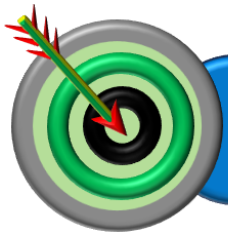
Chapter
01

# Living world



## OBJECTIVES

**INTRODUCTION**

**WHAT IS LIVING?**

**DIVERSITY IN THE LIVING WORLD**

**TAXONOMIC CATEGORIES**

## INTRODUCTION

- The world around us is full of different kinds of living things, making our planet a wonderful and exciting place to live. There are countless types of organisms, each with unique habitats, behaviors, and ways of living.
- Even in the most extreme environments—like freezing mountains, hot deserts, boiling springs, and salty lakes—some special life forms manage to survive. These living beings show how amazing and adaptable life can be, even in the toughest conditions
- The nature which we see and experience around us is really beautiful and amazing that its every glimpse like horse galloping, birds chirping, flowers blooming, honeybees dancing or sharks predating, make us over-awed. Besides, our nature also exhibits countless relationships like cooperation, conflict, nursing, predation etc. which occur among various members of a population and among various populations of a community.
- A variety of relationships are known to occur at micro level, i.e., cellular level too. Such molecular interactions occur inside, around and among the cells, which reveal astonishing facts about life.
- Therefore, when we want to understand what life is really, we get many aspects of it. But a few among them are mainly understood and well-defined. The first aspect defines life in technical term, i.e., as the power an organism possesses to maintain and reproduce itself on earth. It holds that life is unique, complex organisation of different molecules which organise in a specific pattern to form its basic unit, i.e., cell.
- In turn, various kinds of chemical reactions occur inside cells which ultimately lead to the availability of energy, growth, development, responsiveness, metabolism and reproduction, in living beings.
- The second approach is a philosophical one, which mainly focuses on purpose of life to living organisms.
- Biologists study and explain various life-forms from technical aspect. They also try to classify living organisms from non-living things on the basis of some important criteria. They have also developed some universal norms and processes which make study of diverse life-forms easier for us.

## 1.1 WHAT IS LIVING?

The distinctive characteristics exhibited by living organisms are

- **Growth**
- **Reproduction**
- **Metabolism and cellular organisation**
- **Consciousness**

### 1.1.1 Growth

- All living organisms can grow. Increase in mass and increase in number of individuals are twin characters of growth.
- A multicellular organism grows by cell division. In plants, this growth by cell division occurs continuously throughout their life span.
- In animals this growth is seen upto a certain age, however cell division occurs in certain tissues to replace lost cells. Unicellular organisms grow by cell division.

  Growth is of two types:

  **A. Intrinsic growth:** This growth is from inside of the body of living organisms.

  **B. Extrinsic growth:** This growth is from outside i.e. accumulation of material on anybody surface. Non-living exhibits this type of growth.
- In majority of higher plants and animals, growth and reproduction are mutually exclusive events. Non-living objects also grow if increase in body mass is taken as criterion for growth. Growth exhibited by non-living is by accumulation of material on surface.
- Because both living and non-living exhibit growth so**, it cannot be taken as defining property**. Growth from inside (intrinsic growth) can be taken as defining property. A dead organism does not grow.

### 1.1.2 Reproduction:

- Reproduction can be defined as the production of new individuals of same kind by the grown up individuals. Reproduction in case of multicellular organisms is production of progeny possessing features more or less similar to those of parents. Reproduction in case of unicellular organisms like bacteria, unicellular algae or Amoeba is synonyms with growth i.e. increase in number of cells.

- In single celled organism we are not very clear about the usage of these two terms growth and reproduction.
- Reproduction is not found in any non-living object.
- There are many living organisms which do not reproduce like mules, infertile human couples and sterile worker bees, etc. So, the **reproduction also cannot be an all-inclusive defining characteristic of living organisms**. No Non-living object is capable of reproducing or replicating by itself

  Reproduction is of two types: -

  - **Asexual Reproduction:** Reproduction in which **gametic fusion** or **fertilisation** and meiosis are not involved is **Asexual Reproduction**. Many methods of asexual reproduction are there.

  **(a)** **By Asexual spores: -** In algae and fungi
  **(b)** **By Budding: -** In Yeast and Hydra
  **(c)** **By Fragmentation: -** The filamentous algae, fungi and the protonema of moss all easily multiply by fragmentation.
  **(d)** **True Regeneration**: - Fragmented organisms regenerate the lost part of its body and becomes, a new organism. ***e.g***. Planaria (Flat worms)

  - **Sexual Reproduction:** Reproduction in which gametes are formed by meiosis and fertilisation also takes place to form progeny is called sexual reproduction.

### 1.1.3 Metabolism and Cellular organisation:

- The sum total of all the chemical reactions occurring in a living body is metabolism. All living organisms, both unicellular and multicellular plants, animals, fungi and microbes exhibit metabolism.
- No non-living object exhibits metabolism.
- In this way **metabolism is a defining character of living organisms** because it has no exceptions. Metabolic reactions can be demonstrated outside the body in a cell free medium or in a test tube in lab.
- An isolated metabolic reaction outside the body of an organism, performed in a test tube (in-vitro) is neither living nor non-living.
- Isolated metabolic reactions in-vitro are not living things, but surely living reactions because they are similar to the reactions performing in our body.
- Hence, the way cell performs all its functions or processes to organize or constitute the body of an organism **(cellular organization) is unique and that can be regarded as defining feature of all life forms**.

