



Topic No.	Title	Page No.
3.1	Biodiversity <ul style="list-style-type: none"> • Importance of Biodiversity 	56
3.2	Classification – Aims and Principles <ul style="list-style-type: none"> • Aims of Classification • Basis of Classification • Taxonomic Hierarchy • Species 	69
3.3	History of Classification Systems <ul style="list-style-type: none"> • Two-Kingdom Classification System • Three-Kingdom Classification System • Five-Kingdom Classification System 	64
3.4	The Five Kingdoms <ul style="list-style-type: none"> • Status of Viruses 	68
3.5	Binomial Nomenclature	73
3.6	Conservation of Biodiversity <ul style="list-style-type: none"> • Impact of Human Beings on Biodiversity • Deforestation and Over-Hunting • Steps for the Conservation of Biodiversity • Endangered Species in Pakistan 	75
*	Review Questions <ul style="list-style-type: none"> • Multiple Choice Questions • Understanding the Concepts • Short Questions • The Terms to Know 	83
*	Assignment <ul style="list-style-type: none"> • Let's Draw and Label • Self Test 	86

3.1 BIODIVERSITY**LONG QUESTIONS**

1. **Relate the importance of biodiversity with natural ecosystem through examples.**
(Understanding Based)(Ex Q. No. 1)

Ans: IMPORTANCE OF BIODIVERSITY

In a natural ecosystem, the variety of Flora and Fauna are extremely important for its characteristics and survival of species.

Biodiversity is important for mankind in many ways:

Food:

Biodiversity provides food for humans.

Examples:

- Fruits
- Vegetables
- Nuts
- Seeds

Drugs:

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

Example:

- A wide range of medicinal herbs and drugs such as quinine.

Industrial materials:

A wide range of industrial materials are derived directly from plants.

Examples:

- Building materials
- Fibers
- Dyes
- Resins
- Gums
- Adhesives
- Rubber
- Oil

Maintaining Ecosystems:

Biodiversity plays an important role in making and maintaining ecosystems.

Example:

- Formation of communities
- Food-linkages.

Atmospheric Benefits:

It helps in regulating the chemistry of our atmosphere and water supply.

Example:

- Temperature regulation and oxygen supply.

Recycling:

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

Example:

Recycling of nutrients via various biological cycles.

3.1 BIODIVERSITY

SHORT QUESTIONS (Topic 3.1)

Q.1 How many kinds of organisms are present on the earth? (K.B)

Ans: ORGANISMS ON EARTH

The earth is inhabited by at least 10 million kinds of organisms, but less than one-third of these have been studied and catalogued by biologists.

Q.2 Name the principal groups of organisms. (K.B)

Ans: PRINCIPAL GROUPS OF ORGANISMS

Following are the principal groups of organisms:

- Prokaryotes
- Protists
- Fungi
- Plants
- Animals

Q.3 Define biodiversity. (K.B)

(LHR 2014, SWL 2014, FSD 2014, BWP 2015)

Ans: BIODIVERSITY

Definition:

“The measure of the variety of organisms present in different ecosystems is called biodiversity.”

Variety:

It refers to variety within species and among species.

Meaning:

The term ‘biodiversity’ has been derived from two terms.

‘bio’- life

‘diversity’- variety

Q.4 What do you mean by flora and fauna? (K.B)

Ans: FLORA AND FAUNA

Flora:

“The diversity of plants in a particular region is called flora.”

Fauna:

“The diversity of animals in a particular region is called fauna.”

Q.5 On what factors the flora and fauna of a region depend? (K.B)

Ans: FACTORS ON WHICH FLORA AND FAUNA DEPEND

The flora and fauna in a region depend on:

- Climate
- Altitude
- Soil
- Presence of other species

Q.6 How biodiversity is distributed on earth? (U.B)

Ans: DISTRIBUTION OF BIODIVERSITY ON EARTH

Biodiversity is not distributed evenly on earth.

Tropics:

It is richest in the tropics.

Temperate Regions:

Temperate regions have many species.

Polar Regions:

Polar regions have fewer species.

Q.7 How biodiversity has evolved? (U.B)

Ans: EVOLUTION OF BIODIVERSITY

Biodiversity found on earth today is the result of 4 billion years of evolution.

Q.8 What do you know about the origin of life on earth? (U.B)

Ans: ORIGIN OF LIFE ON EARTH

The origin of life is not well known to science, though limited evidence suggests that until 600 million years ago, all life consisted of bacteria and similar unicellular organisms.

Q.9 Describe the importance of biodiversity. (K.B)

(LHR 2015, 2016, MTN 2015)

Ans: IMPORTANCE OF BIODIVERSITY

The biodiversity is important in many ways, such as:

Food:

Biodiversity provides food for humans.

Drugs:

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

Industrial Materials:

A wide range of industrial materials, e.g. building materials, fibers, dyes, resins, gums, adhesives, rubber and oils are derived directly from plants.

Maintenance of Ecosystems:

Biodiversity plays an important role in making and maintaining ecosystems.

Environmental Benefits:

It helps in regulating the chemistry of our atmosphere and water supply.

Recycling:

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

MULTIPLE CHOICE QUESTIONS (Topic 3.1)

1. How many kinds of organisms inhabit the earth? (K.B)

- (A) 10 million (B) 15 million
(C) 20 million (D) 25 million

2. How many principle group of organisms are there? (K.B)

- (A) 4 (B) 2
(C) 3 (D) 5

3. The plants present in a particular region: (K.B)

- (A) Flora (B) Fauna
(C) Species (D) Population

4. The animals present in a particular region: (K.B)

- (A) Flora (B) Fauna
(C) Species (D) Kingdom

5. Biodiversity found on earth today is the result of how many years of evolution? (K.B)

- (A) 3 billion (B) 4 billion
(C) 5 billion (D) 6 billion

3.2 CLASSIFICATION – AIMS AND PRINCIPLES**LONG QUESTIONS**

Q.1 What is classification? Describe its aims and basis. *(Knowledge Based)*

(GRW 2014, DGK 2014, 2015) (Ex Q. No. 2)

Ans:

CLASSIFICATION**Definition:**

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

Biological Classification:

The method by which **biologists divide organisms into groups and subgroups on the basis of their similarities and differences** is called biological classification.

Taxonomy:

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

Systematics:

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

AIMS OF CLASSIFICATION

Following are the aims of classification:

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

BASIS OF CLASSIFICATION**Basis:**

Classification is based on relationships amongst organisms and such relationship is got through similarities in characteristics. 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.

Example:

- Sparrows are more closely related to pigeons than to insects. It means that the former two have common evolutionary histories.

Similarities:

When biologists classify organisms into groups and subgroups, similarities are seen in:

- External structures
- Internal structures
- Stages of development

Role of Modern Genetics:

Modern genetics provides important information to taxonomists. The similarities and differences in the DNA of two studied organisms can be used for getting idea about similarities and differences in their structure and functions.

Q.2 Write a note on taxonomic hierarchy.

(Knowledge Based)

Ans:

TAXONOMIC HIERARCHY

Taxa:

The groups into which organisms are classified are called as taxa.

Taxon:

The singular of 'taxa' is 'taxon'.

Taxonomic Hierarchy:

The taxa form a ladder, called as 'Taxonomic Hierarchy'.

Divisions of Organisms:

All 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:

Kingdom:

A kingdom is a group of related phyla.

Phylum:

A phylum is a group of related classes. (Division: For plants and fungi)

Class:

A class is a group of related orders.

Order:

An order is a group of related families.

