Habitat loss (b) deforestation
(c) overpopulation (d) b and c
25. Who divided living organisms into three kingdom Classification System?
- (a) Linnaeus (b) Aristotle
(c) John Ray (d) Hackel
26. How many children born in each minute in the world?
- (a) 100 (b) 150
(c) 180 (d) 200
27. How many kinds of organisms inhabit the earth?
- (a) 1 million (b) 5 million
(c) 10 million (d) 10 billion
28. Biodiversity means:
- (a) Variety within a species
(b) Variety among the species
(c) Variety within a species and among the species

- (d) None of these
29. The bio diversity of any region depends on:
 (a) Climate
 (b) Altitude
 (c) Soil and other species
 (d) All of these
30. Biodiversity is richer in:
 (a) Tropics
 (b) Temperate regions
 (c) Polar regions
 (d) Desert
31. Biodiversity is the source of:
 (a) Food (b) Fibres
 (c) Rubber and oil (d) All of these
32. The kinds of animals found on Earth:
 (a) 0.5 million (b) 1.0 million
 (c) 1.5 million (d) 2 million
33. The kinds of plants found on Earth:
 (a) 0.1 million (b) 0.3 million
 (c) 0.5 million (d) 1.0 million
34. The branch of biology which deals with classification is?
 (a) Taxonomy (b) Systematic
 (c) Botany (d) Genetics
35. On what basis, organisms have been classified by biologists?
 (a) Similarities (b) differences
 (c) both a and b (d) Randomly
36. It is a group of related phyla:
 (a) Kingdom (b) Class
 (c) Order (d) Family
37. It is a group of related classes:
 (a) Phylum (b) Class
 (c) Family (d) Species
38. It is a group of related orders:
 (a) Genus (b) Family
 (c) Species (d) Class
39. It is a group of related genera:
 (a) Species (b) Family
 (c) Order (d) Class
40. Which one is the lowest taxon of classification?
 (a) Genus (b) Order
 (c) Species (d) Phylum
41. The scientific name of human being is:
 (a) *Homo sapiens*
 (b) *Pisum sativum*
 (c) *Amanita muscaria*
 (d) *E. coli*
42. The class of man is:
 (a) Insecta (b) Mammalia
 (c) Magnoliopsida (d) Proteobacteria
43. The kingdom of bacteria is.
 (a) Fungi (b) Monera
 (c) Protista (d) Plantae
44. Who suggested the first system of classification of organisms?
 (a) Al-Jahiz (b) Aristotle
 (c) John Ray (d) Averroes
45. In which language, Ibn-Rushd translated the Aristotle's book "de Anima"?
 (a) Ibrani (b) Arabic
 (c) Hindi (d) Persian
46. Who introduced Taxon of 'order' in classification?
 (a) Caesalpino (b) John Ray
 (c) Tournefort (d) Rivinus
47. Modern classification (binomial nomenclature) is based on the work of:
 (a) Caesalpino (b) John Ray

- (c) Tournefort
(d) Carolous Linnaeus
48. Who proposed the kingdom protista?
(a) Ernst Hackel (b) Robert Whittaker
(c) Margulis (d) Schwartz
49. The terms "procariotique" and "eucariotique" were introduced by E. Chatton in:
(a) 1866 (b) 1937
(c) 1988 (d) 1990
50. Five kingdom classification system was first introduced by:
(a) Margulis (b) Hackel
(c) Whittaker (d) Linnaeus
51. All prokaryotic organisms are included in kingdom:
(a) Protista (b) Monera
(c) Fungi (d) Plantae
52. Which one is not related to protista?
(a) Algae (b) Protozoans
(c) Bacteria
(d) Fungi like organisms
53. Which kingdom includes eukaryotic, multicellular and absorptive heterotrophs?
(a) Monera (b) Protista
(c) Fungi (d) Plantae
54. Which of the following character is not related to Animalia?
(a) Eukaryotic (b) Multicellular
(c) Heterotrophs (d) Autotrophs
55. Which one of the following is without nuclear membrane?
(a) Animalia (b) Plantae
(c) Monera (d) Protista
56. Cellular organization is absent in:
(a) Viruses (b) Bacteria
(c) Algae (d) Protozoans
57. The body of which organism consists only of RNA?
(a) Prions (b) Viroids
(c) Viruses (d) Algae
58. The species which will become extinct in future:
(a) Threatened (b) Endangered
(c) Extinct (d) All of these
59. How many people live on earth today?
(a) 100 million (b) 300 million
(c) 400 million (d) 600 million
60. It is the national animal of Pakistan.
(a) Dolphin (b) Ibex
(c) Markhor (d) Camel
61. The large omnivorous bird that flies to Pakistan in winter from former Soviet territory is:
(a) Chakor (b) Houbara bustard
(c) Kiwi (d) Ostrich
62. Forests are the source of:
(a) Drugs (b) Fuel
(c) Timber (d) All of these
63. Deforestation results in.
(a) Soil erosions
(b) Increased water storage capacity of dams
(c) More humidity
(d) More clouds
64. The lowest taxon among the following is:
(a) Genera (b) Class
(c) Order (d) Families
65. Euglena is included in kingdom:
(a) Monera (b) Protista
(c) Fungi (d) Plantae