### 1.1.4 Consciousness:

- The most obvious and important feature of all living things is **consciousness**.
- This means they can sense their surroundings and react to changes in the environment, such as light, temperature, water, or other living things.
- Humans and animals do this using their sense organs, while plants respond to things like sunlight, water, and temperature.
- From tiny bacteria to complex animals, all living beings are aware of and react to their surroundings in some way.
- Photoperiod affects reproduction in seasonal breeders, both plants and animals. All organism handle chemicals entering their body.
- Some common examples of consciousness can be seen in organisms, like – Plants exhibit flowering in a particular season (photoperiodism), Some animals perform breeding in a particular season only (seasonal breeders), and all organisms handle the chemicals entering their bodies, etc.
- When humans are concerned a very high level of consciousness is found in human. Human being is the only organism who is aware of himself, i.e., has **self-consciousness**.
- Human is very fast to respond towards the external stimuli and even it can think or predict about possible changes of surroundings also, so it can prepare itself according to the surrounding situations.
- Further, human can even change its surrounding situations upto a limit so this topmost level of consciousness is regarded as self-consciousness, which cannot be seen elsewhere.

**Critical Thinking**

The brain-dead coma patient, virtually supported by machines which replace heart and lungs also has consciousness. So, it is living. But it does not have self-consciousness as it has lost the co-ordination of organs of different body parts.

**TOPIC CENTRIC EXERCISE -01**

**Q1. How many (in number) of the following properties are the defining characteristics of living organisms?**
**Growth, reproduction, metabolism, cellular organisation, consciousness**
(a) 2 (b) 3
(c) 4 (d) 5

**Q2. Consider the following two statements:**
**I. In the single-celled organisms, we are not very clear about the usage of the two terms - growth and reproduction.**
**II. When it comes to unicellular organisms like bacteria, unicellular algae or amoeba, reproduction is synonymous with growth, i.e., increase in number of cells.**
(a) Both I and II are true and II explains I (b) Both I and II are true but II does not explain I
(c) I is true but II is false (d) Both I and II are false

**Q3. Self-consciousness (the awareness of himself) is the property of**
(a) All living organisms (b) Prokaryotes only
(c) Eukaryotes only (d) Human being only

**Q4. Which of the following shows true regeneration?**
(a) Planaria (b) Protonema of mosses
(c) Amoeba (d) Yeast

**Q5. Growth and reproduction are synonymous in**
(a) Tiger (b) Amoeba
(c) Mango (d) Mushroom

## 1. 2 DIVERSITY IN THE LIVING WORLD

- A large variety of living organisms such as herbs, shrubs, trees, insects, dogs, birds, cats or other animals and plants are easily seen around us.
- Also, there are many other organisms which are present around us but we cannot see them with naked eyes like viruses, bacteria etc.
- These are visible only under microscope. Although, when we consider vast areas like forest, desert, plateau etc. we find that number and kinds of living organisms increase many folds.
- These different kinds of plants, animals and other organisms are referred to as **'Biodiversity'** of this earth.
- Biodiversity (Greek word bios = life; diversity = forms) or biological diversity can be defined as the vast array of species of microorganisms, algae, fungi, plants, animals occurring on the earth either in the terrestrial or aquatic habitats and the ecological complexes of which they are a part.
- According to IUCN (International Union of Conservation of Nature and Natural resources), currently known and described species of all organisms are between 1.7-1.8 million.
- There are millions of plants, animals and other organisms in the world that cannot be recognised, studied or described by an individual on its own.
- As we recognise the plants or animals in our own area by their local names, which vary from place to place even within a city, state or country as the persons inhabiting in different regions have different languages and perspective. Hence, there is need to standardise the names of all living organisms after proper identification, in order to study such diverse life forms.

- Therefore, for better understanding of biodiversity scientists have established a definite system of principles, procedures and terms which identifies, categories and assigns specific name to each and every organism known to us. Such systems are acceptable to all biologists all over the world.

**Critical Thinking**

Biodiversity is the number and various kinds of organisms found on earth. It stands for the variability found among living organisms inhabiting this world. Diversity differs from place to place as each habitat has its distinct biota (i.e., life). So, every time we explore some new or even old areas, new organisms are found or discovered. It is so because environmental conditions of the area vary with time as well as the range of tolerance of species also varies which determine whether or not a particular species can occur in that area.

The scientific need for simple, stable and internationally accepted systems for naming the living organisms of the world has generated, a process called "**Nomenclature**". And, before assigning a specific name to an organism, one should determine or know its kind or features correctly, so that one can identify it in each and every part of the world. This is known as "**Identification**".

### 1.2.1 Rules and Recommendations of Nomenclature

- Various biologists follow a definite procedure or criteria while studying these variety of organisms which include - identification, nomenclature and classification.
- Their study is also facilitated by agreed principles and criteria set by biologists all over the world. Likewise, the set of rules and recommendations dealing with the formal names of plants is given or set in International Code of Botanical Nomenclature (ICBN), while the rules of scientific naming of animals is assigned in International Code of Zoological Nomenclature (ICZN).
- Such names which are kept by consent of scientists under codes set by ICBN or ICZN are known as scientific names. These are universally accepted and each species has only one name, i.e., they are unique for every individual species. Also, all the people all over the world are able to correctly identify the name of various living organisms, describe to them. So, these names avoid any kind of ambiguity in names of variety of organisms.
- Similarly International Code of Nomenclature of Bacteria (ICNB), International Code of Nomenclature for Cultivated Plants (ICNCP) and International Code of Virus Classification and Nomenclature (ICVCN) also exist.