Family:

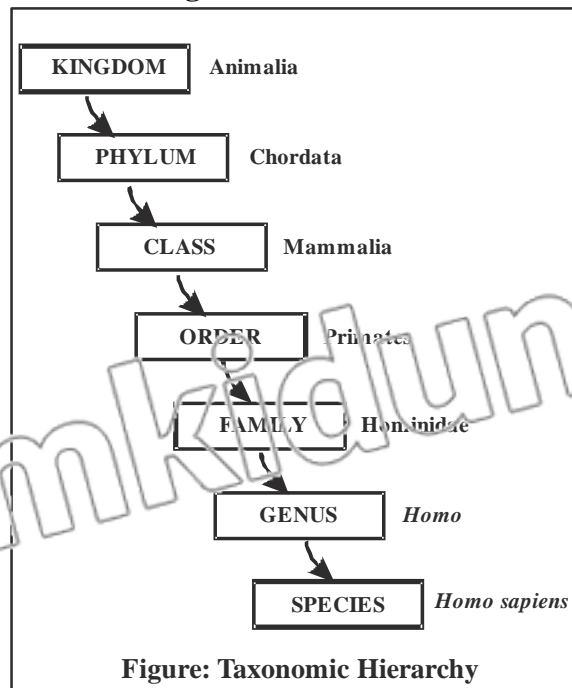
A family is a group of related genera.

Genus:

A genus is a group of related species.

Species:

A species consists of similar organisms.



Q.3 Write a note on species.

(Knowledge Based)

Ans:

SPECIES

Introduction:

Species is the basic unit of classification.

Definition:

“A group of organisms which can interbreed freely among them and produce fertile offsprings, but are reproductively isolated from all other groups in nature is called as species.”

Distinct Characteristic:

Each species possesses its own distinct characteristics like:

- Structural
- Ecological
- Behavioral

Explanation:

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. But in such unnatural crosses they produce an infertile offspring.

Example:

A cross between a male donkey and a female horse produces an infertile offspring.

- Mule

Interbreeding Criteria:

The criteria of interbreeding cannot be used for species recognition in organisms who reproduce asexually and do not interbreed with one another.

Example:

- Many unicellular organisms

SHORT QUESTIONS (Topic 3.2)

Q.1 How many types of animals and plants are known to biologists? (K.B)

Ans:

TYPES OF ANIMALS AND PLANTS

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

Q.2 What is meant by biological classification? (K.B)

Biological Classification:

Ans: It is a method by which biologists divide organisms into groups and sub groups on the basis of similarities and dissimilarities among organisms and also their evolutionary histories.

Q.2 Why does it become difficult to learn about the characteristics of each species? (U.B)

Ans:

DIFFICULTY IN LEARNING CHARACTERISTICS OF EACH SPECIES

Complexity:

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

Habitat:

Some of them live in sea, others on land.

Locomotion:

Some walk, others fly and still others are stationary.

Mode of life:

Each has its own way of life, i.e. getting food, avoiding unfavorable environmental conditions, finding a place to live and reproducing its kind.

Q.3 How would you differentiate between systematics and taxonomy? (K.B)

(BWP 2014, RWP 2014)

Ans:

DIFFERENTIATION

The difference between systematics and taxonomy is as follows:

Systematics	Taxonomy
<ul style="list-style-type: none"> The branch of biology which deals with classification and also traces the evolutionary history of organisms is called systematics. 	<ul style="list-style-type: none"> The branch of biology which deals with classification of organisms is called taxonomy.

Q.3 What are the aims of classification? (K.B)

(MTN 2015, LHR 2013, 2014, DGK 2014, SWL 2015)

Ans: Page no 59

Q.4 What do you mean by taxa and taxonomic hierarchy? (K.B)

(MTN 2015)

Ans: Page no 60.

Q.5 What are the basis of classification? (K.B)

Ans: Basis of classification

Classification is based on relationship amongst organisms and such relationship is got through similarities in characteristics. 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.

- **Similarities are seen in external and internal structures and stages of development.**
- **Similarities and differences in the DNA of two studied organisms.**

Example:

Sparrows are more closely related to pigeons than insects. It means that the sparrows and pigeons have common evolutionary histories.

Q.6 In which species the criteria of interbreeding cannot be used? (U.B)

Ans: Page no 61.

Q.7 Write the classification of human being. (K.B)

Ans:

CLASSIFICATION OF HUMAN BEING

Kingdom..... Animalia
 Phylum..... Chordata
 Class..... Mammalia
 Order..... Primates
 Family..... Hominidae
 Genus..... *Homo*
 Species..... *H.sapiens*

Q.8 Write the classification of pea plant. (K.B)

(LHR 2012)

Ans:

CLASSIFICATION OF PEA PLANT

Kingdom..... Plantae
 Phylum..... Magnoliophyta
 Class..... Magnoliopsida
 Order..... Finales
 Family..... Fabaceae
 Genus..... *Pisum*
 Species..... *P. sativum*

Q.9 Define species? (K.B)

Ans: Page no 61.

Q.10 What is mule? (K.B)

Ans: Page no 66.

Q.11 Why we should emphasize “in nature” in the definition of species? (K.B)

Ans: Page no 66.

MULTIPLE CHOICE QUESTIONS (Topic 3.2)

1. **The branch of Biology which deals with classification and traces the evolutionary history of organisms: (K.B)**

(A) Taxonomy (B) Systematics
(C) Histology (D) Entomology
2. **Biodiversity plays an important role, except: (K.B)**

(A) Recycling nutrients (B) Maintaining ecosystem
(C) Regulation of atmosphere (D) Interbreeding species
3. **Which of the following is highest taxon of classification? (K.B)** (GRW 2013)

(A) Species (B) Genus
(C) Order (D) Family
4. **A class is a group of related: (K.B)**

(A) Phyla (B) Orders
(C) Families (D) Genera
5. **A related group of genera comprises: (K.B)** (LHR 2012)

(A) Phylum (B) Class
(C) Family (D) Order
6. **A genus is a group of related: (K.B)**

(A) Classes (B) Families
(C) Orders (D) Species
7. **A family is a group of related: (K.B)** (MTN 2015, GRW 2014, LHR 2013, DGK 2015)

(A) Genera (B) Orders
(C) Species (D) Classes
8. **A group of related species is: (K.B)** (SWL 2014)

(A) Kingdom (B) Phylum
(C) Genus (D) Order
9. **The order of pea plant: (K.B)**

(A) *Pisum* (B) Fabales
(C) Magnoliophyta (D) Fabaceae
10. **The family of human being: (K.B)**

(A) Chordata (B) Mammalia
(C) Primates (D) Hominidae
11. **The order of human according to classification is: (K.B)** (BWP 2015)

(A) Mammalia (B) Primates
(C) Hominidae (D) *Pisum*
12. **The basic unit of classification: (K.B)** (DGK 2014)

(A) Order (B) Family
(C) Genus (D) Species
13. **The smallest taxon of taxonomy is: (K.B)** (GRW: 2012)

(A) Family (B) Order
(C) Species (D) Kingdom

14. The cross between a male donkey and a female horse produces: (U.B)
 (A) Mule (B) Pony
 (C) Liger (D) Tiger
15. The animal unable to reproduce is: (K.B) (GFW 2015)
 (A) Monkey (B) Mule
 (C) Horse (D) Donkey

HISTORY OF CLASSIFICATION SYSTEMS

LONG QUESTIONS

Q.1 What do you know about history of classification systems? (knowledge Based)

Ans: HISTORY OF CLASSIFICATION SYSTEMS

The following scientists contributed in past for development of classification systems:

Aristotle:

The earliest known system of classification of organisms comes from the Greek Philosopher Aristotle. He classified all living organisms known at that time in two groups:

- Plantae
- Animalia

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.