66. A species is a group of natural population which can:
- Interbreed and produce offsprings
 - Interbreed in nature and produce offspring
 - Interbreed and produce fertile offspring
 - Interbreed in nature and produce fertile offsprings
67. The need of third kingdom protista raised due to:
- presence of certain unicellular organisms
 - presence of plant like character
 - presence of animal like characters
 - presence of both animal and plant like characters
68. Fungi cannot be placed in plantae kingdom because:
- Fungi lack cell wall
 - fungi lack root, stem and leave
 - Fungi lack chlorophyll
 - Fungi do not store food
69. Robert Whittaker selected which one of the following as principle for the

formation of five kingdom classification system?

- Mode of locomotion
 - Mode of nutrition
 - Mode of reproduction
 - Mode of respiration
70. The five kingdom classification system is not based on:
- Mode of nutrition
 - Cytology
 - Genetics
 - Morphology
71. It is at the risk of becoming extinct because few members are left:
- Extinct
 - Threatened
 - Vulnerable
 - Endangered
72. Marco polo Sheep is found in:
- Khunjerab National Park
 - plains
 - India
 - Indus Valley
73. Members of the same species living in the same place is called:
- Habitat
 - Biosphere
 - Community
 - Population
- (Lahore board 2011 G I)

Answers

1.	d	11.	a	21.	b	31.	d	41.	a	51.	b	61.	B	71.	d
2.	a	12.	d	22.	d	32.	c	42.	b	52.	c	62.	D	72.	a
3.	b	13.	d	23.	a	33.	c	43.	b	53.	c	63.	A	73.	d
4.	a	14.	b	24.	a	34.	a	44.	b	54.	d	64.	A		
5.	d	15.	c	25.	d	35.	c	45.	b	55.	c	65.	B		
6.	b	16.	d	26.	c	36.	a	46.	d	56.	a	66.	D		
7.	d	17.	d	27.	c	37.	a	47.	d	57.	b	67.	D		

8.	c	18.	a	28.	c	38.	d	48.	a	58.	b	68.	C		
9.	d	19.	c	29.	d	39.	b	49.	b	59.	d	69.	B		
10.	b	20.	b	30.	a	40.	c	50.	c	60.	c	70.	D		

Short Questions

Q.1. What is term Acellular?

Ans. Non – cellular , a living entity without cells. e.g viroid , prion

Q.2. Define class Animalia.

Ans. It includes eukaryotic, multicellular, consumers. They lack cell wall and can do locomotion. e.g. humans, lion, cat etc.

Q.3. Define Binomial nomenclature. (Lahore board 2012 G I)

Ans. It is the method introduced by Carolus Linnaeus (1707-1778). It is the method of giving scientific name to a species or living organism. The name of organism, consisting of two parts, first one is the genus name and second one is the name of species. e.g. The scientific name of human is *Homo sapiens*

Q.4. Define Class.

Ans. A class is a group of related orders,

Q.5. Define Classification.