### 1.2.2 Binomial Nomenclature

- All biologists follow internationally agreed and accepted codes of rules or principles while assigning scientific name to known or newly discovered organisms. Binomial nomenclature for scientific naming of organisms was developed by Carolus Linnaeus.
- This system provides distinct and proper scientific names to variety of organisms.
- Each name has two parts, i.e., the first part comprises of its generic name, while the second part is the specific epithet.
- This naming system which uses two-word format is universally accepted and used, as it is more convenient to understand and follow.

**Rules of Binomial Nomenclature:** Some universal rules of Nomenclature framed under codes of ICZN, ICBN, etc. are as follows:

1. Biological names are generally taken from Latin language irrespective of their origin. New names are now derived either from Latin language or Latinised.
2. Each organism is given only one name consisting of two words. The first word in a biological name represents its genus while the second component denotes the specific epithet.
3. The scientific name is printed in italics or underlined separately when handwritten to indicate their Latin origin.

4. The first word denoting genus starts with a capital letter, while the specific epithet starts with a small letter.
5. The name of the author or discoverer is written after specific epithet in abbreviated form. For example, Mangifera indica Linn., it indicates that this species was first described by Linnaeus.
6. All the three words (generic name, species epithet and author citation) collectively form binomial epithet.

**Example:**

*Solanum tuberosum* (Potato)
↓ ↓
Generic name Specific epithet

*Panthera leo* (Lion)
↓ ↓
Generic name Specific epithet

**Table show common and scientific names of different common plants and animals**

| Common names | Scientific names | Generic names | Specific epithet |
|---|---|---|---|
| Human | *Homo sapiens* | *Homo* | *sapiens* |
| Lion | *Panthera leo* | *Panthera* | *leo* |
| Dog | *Canis familiaris* | *Canis* | *familiaris* |
| Wheat | *Triticum aestivum* | *Triticum* | *aestivum* |
| Brinjal | *Solanum melongena* | *Solanum* | *melongena* |
| Tiger | *Panthera tigris* | *Panthera* | *tigris* |
| Leopard | *Panthera pardus* | *Panthera* | *pardus* |

**Clue Finder**

Carolus Linnaeus is called the father of taxonomy or father of systematic botany. Linnaeus proposed scientific nomenclature of plants in his book "***Species Plantarum***". It was published on 1 May, 1753; hence this was the initiation of binomial system for plants. So, any name proposed (for plants) before this date is not accepted today. Linnaeus proposed scientific nomenclature of animals in his book "***Systema Naturae***" (10th edition).
H. Santapau is called the father of Indian Taxonomy

### 1.2.3 Need for Classification

- As we know that a huge variety of plants, animals and other organisms with different form and structures exist on this earth.
- Therefore, it is impossible to study all of these variable creatures individually. Hence, to make their study easier, simpler, we have divided them into different ranks or categories on basis of some similarities and differences found among them.
- Thus, in spite of great diversity, organisms are categorised and arranged in hierarchical series of groups and subgroups, on basis of some easily observable characters.
- Hence, classification categorizes every organism known to us into specific scientific arrangement to make its study easier.

### 1.2.4 Classification

- Once the organism is identified and given a name, it is grouped along with its similar ones, so that its study becomes easier and simpler.
- Biological classification is the scientific arrangement of each and every organism, identified and described in a hierarchical series of groups and sub-groups.
- This is done on the basis of similarities and differences in their traits (or characters) found in them. The process of categorising different organisms, on the basis of some easily observable characters is known as **"Classification".**

- When we say, wheat, dog or rat, etc., we recognise each of them with its specific characters and are able to discriminate it from others on basis of some other characteristics.
- These specific characteristics shown by the specific organism help us to assign a category to it. The specific term for these categories is **"taxa".**
- Hence, all living organisms can be classified into different taxa on basis of specific characteristics exhibited by them. And the branch of science which deals with the study of principles and procedures of classification of variety is known as **"Taxonomy".**
- The classical taxonomy is based on observable morphological characters whereas **modern taxonomic studies** are based on some essential features like study of both external and internal structure of organisms along with their cell structure, development process and ecological information of organisms.
- **Hence, characterisation, identification, classification and nomenclature are the processes that are basic to taxonomy.**
- Taxonomy is not a new study; humans have been classifying living things since ancient times because they are curious about nature.
- They have always wanted to learn more about different plants and animals. Over time, they also started using some of these organisms for their needs. For example, early humans had to find food, clothing, and shelter to survive. Later, they grouped plants and animals based on how they were useful to them. In vedic literature, 740 plants and 250 animals are being identified and classified. Aristotle (384-322 BC) divided living beings into animals, human beings and plants.
- Human beings had not only studied different kinds of organisms but also tried to find out relationships among them.
- This led to the development of a new branch of study in science field, known as "**Systematics**".
- The word systematics is derived from Latin word "systema" which means systematic arrangement of organisms.
- It was first used by **Carolus Linnaeus** in the title of his book published as "***Systema Naturae***". Systematics is wider field of science as with identification, nomenclature and classification, it also takes into account evolutionary relationships between various organisms. "**Systematics**" is the science which deals with diversity of organisms and all their comparative and evolutionary relationships.