Ibn Rushd (Averroes):

In 1172, Ibn Rushd translated Aristotle's book 'de Anima' (on the soul) in Arabic.

Andrea Caesalpino:

Period: He was born in 1519 AD and died in 1603 AD.

Contribution: He divided plants into fifteen groups and called them 'genera'.

John Ray:

Period: He was born in 1627 AD and died in 1705 AD.

Contribution: He published important work on plant classification.

Augustus Rivinus:

Period: He was born in 1652 AD and died in 1723 AD.

Contribution: He introduced the taxon of 'order'.

Tournefort:

Period: He was born in 1656 AD and died in 1708 AD.

Contribution: He introduced the taxa of 'class' and 'species'.

Carolus Linnaeus:

Period: He was born in 1707 AD and died in 1778 AD.

Contribution: He grouped species according to similar physical characteristics and divided nature into three kingdoms.

- Mineral
- Vegetable
- Animal

He used five ranks in classification:

- Class
- Order
- Genus
- Species
- Variety

Linnaeus is best known for his introduction of the method still used to formulate the scientific name of every species.

Preference of a System:

Biologists prefer such a system that can provide maximum information about the basic differences and similarities among different organisms.

Q.2 Write a note on two-kingdom classification system. (*Knowledge Based*) (SWL 2015)

Ans: **TWO-KINGDOM CLASSIFICATION SYSTEM**

Introduction:

It is the oldest of all the classification systems.

According to this system, all organisms are classified into two kingdoms:

Kingdom Plantae:

- These organisms can prepare food from simple inorganic materials.
- They can store energy.
- They are autotrophs.

Examples:

- Bacteria
- Fungi
- Algae
- All plants

Kingdom Animalia:

- These organisms cannot synthesize their own food.
- They depend on autotrophs or other organisms for their food.
- They are heterotrophs.

Example:

- All animals

Objections:

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 and lack of cell wall) characters. So there should be a separate kingdom for such organisms.
- This system also ignores the difference between organisms having prokaryotic and those having eukaryotic cells.

Q.3 Write a note on three-kingdom classification system. (*K.B*) (BWP 2015)

Ans: **THREE-KINGDOM CLASSIFICATION SYSTEM**

Introduction:

In 1866, Ernst Haeckel solved the first objection and presented three-kingdom classification system.

According to this system, all organisms are classified into three kingdoms:

Kingdom Plantae:

He placed all plants and fungi in this kingdom.

Kingdom Animalia:

All of the animals were placed in kingdom animalia.

Kingdom Protista:

He proposed a third kingdom, Protista to accommodate *Euglena*-like organisms. He also included bacteria in this kingdom.

Objections:

- This system did not clear the difference between prokaryotes and eukaryotes.
- 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 and get their food by absorption. They do not have cellulose in their cell walls, rather they possess chitin.

SHORT QUESTIONS (Topic 3.3)

Q.1 Why *Euglena* is not fit in two kingdom classification? (U.B)

Ans: Distinction of *Euglena*:

Many unicellular organisms like *Euglena* have both plant like (presence of chlorophyll) and animal-like (heterotrophic mode of nutrition in darkness and lack of cell wall) characters. So there should be a separate kingdom for such organisms.

Q.2 What are the objections made by taxonomists in two kingdom classification system? (U.B)

Ans: Objections on two kingdom classification:

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 of cell wall) characters. So there should be a separate kingdom for such organisms.
- This system also ignores the difference between organisms having prokaryotic and those having eukaryotic cells.

Q.3 What are the distinguishing characteristics of fungi from plants? (U.B) (GRW-G2-2016)

Ans: Characteristics of fungi:

Some biologists disagreed about the position of fungi in kingdom plantae in three kingdom classification system. They are distinguished from plants in many ways as

- Fungi are heterotrophs while plants are autotrophs.
- They get their food by absorption while plants by photosynthesis.
- They possess chitin in their cell walls but plants contain cellulose.

Q.4 What is contribution of Aristotle in classification of living organisms? (K.B)

Ans: Page no 64.

Q.5 Describe contribution of Ibn Rushd for classification of living organisms. (K.B)

Ans: Page no 64.

Q.6 Describe contribution of Augustus Rivinus for classification of living organisms. (I.B)

Ans: Page no 64.

Q.7 Describe contribution of Andrea Caesalpino for classification of living organisms. (K.B)

Ans: Page no 64.

Q.8 What do you know about classification system by Carolus Linnaeus? (K.B)(LHR 2012)

Ans: Page no 64.

Q.9 Why was two-kingdom classification system rejected? (K.B)

Ans: Page no 65.

Q.10 Who proposed three-kingdom classification system and what were the problems with this kingdom system? (K.B)

Ans: Page no 65.

Q.11 What is the role of E-Chatton? (K.B)

Ans:

ROLE OF E-CHATTON

In 1937, E-Chatton suggested the terms of 'Procariotique' to describe bacteria and 'Eucariotique' to describe animal and plant cells.

Q.12 What is the basis of five-kingdom classification system? (K.B) (BWP 2015, RWP 2014)

Ans:

BASIS OF FIVE-KINGDOM CLASSIFICATION SYSTEM

Cellular Organization:

The levels of cellular organization i.e.

- Prokaryotic
- Unicellular eukaryotic.
- Multicellular eukaryotic.

Modes of Nutrition:

The principle modes of nutrition. i.e.

- Photosynthesis
- Absorption
- Ingestion

MULTIPLE CHOICE QUESTIONS (Topic 3.3)

1. Who introduced the system of classification of organisms for the first time? (K.B) (LHR 2015)

(A) Ernst Hackel	(B) Aristotle
(C) Carlous Linnaeus	(D) Robert Whittaker
2. Divided plants into fifteen groups and called them "genera": (K.B)

(A) John Ray	(B) Tournefort
(C) Carolus Linnaeus	(D) Andrea Caesalpino
3. Who introduced the taxon of "order"? (K.B) (DGK 2014)

(A) Tournefort	(B) Carolus Linnaeus
(C) Augustus Rivinus	(D) Aristotle
4. Carolus Linnaeus divided nature into _____ kingdoms? (K.B) (RW 2015)

(A) Three	(B) Four
(C) Five	(D) Six
5. In which year three kingdom classification system was proposed? (K.B)

(A) 1860	(B) 1862
(C) 1864	(D) 1866
6. Who proposed three kingdom classification system? (K.B) (FSD 2015)

(A) E-Chatton	(B) Robert Whittaker
(C) Ernst Hackel	(D) Margulis

3.4 THE FIVE KINGDOMS

LONG QUESTIONS

Q.1 Write a note on five-kingdom classification system. (*Knowledge Based*)
(BWP 2014, SGD 2015) (Ex Q. No. 4)

Ans: FIVE-KINGDOM CLASSIFICATION SYSTEM

Introduction:

In 1967, Robert Whittaker introduced the five-kingdom classification system.

Basis:

This system is based on:

Cellular Organization:

The levels of cellular organization, i.e.

- Prokaryotic
- Unicellular eukaryotic
- Multi-cellular eukaryotic

Modes of Nutrition:

The principle modes of nutrition, i.e.