Ans. The arrangement of organisms into groups and sub-groups on the basis of similarities and differences is called classification

Q.6. Define Conservation.

Ans. The protection, preservation, management or restoration of natural environment and the ecological communities that inhabit them.

Q.7. What are Endangered Species? (Lahore board 2012 G II)

Ans. A species is called endangered if it is at the risk of becoming extinct when few members of that species are left.

Q.8. Define Family

Ans. A family is a group of related genera.

Q.9. Define Fauna

Ans. The diversity in animals is called fauna.

Or

The study of total found animals in a particular region is known as fauna.

Q.10. Define Flora

Ans. The diversity in plants is called flora

Or

The study of total occurring plants in a particular region is known as flora.

Q.11. Define Fungi

Ans. A group of heterotrophic organisms with absorptive mode of nutrition is called fungi. Fungi cell wall is made up of chitin and are also called decomposers.

Q.12. Define Genus

Ans. A genus is a group of related species.

Q.13. What is IUCN?

Ans. International Union for the Conservation of Nature and Natural Resources.

Q.14. Define Monera.

Ans. It includes prokaryotic organisms. They lack definite membrane bounded nucleus and membrane bounded organelles.

Q.15. Define Order.

Ans. An orders is a group of related families.

Q.16. Define Phylum .

Ans. A phylum is a group of related classes.

Q.17. Define Plantae.

Ans. It includes eukaryotic multicellular autotrophs. They have multicellular sex organs Cell wall is made up of cellulose.

Q.18. Define Prion.

Ans. Prions are composed of protein only and act as infectious particles in plants. They are acellular particles.

Q.19. Define Protista.

Ans. It consists of the group of most diverse organisms. It consists of unicellular and simple multicellular eukaryotes. It includes animal like protozoans. Plant like algae and fungi like protists.

Q.20. What is Soil erosion?

Ans. The removal of top layer of soil by wind, rain or flood is called soil erosion.

Q.21. Define Systematics.

Ans. The branch of biology which deals with evolutionary histories of organisms is known as systematics.

Q.22. Define Taxon.

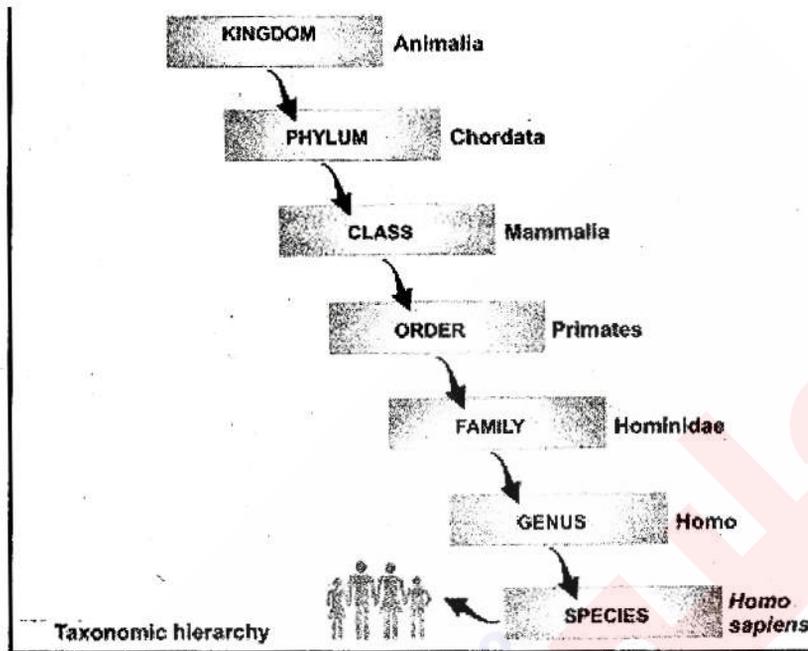
Ans. The group into which living organisms are classified are called taxa (singular taxon)

Or

Each rank of classification is known as taxon. e.g. kingdom, phylum, class.

Q.23. Define Taxonomic hierarchy.

Ans. The groups into which organisms are classified are known as taxa and these taxa form a ladder called taxonomic hierarchy.



Q.24. Define the term Viroid.