**Table showing difference between Taxonomy and Systematics**

| Taxonomy | Systematics |
|---|---|
| 1. Derived from two Greek words 'taxis' and 'nomos'.<br>2. Includes characterisation, identification, nomenclature and classification of organisms. | 1. Derived from Latin word 'systema'.<br>2. Includes characterisation, identification, nomenclature, classification of organisms along with their evolutionary study. |

**Clue Finder**

1. The reasons for **large scale biodiversity** amongst living beings are:
   A. Adaptations in organisms to diverse habitat in order to reduce competition.
   B. Change in genetic constitution.
   C. Isolation
2. **Ontogeny** is the life history of organisms. **Phylogeny** is the evolutionary history of organisms.
3. **Systematics** is taxonomy along with phylogeny.
4. **Classical** or **old** or **descriptive systematics** is based upon morphological characters. According to its basic unit of classification is **species**. **Pioneer workers** are Aristotle and Linnaeus.
5. **New systematics / Biosystematics / Neosystematics** is based upon all characters, i.e., morphological, cytological, ecological, biochemical, genetical etc. The term was coined by Julian Huxley. Basic unit of classification is population or sub-species for the new systematics.
6. **Trinomial nomenclature**: Proposed by **Lamarck**, it involves the use of three words for a name so that the names of subspecies (animals) or varieties (plants) can also be

**TOPIC CENTRIC EXERCISE -02**

**Q1. Need for a proper system of classification arises because**
(a) The organisms of the past cannot be studied without it.
(b) Classification helps in knowing the relationship among the different group of organisms.
(c) It is not possible to study every organism.
(d) All of these

**Q2. Which of the following is against the rules of ICBN?**
(a) Hand written scientific names should be underlined.
(b) Every species should have a generic name and a specific epithet.
(c) Scientific names are in Latin and should be italicized.
(d) Generic and specific names should be written starting with small letters.

**Q3. The systematic arrangement of taxa is called**
(a) Key (b) Taxonomy
(c) Genealogy (d) Hierarchy.

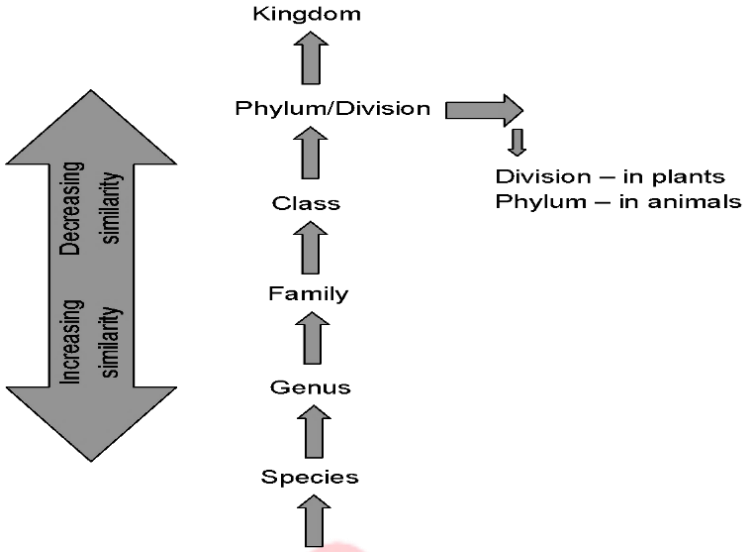
**Q4. In which of the following language the technical names of organisms are given?**
(a) English (b) Latin
(c) French (d) Greek

**Q5. Given below is the botanical name of mango. Mark the option in which the name is correctly written.**
(a) *Mangifera indica* Linn (b) Mangifera Indica
(c) mangifera indica (d) *Mangifera indica*

## 1.3 TAXONOMIC CATEGORIES

- Classification is not a single step process but involves hierarchy of steps in which each step represent a rank or category. Since the category is a part of overall taxonomic arrangement, it is called the taxonomic category and all categories together constitute the taxonomic hierarchy. Each category referred to as a unit of classification, in fact, represents a rank and is commonly termed as taxon (Plural taxa).
- To categorise an individual or group of organisms in a definite rank, we should have all the basic knowledge of its characteristics. This would help us in identifying the similarities and dissimilarities among the individuals

of the same kind of organisms as well as of other kinds of organisms. Here, we will explain all the seven broad or obligate categories of taxonomic hierarchy




- **Species:** Species is a group of individual organisms with fundamental similarities which show a common set of characters and can be **distinguished** from the other closely related species based on the distinct morphological differences.
- **Eg.:**- *Mangifera, Solanum* **and** *Panthera* are genera and represents another higher level of taxon or category.
  It is smallest Taxonomic Category. It is basic unit of classification**.**

**Clue Finder**

**John Ray**: Proposed the **term** and **concept of species.**
**Biological Concept of Species:**
Ernst Mayr (Darwin of 20th century) proposed the **Biological Concept of Species.**
According to Mayr "Species is the group of individuals which can interbreed naturally and produce fertile offspring". This definition of Mayr was incomplete because this definition is applicable to only on sexually reproducing living beings but there are many organisms that have only asexual mode of reproduction. eg. Bacteria, Mycoplasma. BGA
Biological species concept is based on **reproductive isolation**.
In taxonomy, the determination of species is mainly based on morphological characters.