- Photosynthesis
- Absorption
- Ingestion

Number of Kingdoms:

Organisms are divided into the following five kingdoms:

- Kingdom Monera
- Kingdom Protista
- Kingdom Fungi
- Kingdom Plantae
- Kingdom Animalia

Modification:

In 1988, Margulis and Schwartz modified the five-kingdom classification of Whittaker. They considered genetics along with cellular organization and modes of nutrition in classification. They classified the organisms into the same five kingdoms as proposed by Whittaker.

THE FIVE KINGDOMS

Kingdom Monera:

- It includes prokaryotic organisms i.e. they are made up of prokaryotic cells.
- They are unicellular.
- Some may form chains, clusters or colonies of cells.
- Most of them are heterotrophic.
- Some perform photosynthesis because of presence of chlorophyll in cytoplasm.
- They are radically different from eukaryotic cells.

Examples:

In this kingdom, there are two kinds of organisms:

- Bacteria
- Cyanobacteria

Kingdom Protista:

It includes eukaryotic organisms, which are unicellular or simple multicellular.

Types of Protists:

There are three main types of protists:

i. Algae:

- They are unicellular, colonial or simple multicellular.
- They resemble plant cells with cell walls and chlorophyll in chloroplasts.
- Simple multicellular means that they do not have multicellular sex organs and do not form embryos during life cycle.

ii. Protozoans:

- They resemble animals.
- Their cells lack cell walls and chlorophyll.

iii. Fungi-like Protists:

- Some protists resemble fungi.

Kingdom Fungi:

- It includes eukaryotic multicellular heterotrophs.
- They are absorptive in their mode of nutrition.
- Most fungi are decomposers. They live on organic material, secrete digestive enzymes, and absorb small organic molecules formed by the digestion by enzymes.

Examples:

- Mushrooms

Kingdom Plantae:

- It includes eukaryotic multicellular autotrophs.
- Plants are autotrophic in nutritional mode.
- They make their own food by photosynthesis.
- They have multicellular sex organs.
- They form embryos during their life cycles.

Examples:

- Mosses
- Ferns
- Flowering plants

Kingdom Animalia:

- It includes eukaryotic multicellular consumers.
- They live mostly by ingesting food and digesting it within specialized cavities.
- They lack cell walls.
- They show movements.

Examples:

- Rabbit
- Starfish
- Monkey

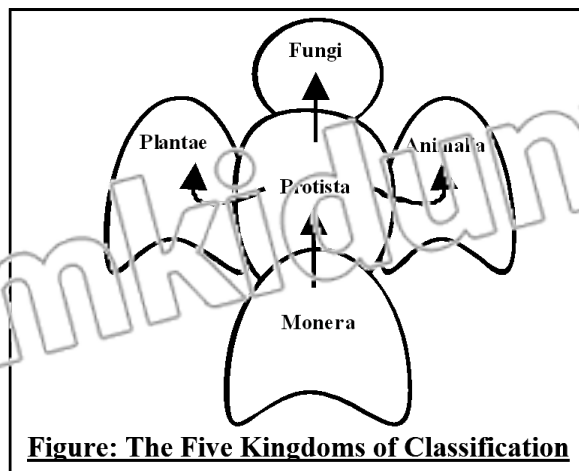


Figure: The Five Kingdoms of Classification

Opinion of Biologists:

Biologists believe that **kingdom protista evolved from monera**, and it gave rise to the other **three eukaryotic kingdoms**, i.e. **fungi, plantae and animalia**.

Q.2 Compare the distinguishing characteristics of the five kingdoms of life. (K.B)

Ans:

COMPARISON OF CHARACTERISTICS

A comparison of distinguishing characteristics of the five kingdoms of life is as follows:

Kingdom	Cell Type	Nuclear Envelope	Cell Wall	Mode of Nutrition	Multi-cellularity
Monera	Prokaryotic	Absent	Non-cellulose (polysaccharide plus amino acids)	Autotroph or heterotroph	Absent
Protista	Eukaryotic	Present	Present in some forms, various types	Photosynthetic or heterotroph, or combination	Absent in most forms
Fungi	Eukaryotic	Present	Chitin	Absorptive heterotroph	Present in most forms
Plantae	Eukaryotic	Present	Cellulose and other polysaccharides	Photosynthetic	Present in all forms
Animalia	Eukaryotic	Present	Absent	Ingestive heterotroph	Present in all forms

Q.3 Write a note on status of viruses.

Ans:

STATUS OF VIRUSES

Viruses are at the **borderline of living and non-living**. They have **both non-living and living features** which distinguish their unique identity.

Non-living Features:

- Due to their crystalline nature they are considered as non-living.
- They are acellular i.e. they do not have cellular organization.

Living Features:

- They contain DNA or RNA, normally encased in a protein coat.
- They reproduce, but only in living cells.
- They cause a number of diseases in living cells.

Conclusion:

They are not considered as organisms, and thus are not assigned any place in the five-kingdom classification system.

SHORT QUESTIONS (Topic 3.4)

Q.1 How would you differentiate between organisms of kingdom animalia and fungi? (K.B)

Ans: DIFFERENTIATION

The differences between kingdom animalia and fungi are as follow:

Animals	Fungi
Mode of Nutrition	
Animals have ingestive mode of nutrition.	Fungi have absorptive mode of nutrition.
Cell Wall	
Animals lack cell wall.	Fungi contain cell wall composed of chitin.
Decomposers	
Animals are not decomposers.	Fungi are decomposers.
Examples	
• Herbivores	• Mushrooms

Q.2 What types of organisms are included in kingdom Monera? Give Examples. (K.B)

(BWP 2015)

Ans: Page no 68.

Q.3 Write down two characteristics of kingdom protista. (K.B)

(DGK 2015)

Ans: Page no 69.

Q.4 Write two characteristics of kingdom fungi? (K.B)

(FSD 2015, SGD 2015)

Ans: Page no 69.

Q.5 Describe two characteristics of kingdom plantae. (K.B)

(GRW 2014)

Ans: Page no 69.

Q.6 How can you divide five kingdoms into two groups on the basis of types of cells? (U.B)

Ans: Page no 69.

Q.7 What are prions and viroids? (K.B)

(GRW 2014, SWL 2015)

Ans: PRIONS AND VIROIDS

Acellular:

Prions and viroids are acellular forms of organisms. Both of these particles cause infectious diseases in certain plants they are not included in five-kingdom classification.

Prions:

They are composed of proteins only.

Viroids:

They are composed to circular RNA only.

Q.8 Clarify that viruses are living or non-living? (K.B)

(LHR 2016, RWP 2015)

Ans: Page no 76

MULTIPLE CHOICE QUESTIONS (Topic 3.4)