Ans. Viroids are composed of circular RNA only and act as infectious particles and causes diseases in certain plants.

Q.25. What is the origin of biodiversity?

Ans. 10 million kinds of organisms inhabit the earth. But biologists studied and catalogued less than one third of these. Diversity among the organisms is more obvious than fundamental unity of life. This diversity emerged as modifications in organisms.

Q.26. Define biodiversity. Describe briefly the meaning of biodiversity. (Lahore Board 2011 G I)

Ans. Biodiversity is a measure of the variety of organisms present in different ecosystems. The term "biodiversity" is derived from "bio" and "diversity". Bio means life and "Diversity" means variety within a species and among species.

Q.27. Give importance of biodiversity.

Ans.

- 1- Biodiversity provides food for humans
- 2- Most of drugs are derived, directly or indirectly, from biological sources.
- 3- Many industrial materials are derived directly from biological resources. These materials are building materials, fibres, dyes, resins, gums, adhesives, rubber and oil.

Q.28. Define taxonomy and systematics?

Ans. The branch of biology which deals with classification is called taxonomy. The branch which deals with classification and traces the evolutionary history of organisms is called systematics.

Q.29. Define Species.

Ans. A species is a group of organisms which can interbreed freely among them and produce fertile offspring, but are reproductively isolated from all other such groups in nature.

Q.30. Is the interbreeding concept of species is applicable to organism which reproduce asexually?

Ans. The criteria of interbreeding is applied to those which regularly interbreed among themselves. But in some groups asexual reproduction predominates. Therefore they do not interbreed with one another. Thus here interbreeding cannot be used as a criterion for species recognition.

Q.31. What is the role of Ibn Rushd (Averroes) in classification?

Ans. He was a judge (Qazi) in Seville (Spain). In 1172, he translated and abridged Aristotle's book "de Anima (On the Soul)" into Arabic. His original commentary has now lost. But its translation into Latin is available.

Q.32. What were the objections on three kingdom system?

Ans. 1- This system did not clear the difference between prokaryotes and eukaryotes.
2- Some biologists disagreed about the position of fungi in kingdom plantae. Fungi resemble plants in many ways. But they are not autotrophs. They are special form of heterotrophs. They get their food by absorption. They do not have cellulose in their cell walls. Their cell wall is composed of chitin.

Q.33. What was the work of Robert Whittaker? Give his basis of classification?

Ans. In 1967, he introduced the five-kingdom classification system. This system is based on
1- **the levels of cellular organization** i.e. prokaryotic, unicellular eukaryotic and multicellular eukaryotic. 2- **The principal modes of nutrition** i.e. photosynthesis, absorption, and ingestion.

Q.34. When does scientific name is abbreviated? Give example.

Ans. The scientific name is generally written in full when it is first used. But sometimes several species form the same genus. Here they may be abbreviated by just using an initial for the genus. For example, the bacterium *Escherichia coli* is often written as just *E. coli*.

Q.35. What are the benefits of using binomial nomenclature?

Ans. 1- This system has great value. It has widespread use.
2- There is stability of its names. Every species can be unambiguously identified by binomial nomenclature.
3- It requires just two words. 4- The same name can be used all over the world, in all languages. It avoids difficulties of translation.

Q.36. How biodiversity is lost by over-hunting.

Ans. Over-hunting is also an important cause of the extinction of species. It is causing endangerment of many species like whales, ibex, urial, markhor etc. (Markhor is the national

animal of Pakistan). There is legal and illegal commercial hunting. It is the principal threat to biodiversity i.e. 23%

Q.37. What is deforestation?

Ans. The cutting down of trees for the conversion of a forest to non-forest land is called deforestation. It is done for using the land for various purposes. Humans use this land for pasture or urban use etc.

Q.38. What is Northern Areas Conservation Project?

Ans. The northern areas of Pakistan is a habitat for a number of wildlife species. The survival of these species is under threat. The NACP is a project of WWF-P. It is successful in implementing a ban on the hunting of these species.

Q.39. What is Conservation of migratory birds in Chitral, NWFP?