- **Genus:** Genus comprises a group of related species which has more characters in common in comparison to species of other genera.
  e.g. Potato and brinjal are two different species but both belong to the genus *Solanum*.
  Lion (*Panthera leo*), Tiger (*Panthera tigris*), and leopard (*Panthera pardus*) belongs to same genus - *Panthera*
  This genus differs from another genus *Felis* which includes cats.
- **Family:** Family has a group of related genera with still less number of similarities as compared to genus and species. Families are characterised on the basis of both vegetative and reproductive features of plant species but reproductive or sexual or floral characters are used mainly.
  e.g. Three different genera ***Solanum***, ***Petunia*** and ***Datura*** are included in family Solanaceae.
- Among plants for example, three different genera Solanum, Petunia and Datura are placed in the family Solanaceae. Among animals for example, genus Panthera, comprising lion, tiger, leopard is put along

with genus, Felis (cats) in the family Felidae. Similarly, if you observe the features of a cat and a dog, you will find some similarities and some differences as well. They are separated into two different families Felidae and Canidae, respectively.

- **Order: Order** being a higher category is the assemblage of families which exhibit a few similar characters. Generally, order and other higher taxonomic categories are identified based on the aggregates of characters. e.g. Plant families like **Convolvulaceae, Solanaceae** are included in the order **Polynomials** which is mainly based on the floral or reproductive or sexual characters**.**
- **Animal** family **Canidae & Felidae are included in order Carnivora**
- **Class:** Class includes organism of related orders having less similarities than orders.
  For example, **order** Primata comprising monkey, gorilla and gibbon is placed in class Mammalia along with order Carnivora that includes animals like tiger, cat and dog. Class Mammalia has other orders also.
- **Phylum or** Division**:** It is a category higher than that of class. The term phylum is used for animals, while division is commonly used for plants. Phylum or division is a group of related classes, i.e., it is formed of one or more classes. Different classes, comprising animals like fishes, amphibians, reptiles, birds and mammals, together constitute the next higher category known as "**Phylum**". All of these different organisms are placed in the phylum Chordata as all of the animals in these classes have some common characters like presence of notochord at least at some stage of their lives, dorsal hollow neural system, etc. In case of plants, classes with a few similar characters are assigned to higher category called **division**.
- **Kingdom:** It is largest taxonomic category based only on few general characters
- There are 7 main taxonomic categories. They are obligate or essential or broad categories i.e. they are strictly used at the time of any plant classification. There are some extra or sub categories, like sub division, sub order, sub family, etc. They are used only when they are needed
- The classification of any plant or animal is written in descending or ascending order.
- **Taxonomic Hierarchy**- Descending or ascending arrangement of taxonomic categories is known as hierarchy.

| **Suffix taxa (Taxon)** | |
|---|---|
| Division | -phyta |
| Class | -opsida-phyceae, -ae |
| Order | -ales |
| Family | -aceae |

| **Organisms with their Taxonomic Categories** | | | | | | |
|---|---|---|---|---|---|---|
| **Common Name** | **Biological Name** | **Genus** | **Family** | **Order** | **Class** | **Phylum/ Division** |
| Man | *Homo sapiens* | *Homo* | Hominidae | Primata | Mammalia | Chordata |
| Housefly | *Musca domestica* | *Musca* | Muscidae | Diptera | Insecta | Arthropoda |
| Mango | *Mangifera indica* | *Mangifera* | Anacardiaceae | Sapindales | Dicotyledonae | Angiospermae |
| Wheat | *Triticum aestivum* | *Triticum* | Poaceae | Poales | Monocotyledonae | Angiospermae |

**Critical Thinking**

As we go higher from species to kingdom number of common characters decreases. Lower the taxa more are the characteristics that the members with in the taxon share. Higher the category, greater is the difficulty of determining the relationship to other taxa at the same level.

**TOPIC CENTRIC EXERCISE -03**

**Q1.** **Which taxonomic category shows maximum number of common characters?**
(a) Family (b) Class
(c) Species (d) Phylum

**Q2.** **How is 'Taxa' different from 'taxon'?**
(a) The singular of taxon (b) The plural of taxon
(c) Higher taxonomic category than taxon (d) Lower taxonomic category than taxon

**Q3.** **The term taxon refers to**
(a) Name of species (b) Name of genus
(c) Name of family (d) A taxonomic group of any rank.

**Q4.** **Select the incorrect match regarding classification of human.**
(a) Family – Hominidae (b) Genus - Homo
(c) Order – Carnivora (d) Class - Mammalia

**Q5.** **The second highest taxonomic group in plants is**
(a) Kingdom (b) Division
(c) Phylum (d) Order.

**Solved Examples**

**Ex: 1.** **In which of the following, metabolic reactions occur-**
(a) Living organisms only
(b) Living beings as well as in cell free system
(c) Non-living objects only
(d) In vitro conditions only

**Sol.** **(b)** Metabolic reactions occur in living beings as well as in cell free system

**Ex: 2.** **Select the incorrect statement.**
(a) Increase in mass and increase in number are twin characteristics of growth.
(b) Consciousness is not a defining property of living organisms.
(c) Fungi and protonema of mosses multiply by fragmentation.
(d) All of these

**Sol.** **(b)** Consciousness is a defining property of living organisms.

**Ex: 3.** **Read the given statements and select the correct option.**
**Statement I:** Name of the author appears before the generic name in binomial nomenclature.
**Statement II:** Linn indicates species was first described by Linnaeus.
(a) Both Statement I and Statement II are correct.
(b) Both Statement I and Statement II are incorrect.
(c) Statement I is correct but Statement II is incorrect.
(d) Statement I is incorrect but Statement Il is correct.