1. Bacteria are assigned to the kingdom: (K.B) (LHR 2015)

- (A) Fungi (B) Monera
(C) Protista (D) Porifera

2. Which of the following group includes organisms all of which are prokaryotes? (K.B) (DGK 2014)

- (A) Plants (B) Bacteria
(C) Protists (D) Animals

3. In which year five-kingdom classification system was proposed? (K.B)

- (A) 1965 (B) 1966
(C) 1967 (D) 1968

4. **Who proposed five-kingdom classification system? (K.B)** (SGD 2014)
(A) E-Chatton (B) Robert Whittaker
(C) Ernst Hackel (D) Margulis
5. **Five-kingdom classification system of Whittaker was modified by: (K.B)**
(A) Margulis (E) Schwartz
(C) E-Chatton (D) Both A and B
6. **Which organism is included in kingdom monera? (K.B)** (SGD 2014)
(A) Cyanobacteria (B) Algae
(C) Fungi (D) Virus
7. **According to Biologists, the protists are the ancestors of: (K.B)**
(A) Plantae (B) Fungi
(C) Animalia (D) All of these
8. **Kingdom protista includes: (K.B)** (SWL 2015)
(A) Eukaryotic unicellular (B) Simple multicellular
(C) Eukaryotic multicellular (D) Both A and B
9. **Nuclear envelope is absent in: (U.B)**
(A) Monera (B) Protista
(C) Fungi (D) Plantae
10. **Viruses belong to kingdom: (K.B)** (GRW 2013, LHR 2013)
(A) Monera (B) Protista
(C) Fungi (D) None of these
11. **Which organisms are composed of only proteins? (K.B)**
(A) Prions (B) Viroids
(C) Fungi (D) Algae
12. **Which of these is acellular particle? (K.B)** (LHR 2016)
(A) Human (B) Bacteria
(C) Fungi (D) Virus
13. **The organisms that are composed of circular RNA only? (K.B)**
(A) Prions (B) Viroids
(C) Fungi (D) Algae
14. **The cell wall of fungi is made up of: (K.B)**
(A) Chitin (B) Cellulose
(C) Peptidoglycan (D) Lignin
15. **Common example of kingdom fungi is: (K.B)** (MTN 2015)
(A) Mushroom (B) Fern
(C) Algae (D) Mosses

3.5 BINOMIAL NOMENCLATURE

LONG QUESTIONS

Q.1 Write a note on binomial nomenclature. (K.B)(LHR 2015, BWP 2015, FSD 2014) (15 Q. No. 5)

Ans: BINOMIAL NOMENCLATURE

Introduction:

Binomial nomenclature is the method of giving scientific names to living organisms. Swedish biologist **Carolus Linnaeus (1707-1778 AD)** first introduced and adopted the system of binomial nomenclature. His system spread rapidly and became popular. Many of his names are in use today.

Meaning:

'binomial' means 'two names'

Format:

As the word "binomial" suggests, the scientific name of any living organism consists of two names:

- **The first is the genus name.**
- **The second one is the name of the species.**

Rules:

Some of the rules which are universally adopted while suggesting and documenting scientific names are as follow:

- **Scientific names are usually printed in *Italics*, such as *Homo sapiens*. When handwritten, they are underlined.**
- **The first term (generic name) always begins with a capital letter. The species name is never capitalized, even when derived from a proper name.**
- **The scientific name is generally 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* will be written as *E. coli*.**

SIGNIFICANCE

Different Names of Same Species:

Different regions have different names for the same organism.

Example:

- **Common name of onion in Urdu is 'piyaz', but in different regions of Pakistan it is also known as 'ganda' or 'bassal' or 'vassal'. In other countries, it has other sets of names. In science, it is known with a single name as *Allium cepa*.**

Same Name for Different Species:

In some cases, different organisms are called by the same common name.

Example:

- **The name 'black bird' is used both for crow as well as raven.**

Common Names:

Common names have no scientific basis.

Example:

A fish is a vertebrate animal with fins and gills. But several common names do not fit a biologist's definition of fish like:

- **Silver fish**
- **Cray fish**

- Jelly fish
- Star fish

Name in the Honour of Scientist:

Sometimes organisms are named in honour of the research workers who described and classified them.

Example:

The Orchid tree, (Mountain-coony) was named as *Bauhinia variegata* after the Swiss botanist, Bauhin. *Bauhinia variegata* is an ornamental tree found in south-east Asia.

Advantages:

- Organisms can be given proper scientific names by binomial nomenclature.
- The value of this system is that it is widely used.
- This system gives stability to an organism's identification.
- Every organism can be unambiguously identified with just two words.
- Same names can be used all over the world, in all languages avoiding difficulties of translation.

Examples:

<u>Common Name</u>	<u>Scientific Name</u>
Onion	<i>Allium cepa</i>
Starfish	<i>Asterias rubens</i>
House crow	<i>Corvus splendens</i>
Man	<i>Homo sapiens</i>
Pea	<i>Pisum sativum</i>

SHORT QUESTIONS (Topic 3.5)

Q.1 Define binomial nomenclature. (K.B) (GRW 2015, MTN 2014, SWL 2015)

Ans: Page no 73.

Q.2 State any two rules for suggesting scientific names to living organisms. (A.B)

Ans: Page no 73.

Q.3 What are the problems with common names of living organisms? (K.B)

Ans: Page no 73.

Q.4 What is the problem arise when different species have common name?

Ans: Page no 73.

Q.5 Write the advantages of writing scientific names.

Ans: Page no 73.

Q.6 Write down scientific names of following (K.B) (MTN 2015)

(a) Onion (b) Starfish (c) House crow (d) Orchid tree

<u>COMMON NAMES</u>	<u>SCIENTIFIC NAMES</u>
(a) Onion	<i>Allium cepa</i>
(b) Starfish	<i>Asterias rubens</i>
(c) House crow	<i>Corvus splendens</i>
(d) Orchid tree	<i>Bauhinia variegata</i>

MULTIPLE CHOICE QUESTIONS (Topic 3.5)

- Who first introduced and adopted the system of binomial nomenclature? (K.B)
 - E-Chatton
 - Robert Whittaker
 - Carolus Linnaeus
 - Marguis
- Bauhinia variegata* is an ornamental tree found in: (K.B)
 - North Asia
 - South Asia
 - Southeast Asia
 - North America
- Scientific name of onion: (K.B) (SGD 2014, GRW 2015, LHR 2012, 2014)
 - Allium cepa*
 - Asterias rubens*
 - Corvus splendens*
 - Homo sapiens*
- Scientific name of house crow: (K.B)
 - Allium cepa*
 - Asterias rubens*
 - Corvus splendens*
 - Homo sapiens*
- Scientific name of star fish: (K.B)
 - Allium cepa*
 - Asterias rubens*
 - Corvus splendens*
 - Homo sapiens*

3.6 CONSERVATION OF BIODIVERSITY**LONG QUESTIONS**

Q.1 Write a note on conservation of biodiversity. (K.B) (SGD 2014)

Ans: CONSERVATION OF BIODIVERSITY

Loss of Biodiversity:

During the last century, loss of biodiversity has been increasingly observed. In the modern era, due to human actions, species and ecosystems are threatened with destruction to an extent rarely seen in earth history.

Warning by Biologists:

Biologists warn that global ecosystem would collapse if biodiversity continues to be reduced at the same rate.

An Extinct Species:

In an ecosystem, a species is called 'extinct' when there is no doubt that the last individual of that species has died in that ecosystem.

Outcome of Extinction:

When species of an ecosystem becomes extinct, the stability of that ecosystem is harmed.

An Endangered Species:

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

Examples:

Many plant and animal species have gone extinct in Pakistan. Examples of extinct and endangered animal species are:

- Lion
- Tiger
- Asiatic cheetah
- Indian one horned rhinoceros
- Swamp deer
- Indian wild ass
- Hangul
- Blackbuck

Q.2 Describe impact of human beings on biodiversity. (K.B) (MTN 2015, FSD 2014) (Ex Q. No. 6)

Ans: IMPACT OF HUMAN BEINGS ON BIODIVERSITY

Early Human Population:

By 10, 000 years ago, there were about 5 million people on earth.

Population Growth:

With the advancement in agriculture and industry, human population began to grow rapidly. Today around 600 million people live on earth.

Population Addition:

More than 260,000 people are added to the world population each day, or more than 180 each minute.