Ans. Chitral lies on the migratory route of several important bird species. These birds face enormous hunting pressure. WWF-Pakistan initiated efforts to reduce the hunting pressure in 1992. These efforts proved successful.

Q.40. What are the reasons of decline of Houbara bustard?

Ans. It is hunted by the foreigners. This bird is popular among the Arabs. Its population is not declined only due to hunting. It is also declined due to the destruction of its natural habitats.

Q.41. What factors do affect biodiversity of a region?

Ans. i) Climate ii) Altitude iii) Soil iv) Presence of other species.

Q.42. Why Carolus Linnaeus is famous?

Ans. i) He introduced Binomial nomenclature.
 ii) He divided the nature into three kingdoms: (i) Minerals (ii) vegetables (iii) animals.
 iii) He used five ranks for classification: (i) class (ii) order (iii) genus (iv) species (v) variety.

Q.43. What are the aims of classification?

Ans. i) To determine similarities and differences among organisms so that they can be recognized and studied easily.
 ii) To find the evolutionary relationship among organisms.

Q.44. What is basis of classification?

Ans. Classification is based on similarities in the form or structure. These similarities are seen in:

- i. Structure (Both external and internal)
- ii. Stage of development
- iii. Modern genetics

These similarities suggest that all organisms are related to one other at some point in their evolutionary histories.

However, some organisms are closely related than others, for example sparrows are more closely related to pigeons than to insects. It means sparrows and pigeons have common evolutionary histories. The differences are also considered as the basis of classification.

Q.45. What are Taxa? Give examples.

Ans. The groups into which organisms are classified are called taxa. e.g. Kingdom, phylum, class, order, family, genus, species.

Q.46. Name the largest and smallest taxa?

Ans. Kingdom is the largest taxon while species is the smallest taxon.

Q.47. Write the names of five kingdoms of organisms.

- Ans.**
- i) Monera
 - ii) Protista
 - iii) Plantae
 - iv) Fungi
 - v) Animalia

Q.48. What are the characteristics of kingdom Monera?

- i) It includes prokaryotes.
- ii) They are mostly unicellular, although some types form chains, clusters or colonies of cells.
- iii) They are mostly heterotrophic but few are photosynthetic e.g., Bacteria, cyanobacteria.

Q.49. What are the types of protista?

- Ans.**
- i) Protozoans (Animal like protists)
 - ii) Algae (plant like protists)
 - iii) Fungi like protists

Q.50. What are simple multicellular organisms?

Ans. They don't have multicellular sex organs and don't form embryos during their life cycles. e.g., algae and fungi like protists

Q.51. Give examples of Protozoans

- Ans.**
- i) Paramecium
 - ii) Amoeba
 - iii) Volvox

Q.52. How can you divide the five kingdoms into two groups on the basis of types of cells?

Ans. Group – I: Monera includes organisms with Prokaryotic cells.

Group – II: Protista, Plantae, Fungi and Animalia include organisms with eukaryotic cells.

Q.53. Write the botanical names of piyaz and House crow.

- Ans.** Piyaz → *Allium cepa*
House crow → *Corvus splendens*

Q.54. What is an extinct species?

Ans. A species is called extinct when there is no doubt that last individual of that species has died.

Q.55. Give a list of extinct animals in Pakistan.

- Ans.** i) Lion
ii) Asiatic Cheeta
iii) Tiger
iv) Indian one-horned Rhinoceros
v) Swamp deer
vi) Indian wild ass
vii) Hangul
viii) Black Buck

Q.56. What are the effects of deforestation?

- Ans.** i) Amount of water in soil and atmosphere is affected.
ii) Chances of soil erosion are increased.
iii) Storage capacity of dams is decreased.
iv) Amount of rainfall is decreased.
v) Amount of CO₂ is increased in atmosphere.

Q.57. Give significance of forests.

- Ans.** i) Forests support biodiversity. ii) Forests provide habitat for wildlife.
iii) Forests are the source of medicines, timber, fuel wood etc.

Q.58. Name the two organization working for conservation of biodiversity in Pakistan.

- Ans.** i) The international Union for the Conservation of Nature and Natural Resource (IUCN)
ii) The World Wildlife Fund – Pakistan (WWF-P)