**Sol.** **(b)** Name of the author appears after specific epithet, i.e., at the end of the biological name and is written in an abbreviated form

**Ex: 4.** **Binomial nomenclature means**
(a) One name given by two scientists
(b) One scientific name consisting of a generic and specific epithet

(c) Two names, one latinised, other of a person
(d) Two names of same plant.

**Sol.** **(b)** Binomial nomenclature is a system of naming organisms using two parts:
(i) Generic name (First word, starts with a capital letter)
(ii) Specific epithet (Second word, starts with a lowercase letter)

**Ex: 5.** **If potato and datura are sharing same family, then they are also sharing the same**
(a) Genus (b) Species
(c) Order (d) All of these

**Sol.** **(c)** Since both Potato and Datura belong to the same family (Solanaceae), they must also belong to the same order (Solanales)

**Ex: 6.** **Which of the following statements is incorrect?**
(a) Dead organism does not grow.
(b) Non-living organisms can also show growth by accumulation of material.
(c) In living organisms, growth is from inside.
(d) Some non-living objects are not capable of reproducing or replicating themselves.

**Sol.** **(d)** No non-living object is capable of reproduction or self-replication.

**Ex: 7.** **The systematic and monumental description of life forms brought in out necessity of**
(a) Detailed systems of identification (b) Nomenclature
(c) Classification (d) All of these

**Sol.** **(d)** The detailed study and description of different life forms required:
Identification – To recognize and differentiate organisms.
Nomenclature – To assign a universal scientific name to each organism.
Classification – To systematically arrange organisms into groups based on similarities and differences

**Ex: 8.** **The families, Convolvulaceae and Solanaceae are included in the order Polymoniales mainly on the basis of**
(a) Morphological characters (b) Reproductive characters
(c) Floral characters (d) Both (a) and (b)

**Sol.** **(d)** Families are characterized on the basis of both vegetative and reproductive features of plant species.

**Ex: 9.** **Select the correct sequence in the taxonomic hierarchy in ascending order.**
(a) Hominidae → *Homo* → Mammalia → Chordata → Primata
(b) *Homo* → Hominidae → Primata → Mammalia → Chordata
(c) Primata → Chordata → Mammalia → Hominidae → *Homo*
(d) Chordata → Primata → Mammalia → Hominidae → *Homo*

**Sol.** **(b)** The taxonomic hierarchy follows a specific order from lowest (most specific) to highest (broadest):
Species → Genus → Family → Order → Class → Phylum → Kingdom

**Ex: 10.** **Which of the following belongs to class 'Dicotyledonae'?**
(a) Mango (b) Wheat
(c) Housefly (d) Man

**Sol.** **(a)** Mango belongs to Class Dicotyledonae

# Exercise-01 Level -01

**1.** Which of the following shows extrinsic growth?
(a) Snow mountain (b) Bacteria
(c) *Euglena* (d) *Spirogyra*

**2.** Metabolic reaction involves
(a) Synthesis of biomolecules only
(b) Breakdown of some biomolecules only
(c) All physical changes which occur in objects around us
(d) All chemical reactions which occur inside an organism

**3.** When green plants capture sunlight and utilise it to synthesize glucose, the reactions involved during this process are said to be
(a) Catabolic reactions
(b) Anabolic reactions
(c) Decomposition reactions
(d) Chain reactions

**4.** Sensitivity is the
(a) Ability to grow
(b) Ability to reproduce
(c) Ability to detect changes in the environment
(d) Ability to capture sunlight

**5.** Which is not a feature of all living organisms?
(a) Metabolism
(b) Cellular organization
(c) Self-consciousness
(d) Consciousness

**6.** Identification is the process of
(a) Naming living organism
(b) Recognizing the characteristic features of an organism
(c) Categorizing living organism
(d) Discovering new species of plants and animals

**7.** Taxonomically known number of species is
(a) 1.7-1.8 billion (b) 1.7-1.8 million
(c) 5 to 30 million (d) 17 million

**8.** Which one of the following character is common in classical taxonomy and modern taxonomic studies?
(a) Morphological characters
(b) Development process
(c) Genetical characters
(d) Ecological information of organisms

**9.** Classification of organisms is required because
(a) It makes the study of organisms easier and simpler
(b) It enables us to study geographical distribution of some organisms
(c) It makes the study of organisms complex
(d) It leads to ambiguity in study of various organisms

**10.** The word 'taxon' signifies
(a) Scientific name of an organism
(b) Developmental process of an organism
(c) Taxonomic group of any rank
(d) Ecological importance of an organism

**11.** Lowest category of taxonomic hierarchy is
(a) Taxon (b) Rank
(c) Species (d) Genus

**12.** Pick the incorrect statement about species.
(a) Each species has some distinct morphological features than other species
(b) The group of organisms in a particular species freely interbreed among themselves
(c) The second part of biological name consists of specific epithets
(d) Each species may have one or more genus

**13.** The specific epithet in *Solanum tuberosum* and *Panthera leo* respectively is
(a) *tuberosum* and *Panthera*
(b) *Solanum* and *leo*
(c) *tuberosum* and *leo*
(d) *Solanum* and *Panthera*