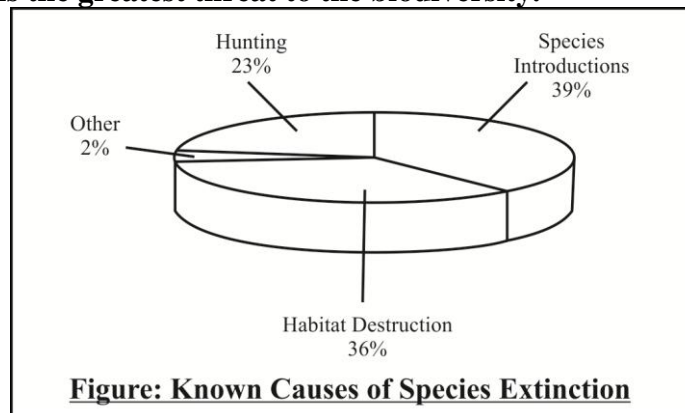
Threats to Biodiversity:

To improve the living conditions for 600 million individuals, humans are imposing serious threats to the survival of biodiversity that are:

- **Habitat loss**
- **Deforestation**
- **Over-hunting**
- **Introduction of new species**
- **Removal of species**
- **Pollution**
- **Climate change**

Greatest Threat:

Habitat loss is the greatest threat to the biodiversity.



Removal of Sea Stars from Ocean:

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

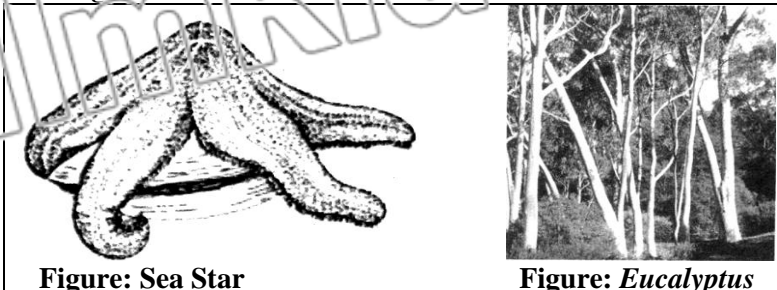


Figure: Sea Star

Figure: Eucalyptus

Hazard from *Eucalyptus* Plant:

Eucalyptus plants were imported from Australia and introduced in Pakistan. These plants consume more water and have disturbed the water-table (level of underground water). It harms other small plants that grow near *Eucalyptus* trees.

Q.3 Write a note on deforestation and over-hunting. (Knowledge Based) (Ex Q. No. 7)

Ans: **DEFORESTATION**

Definition:

“The cutting down of trees for the conversion of a forest to a non-forest land is called deforestation.”

Outcomes:

The destruction of the significant areas of forests has resulted in:

- Degraded environment
- Reduced biodiversity

Intensity:

Sometimes there is slow forest degradation and sometimes sudden and catastrophic clear cutting for urban development.

Causes:

Deforestation can be the result of deliberate removal of forests for:

- Wood
- Agriculture
- Urban development
- The race to produce cash through fruits, spices, sugar, tobacco, soap, rubber, paper and cloth have stimulated many to get them by using soil and destroying the forests.

EFFECTS OF DEFORESTATION**Amount of Water:**

Deforestation affects the amount of water in soil and moisture in the atmosphere.

Soil Erosion:

When there are no trees to keep soil in place, there are more chances of soil erosion.

Loss of Nutrients:

Heavy rainfall washes this soil into rivers. Essential nutrients are washed out of soil.

Flooding:

Rivers become choked up with mud and silt, which can cause floods.

Decreased Capacity of Dams:

The silted water gets stored in dams and it reduces their water storage capacity.

Decreased Transpiration:

Deforestation contributes to decreased transpiration, which lessens cloud formation.

This ultimately reduces the sources of rains.

Long Term Losses:

Short-term economic gains made by conversion of forest to agriculture often leads to loss of long term income.

IMPORTANCE OF FORESTS

The following important aspects of forests are being harmed due to deforestation:

Biodiversity:

Forests support considerable biodiversity.

Heating and Cooking:

The utilization of forest products, like timber and fuel-wood, has played a key role in human societies. In developing countries, almost 3 billion people rely on wood for heating and cooking.

Timber:

Developed countries today continue to utilize timber for building houses.

Paper:

Wood pulp is used for making paper.

Cleaning Environment:

Forests extract carbon dioxide and pollutants from air, thus contributing to biosphere stability.

Aesthetic Beauty:

Forests are also valued for their aesthetic beauty and tourist attraction.

Deforestation in Khyber Pakhtunkhwa:

In the province Khyber Pakhtunkhwa, the closed canopy forests are shrinking at approximately 1% per year.



Figure: Soil erosion



Figure: Chopping up of trees for the construction of road

OVER-HUNTING

Overhunting has been a significant cause of the extinction of hundreds of species and the endangerment of many more such as:

- Whales
- Ibex
- Urial
- Markhor (the national animal of Pakistan)

Principal Threat:

Commercial hunting, both legal and illegal, is the principal threat.

Q.4 Explain the steps taken for the conservation of biodiversity. (K.P) (E: Q. No. 3)

Ans: **STEPS FOR THE CONSERVATION OF BIODIVERSITY**

Though rich in biodiversity, Pakistan today faces severe threats to its animal and plant species.

Organizations:

The International Union for the Conservation of Nature and Natural Resources (IUCN) and World Wildlife Fund-Pakistan (WWF-P) work in close coordination with Pakistan's Ministry of Environment and other government and non-government institutions.

Red List:

The IUCN has prepared the first national Red List (list of endangered or threatened species). Following are a few examples of environmental work that has been carried out in Pakistan in order to conserve species and associated habitats.

National Conservation Strategy:

In 1980's, IUCN and the government of Pakistan formulated the **National Conservation Strategy for Pakistan for the conservation of Pakistan's biodiversity.**

UN Convention on Combating Desertification (CCD):

This is an international **treaty against damage and poverty in dry lands. Pakistan signed this in 1997.**

Himalayan Jungle Project (HJP):

It started in 1991 in the **Palas Valley, in Khyber Pakhtunkhawa (KP).** It aimed at protecting one of the richest areas of biodiversity in Pakistan.

Conservation of Biodiversity of the Suleiman Range, Balochistan:

Suleiman Range Chilghoza Forest is the largest chilghoza forest in the world. In 1992, WWF-P started its conservation program.

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.**

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** initiated efforts to reduce the **hunting pressure in 1992.** The efforts proved successful.

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-P developed the management plan of the park.

Ban on Games:

Foreigners visit the northern areas and play many games in which bears are used. **WWF-P** has been successful in imposing a ban on this **illegal practice.**

Q.5 Write a note on endangered species in Pakistan.

(Knowledge Based)

(SWL 2015, MTN 2015, SGD 2014, RWP 2015)

Ans:

ENDANGERED SPECIES IN PAKISTAN

Due to human activities, biodiversity in Pakistan is facing a huge loss. Here are a few examples of endangered species in Pakistan:

Indus Dolphin:

According to WWF-P, only 600 animals of the species of Indus Dolphin are left in the Indus River.

Reasons:

The population of this species declined due to:

- **Water pollution**
- **Poaching**
- **Destruction of habitat**

Marco Polo Sheep:

Marco Polo sheep are mostly found in the **Khunjerab National Park** and nearby areas.

Steps for Conservation:

Their numbers have been rapidly decreasing in the last two decades and **WWF-P** has started projects for its conservation.

Houbara Bustard:

This bird flies to Pakistan in the winter season from former Soviet territory and settles in **Cholistan and Thar deserts.**

Decrease in Population:

The decline in its population is due to hunting by foreigners and destruction of its habitats.