**14.** All related species are kept under
(a) One common genus
(b) Different genus due to different evolutionary courses
(c) Various groups according to the similarities and differences
(d) Different higher taxa on basis of morphological differences

**15.** Various groups of related genera are kept in
(a) A single species
(b) A single family
(c) Many species but single family
(d) Taxon which comes lower to genus

**16.** Solanaceae is a
(a) Single family of related genera
(b) Species name of potato
(c) Taxon of similar genus like *Allium*, *Colchicum*
(d) Local name of tomato

**17.** Carnivora includes
(a) Group of organisms belonging to related genera
(b) Group of organisms belonging to related species
(c) Group of organisms belonging to related families

(d) Group of organisms which are similar in all features

**18.** The order Polymoniales consists of
(a) Canidae and Felidae like families
(b) *Solanum* and *Allium* like genera
(c) *Lupus* and *familiaris* like species
(d) Convolvulaceae and Solanaceae like families

**19.** The group of organisms belonging to one or more related orders are assigned to-
(a) Different class but same family
(b) Same class on basis of a few similar characters
(c) Any taxa lower to order, in taxonomical hierarchy
(d) Same family due to similar morphological characters

**20.** Different organisms belonging to different orders are placed in a single class due to the fact that
(a) They have all similar morphological and reproductive characters
(b) They have similar place of origin
(c) They share a common habitat
(d) They have few similar or common characters

**21.** Which of the following represents "Phylum"?
(a) Mammalia (b) Chordata
(c) Solanum (d) Carnivora

**22.** Chordata includes
(a) Fishes, birds
(b) Mammals, reptiles
(c) Aves, reptilia
(d) All of these

**23.** From species to kingdom, the number of common characteristics among organisms goes on
(a) Increasing
(b) Increasing upto taxon family then further decreases
(c) Decreasing
(d) Decreasing upto class then increases afterwards

**24.** All plants are included in
(a) Division - Angiospermae
(b) Class-Dicotyledonae
(c) Kingdom - Animalia
(d) Kingdom - Plantae

**25.** Which of the following is not a result of cell division?
(a) Growth (b) Repair
(c) Metabolism (d) Reproduction

**26.** Mark the incorrect pair.
(a) Hydra - Budding
(b) Flatworm- True regeneration
(c) Amoeba- Fragmentation
(d) Yeast - Budding

**27.** Which of the following is incorrect for reproduction?
(a) Unicellular organisms reproduce by cell division
(b) Reproduction is an inclusive characteristic of living organisms
(c) In unicellular organisms, reproduction and growth are linked together
(d) Non-living objects are incapable of reproducing

**28.** In Binomial Nomenclature,
(a) Genus name is written after species
(b) Genus and species names are written in italics if the name is computer typed.
(c) Genus and species have the same name always.
(d) The first letter of genus and species name is capital.

**29.** The standard name of any living organism is known by the same name all over the world is called:
(a) Nomenclature (b) Taxonomy
(c) Classification (d) Description

**30.** Which of the following statement is correct?
(a) Potato and brinjal are two different genera
(b) Lion and tiger are placed in different genera
(c) Petunia and Datura are placed in same family
(d) Solanaceae and Poaceae are placed in same class

**31.** Taxonomic category with a group of related genera is characterized on the basis of:
(a) Cell structure
(b) Vegetative features
(c) Only floral characters
(d) Vegetative and reproductive features

**32.** Taxonomic categories are __A__ biological entities & __B__ morphological aggregates.
A & B respectively stand for:
(a) Same, Merely
(b) Distinct, not Merely
(c) Same, not Merely
(d) Distinct, Merely

**33.** Plant nomenclature means:
(a) To give names to plants without any rules
(b) Nomenclature of plants under the international rules (ICBN)
(c) Nomenclature of plants in local language
(d) Nomenclature of plants in English language

**34.** Which of the following is a more correct name of potato plant?
(a) *Solanum tuberosum*
(b) *Solanum Tuberosum*
(c) *Solanum tuberosum* Linn.
(d) *Solanum tuberosum*

**35.** Phylogeny refers to:
(a) Natural classification
(b) Morphological characters
(c) Evolutionary history
(d) Origin of algae

**36.** Who is regarded as "Darwin of 20th century"?
(a) John Ray (b) Lamarck
(c) Ernst Mayr (d) Darwin

**37.** The word systematics is derived from following language:
(a) German (b) Greek
(c) Latin (d) Spanish

**38.** Which of the following statements regarding nomenclature is correct?
(a) Generic name always begins with capital letter whereas specific name with small letter
(b) Scientific name should be printed in italics
(c) Scientific name when handwritten should be underlined
(d) All the above

**39.** Animals, mammals and dogs represent:
(a) Taxa at different levels
(b) Taxa at same level
(c) Different levels of same taxa
(d) All are correct

**40.** The twin characteristics of growth are:
(a) Increase in number of individuals, increase in mass
(b) Increase in height and increase in mass
(c) Increase in molecular weight and increase in mass
(d) Increase in size and decrease in mass

**41.** How many (in number) of the following properties are the defining characteristics of living organisms? Growth, reproduction, metabolism, cellular organization, consciousness
(a) 2 (b) 3
(c) 4 (d) 5

**42.** Which of the following do not reproduce?
(a) Mules
(b) Worker bees
(c) Infertile human couples
(d) All the above

**43.** In binomial nomenclature, the first and second components represent:
(a) Genus and species
(b) Genus and class
(c) Species and genus
(d) Kingdom and class