SHORT QUESTIONS (Topic 3.6)

Q.1 Define extinct species. (K.B) (GRW 2013)

Ans: Page no 75.

Q.2 What are endangered species? Give examples. (K.B)

(LHR 2012, GRW 2013, 2015, SGD 2014, FSD 2015)

Ans: Page no 75.

Q.3 Write a short note on Eucalyptus plants. (K.B)

Ans: Page no 76.

Q.4 What is the effect of deforestation on biodiversity? (A.B)

(LHR 2016, GRW 2013)

Ans: Page no 77.

Q.5 What is the role of over-hunting in extinction? (K.B)

(LHR 2015)

Ans: Page no 78.

Q.6 What are the main causes of loss of biodiversity in Pakistan? (A.B)

Ans: Page no 77.

Q.7 Which organizations are working for the conservation of biodiversity in Pakistan? (A.B)

Ans: Page no 78.

Q.8 Which organization has prepared first red list of Pakistan? (A.B)

Ans: Page no 78.

Q.9 Write names of animals to which northern areas provide habitat. (K.B)

Ans: **NAMES OF ANIMALS OF NORTHERN AREAS**

The northern areas of Pakistan provide habitats to the following animals.

- Musk deer
- Snow leopard
- Astore markhor
- Himalayan ibex
- Woolly flying squirrel
- Brown bear

Q.10 How many migratory birds are killed each year? (K.B)

Ans: **NUMBER OF MIGRATORY BIRDS**

It is estimated that about 200,000 of the one million migratory birds passing through Chitral are killed during migration.

Q.11 What herders do with bear cubs? (U.B)

Ans: **HERDERS AND BEAR CUBS**

The herders capture the bear cubs sell them to the trainers who train them and sell them to the foreigners.

Q.12 Write a short note on Houbara Bustard. (K.B)

(LHR 2013)

Ans: Page no 79

Q.13 Name the national animal and bird of Pakistan. (K.B)

(LHR 2013, SWL 2014, RWP 2015)

Ans: **NATIONAL ANIMAL**

Malhor is the national animal of Pakistan.

NATIONAL BIRD

Chakor partridge is the national bird of Pakistan.

MULTIPLE CHOICE QUESTIONS (Topic 3.6)

1. **What was the population of earth ten thousand years ago? (K.B)**
 (A) 2 million (B) 3 million
 (C) 4 million (D) 5 million
2. **How many people are added in human population each day? (K.B)**
 (A) 240,000 (B) 250,000
 (C) 260,000 (D) 270,000
3. **Number of persons increasing in the world population after every minute: (K.B)**
 (RWP 2014)
 (A) 180 (B) 290
 (C) 280 (D) 490
4. **A species that no longer lives in an ecosystem is called: (K.B)**
 (LHR 2014)
 (A) Endangered species (B) Global ecosystem
 (C) Extinct species (D) Population
5. **The greatest cause of species extinction is: (K.B)**
 (A) Hunting (B) Species introduction
 (C) Habitat destruction (D) Disease
6. **The greatest threat to biodiversity on earth today: (K.B)**
 (A) Species introduction (B) Pollution
 (C) Habitat loss (D) Hunting
7. **Which organization prepared the first National Red List of Pakistan? (A.B)**
 (A) WWF-P (B) IUCN
 (C) NACP (D) HJP
8. **Pakistan signed UN Convention on Combating Desertification in: (K.B)**
 (A) 1995 (B) 1996
 (C) 1997 (D) 1998
9. **When was Himalayan Jungle Project started? (A.B)**
 (A) 1990 (B) 1991
 (C) 1992 (D) 1993
10. **How many birds are killed in Chitral during migration? (K.B)**
 (A) 100,000 (B) 200,000
 (C) 300,000 (D) 400,000
11. **How many animals of Indus Dolphin are left today in the Indus River? (K.B)**
 (A) 300 (B) 400
 (C) 500 (D) 600
12. **Houbara bustard flies to Pakistan in: (K.B)**
 (A) Summer (B) Spring
 (C) Autumn (D) Winter
13. **The national animal of Pakistan: (K.B)**
 (BWP 2015, LHR 2016)
 (A) Markhor (B) Snow leopard
 (C) Tiger (D) Brown bear
14. **The national bird of Pakistan: (K.B)**
 (SWL 2015, LHR 2016)
 (A) Markhor (B) Pigeon
 (C) Chakor partridge (D) Brown bear

ANSWER KEYS**MULTIPLE CHOICE QUESTIONS****3.1 BIODIVERSITY**

1	A	3	A	5	B
2	D	4	B		

3.2 CLASSIFICATION – AIMS AND PRINCIPLES

1	B	6	D	11	B
2	D	7	A	12	D
3	C	8	C	13	C
4	B	9	B	14	A
5	C	10	D	15	B

3.3 HISTORY OF CLASSIFICATION SYSTEMS

1	B	4	A
2	D	5	D
3	C	6	C

3.4 THE FIVE KINGDOMS

1	B	6	A	11	A
2	B	7	D	12	D
3	C	8	D	13	B
4	B	9	A	14	A
5	D	10	D	15	A

3.5 BINOMIAL NOMENCLATURE

1	C	4	C
2	C	5	B
3	A		

3.6 CONSERVATION OF BIODIVERSITY

1	D	6	C	11	D
2	C	7	B	12	D
3	A	8	C	13	A
4	C	9	B	14	C
5	C	10	B		

REVIEW QUESTIONS

MULTIPLE CHOICE QUESTIONS

1. **Classification means the grouping of organisms on the basis of: (K.B)**
 (a) How they feed (b) The features they have in common
 (c) How they respire (d) How they can survive
2. **The kingdom Protista includes: (K.B)**
 (a) Unicellular and simple multicellular organisms with prominent nucleus
 (b) True multicellular organisms with no prominent nucleus
 (c) True multicellular organisms with prominent nucleus
 (d) Unicellular organisms with no prominent nucleus
3. **Viruses are not classified in any system because: (K.B)**
 (a) They are too poorly understood (b) They are too small
 (c) Their genetics cannot be determined (d) They are not considered organisms
4. **Viruses are assigned to the kingdom: (K.B)**
 (a) Monera (b) Protista (c) Fungi (d) None of the above
5. **A related group of genera comprises: (K.B)**
 (a) An order (b) A family (c) A class (d) A phylum
6. **In which kingdom would you classify unicellular eukaryotes? (U.B)**
 (a) Fungi and plantae (b) Fungi and monera (c) Only protista (d) Only fungi
7. **In binomial nomenclature, the first letter of the _____ name is capitalized. (K.B)**
 (a) Family (b) Class (c) Species (d) Genus
8. **Which one of the following sequences shows the correct hierarchy of classification, going from smaller to the bigger group? (K.B)**
 (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
9. **Which one of the following may be the correct way of writing the scientific name of an organism? (K.B)**
 (a) *Canis lupis* (b) Saccharum (c) Grant's gazelle (d) E. Coli
10. **A certain organism is multicellular, adapted for photosynthesis, and has multicellular sex organs, to which kingdom does it belong? (U.B)**
 (a) Animalia (b) Fungi (c) Plantae (d) Protista
11. **Species that are in the same _____ are more closely related than species that are in the same _____.(K.B)**
 (a) Phylum, class (b) Family, order (c) Class, order (d) Family, genus
12. **When the last member of a particular species dies, the species is said to be _____.(K.B)**
 (a) Established (b) Extinct (c) Threatened (d) Endangered
13. **In which season Houbara bustard migrates to Pakistan and settles here? (K.B)**
 (a) Summer (b) Spring (c) Autumn (d) Winter

ANSWERS KEY

1	b	2	a	3	d	4	d	5	b
6	C	7	d	8	d	9	a	10	c
11	B	12	b	13	d				

UNDERSTANDING THE CONCEPTS

1. Relate the importance of biodiversity with natural ecosystem through examples. (K.B)
See the LQ.1 of (Topic 3.1)
2. Explain the aims and principles of classification, keeping in view its historical background. (K.B)

Ans: See the LQ.1 of (Topic 3.2)

3. Explain the base for establishing five kingdoms of living organisms. (U.B)

Ans: See the LQ.1 of (Topic 3.4)

4. Justify why viruses are excluded from the Five-kingdom classification system. (U.B)

Ans:

STATUS OF VIRUSES

Viruses are at the borderline of living and non-living. They have both non-living and living features which distinguish their unique identity.

Non-living Feature:

- Due to their crystalline nature they are considered as non living.
- They are acellular i.e. they do not have cellular organization.

Living Features:

- They contain DNA or RNA normally encased in a protein coat.
- They reproduce, but only in living cells.
- They cause a number of diseases in living cells.

Conclusion:

- They are not considered as organisms, and thus are not assigned any place in the five-kingdom classification system.

5. Describe the aims and principles of binomial nomenclature. (K.B)

Ans: See the LQ.1 of (Topic 3.5)

6. Explain the impact of human beings on biodiversity. (A.B)

Ans: See the LQ.2 of (Topic 3.6)

7. Identify causes of deforestation and its effects on biodiversity. (A.B)

Ans: See the LQ.3 of (Topic 3.6)

8. Describe some of the programs running in Pakistan for the conservation of biodiversity. (A.B)

Ans: See the LQ.4 of (Topic 3.6)

SHORT QUESTIONS

- Q.1 What is the difference between the modes of nutrition of fungi and animals? (K.B)

Ans:

DIFFERENTIATION

Animals	Fungi
Mode of Nutrition	
Animals have ingestive mode of nutrition.	Fungi have absorptive mode of nutrition.
Decomposers	
Animals are not decomposers.	Fungi are decomposers.
Examples	
• Herbivores	• Mushrooms

Q.2 It is difficult to use the criterion of inter-breeding to define species of unicellular organisms, why? (U.B)

Ans: Page no 66.

Q.3 How are taxonomy and systematics related? (K.B)

Ans: Page no 67.

Q.4 Differentiate between the terms 'extinct' and 'endangered'. (K.B)

Ans: DIFFERENTIATION BETWEEN EXTINCT AND ENDANGERED

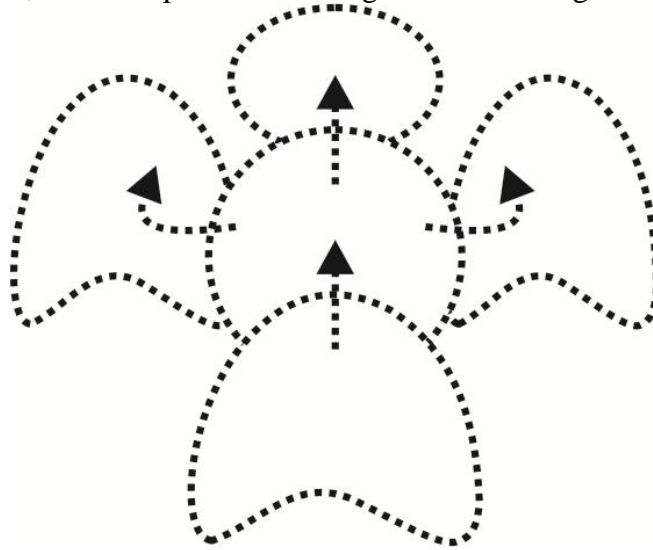
Extinct	Endangered
Definition	
A species that no longer lives in an ecosystem is called 'extinct' in that ecosystem.	A species is called 'endangered' when it is at risk of extinction in the near future
Survival	
An endangered species have a few surviving individuals left.	An endangered species have a few surviving individuals left.
Conservation	
There is no chance of saving an extinct species.	Endangered species can be saved from extinction if proper measures are taken to preserve it.
Examples	
<ul style="list-style-type: none"> • Hangul • Blackbuck 	<ul style="list-style-type: none"> • Indus Dolphin • <i>Houbara Bustard</i>

Q.5 What are the contributions of Whittaker, Margulis and Schwartz in taxonomy? (K.B)

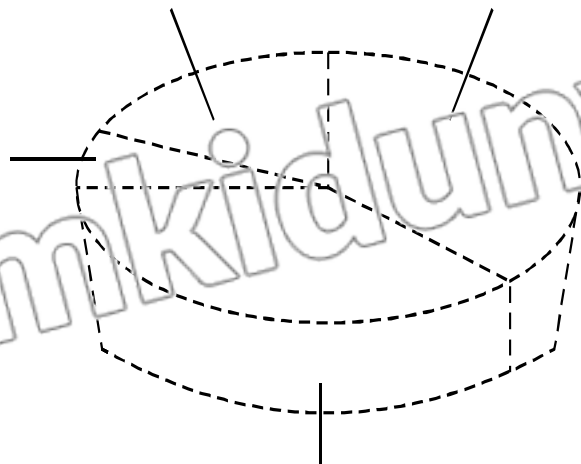
Ans: Page no 66.

KIPS ASSIGNMENT**LET'S DRAW & LABEL****(A) The Five Kingdoms of Classification****Instructions:**

- Start from the base showing kingdom monera.
- Now show kingdom protista at center.
- Indicate right, left and up arrow showing other three kingdoms.

**(B) Known Causes of Species Extinctions****Instructions:**

- Draw an oval.
- Extend its edges from right and left side.
- Use a small scale to draw lines showing percentages of causes.



**SELF TEST**

Time: 40 min

Marks: 25

Q.1 Four possible answers A, B, C and D to each question are given, mark the correct answer. (6×1=6)

1. In which year five kingdom classification system was proposed? (K.B)

- (A) 1965 (B) 1966
(C) 1967 (D) 1968

2. Scientific name of onion: (K.B)

- (A) *Homo sapiens* (B) *Zea mays*
(C) *Allium cepa* (D) *Corvus splendens*

3. How many birds are killed during migration? (K.B)

- (A) 100,000 (B) 200,000
(C) 300,000 (D) 400,000

4. Due to which character euglena is not fit in kingdom plantae. (U.B)

- (A) Movement (B) Absence of cell wall
(C) Presence of chlorophyll (D) Autotrophic in light

5. A specie that no longer lives in an ecosystem is called: (K.B)

- (A) Endangered species (B) Threatened species
(C) Extinct species (D) Dead species

6. How many people are added to the world's population each minute? (K.B)

- (A) More than 180 (B) More than 600
(C) More than 60 (D) More than 150

Q.2 Give short answers to following questions.

(5×2 = 10)

- (i) Define biodiversity. (K.B)
(ii) Discuss kingdom protista. (K.B)
(iii) Write the classification of human being. (K.B)
(iv) What are prions? (K.B)
(v) Write names of animals to which northern areas of Pakistan provide habitat. (K.B)

Q.3 Answer the following questions in detail.

(5+4 = 9)

- (a) What do you know about history of classification systems? (K.B) (5)
(b) Write a note on deforestation and over-hunting. (K.B) (4)

Note:

Parents or guardians can conduct this test in their supervision in order to check the skill of students.