**44.** The scientific name does not ensure
(a) Each organism has only one name
(b) Description of any organism lead to the same name of organism in any part of the world
(c) No two organisms have the same name
(d) Status of threat of extinction of that organism holding a specific scientific name

**45.** As we go lower from kingdom to species the number common characteristics goes on
(a) Increasing
(b) Remain unchanged
(c) Decreasing
(d) Sometimes decreasing

**46.** Which of the following taxonomic categories contains organisms least similar to one another?
(a) Genera (b) Family
(c) Class (d) Species

**47.** Identify the incorrect statement.
(a) Class like Mammalia is involved in phylum Chordata.
(b) Order like Insecta is involved in class Diptera
(c) Genus like *Panthera* is involved in family Felidae.
(d) Order like Primata is involved in class Mammalia.

**48.** Potato, Tobacco, Brinjal, Mango belong to how many genera?
(a) 5 (b) 3
(c) 4 (d) 2

**49.** Diptera is the order of
(a) Mango (b) Housefly
(c) Maize (d) Human

**50.** Based on the common features, fishes, amphibians, reptiles are placed in-
(a) Arthropoda (b) Chordata
(c) Mammalia (d) Insecta

# Exercise-02 Level -02

**1.** Which of the following pairs is correctly matched?
(i) Fungi - Regeneration
(ii) Mosses - Fragmentation
(iii) Planaria - Budding
(a) (i) & (ii) (b) Both (i) & (ii)
(c) Only (ii) (d) Only (iii)

**2.** Find out the true (T) and False (F) statements and choose the correct option.
I. Order is the assemblage of families which exhibit a few similar characters.
II. *Solanum*, Petunia and *Lilium* belongs to the family Solanaceae.
III. *Panthera* and *Felis* belong to the order Felidae.

IV. Dog belongs to the family Canidae.
(a) I-T, II-T, III-F, IV-F
(b) I-T, II-T, III-T, IV-F
(c) I-T, II-F, III-T, IV-T
(d) I-T, II-F, III-F, IV-T

**3.** Consider the following statements and select the correct option.
(a) Growth cannot be taken as defining property of living organisms
(b) Reproduction is an exclusive defining characteristic of living organisms.
(c) Metabolism can be regarded as defining feature of all living organisms.
(d) All living organisms are self-conscious.
(a) All are correct except (b)
(b) Only (a) and (c) are correct
(c) Only (a) is correct
(d) Only (b) and (d) are correct

**4.** Read the statements **A** and **B** and choose the correct option.
**A:** Biodiversity represents the number and types of organisms present on earth
**B:** The number of species that are known and described range between 1.7 – 1.8 million
(a) Both **A** and **B** are correct
(b) Both **A** and **B** are incorrect
(c) **A** is correct but **B** is incorrect
(d) **B** is correct but **A** is incorrect

**5.** Find out the **true (T) / false (F)** statements and choose the correct option
I. An isolated metabolic reaction in a test tube is neither living nor non-living
II. Bacteria lack the property of consciousness
III. Living organisms are self-replicating, evolving and self-regulating interactive systems capable of responding to external stimuli
IV. The scientific names ensure that each organism has only one name
(a) I–T, II–T, III–T, IV–T
(b) I–T, II–F, III–T, IV–T
(c) I–F, II–F, III–T, IV–T
(d) I–T, II–F, III–T, IV–F

**6.** Find out the **true (T) / false (F)** statements and choose the correct option
I. Families are characterized on the basis of both vegetative and reproductive features of plant species
II. Biological names are generally in italics and written in Latin
III. Name of the author appears after the specific epithet and is written in an abbreviated form
IV. Based on characteristics, all living organisms can be classified into different taxa
(a) I–T, II–T, III–F, IV–F
(b) I–T, II–T, III–T, IV–F
(c) I–T, II–F, III–T, IV–T
(d) I–T, II–F, III–T, IV–F

**7.** Read the following statements and select the correct ones.
I. Unicellular organism grow by cell division.
II. Plant grows by cell division upto a particular stage of life
III. Animal exhibits growth throughout their life span.
(a) I and III (b) II and III
(c) I and II (d) I only

**8.** Read the given statements and state which ones are **true (T)** and which ones are **false (F)**.
A. In single celled organisms, reproduction is synonymous with growth.
B. Cellular organisation of the body is the defining feature of life forms.
C. Metabolic reactions cannot be demonstrated outside the body in cell-free system.
D. All living organisms are linked to one another by sharing common genetic material to varying degrees.
(a) A–T, B–T, C–F, D–F
(b) A–F, B–T, C–T, D–T
(c) A–T, B–T, C–F, D–T
(d) A–F, B–F, C–T, D–F

**9.** Select the option that correctly categorize *Mangifera indica* in sequence of taxonomic category - Family, Order, Genus, Class and Division.
(a) Angiosopermae, Dicotyledonae, *Mangifera*, Anacardiaceae, Sapindales
(b) Dicotyledonae, Sapindales, *Indica*, Anacardiaceae, Angiospermae
(c) Anacardiaceae, Sapindales, *Mangifera*, Dicotyledonae, Angiospermae
(d) Sapindales, Dicotyledonae, *Indica*, Angiospermae, Anacardiaceae

**10.** The taxonomic category class represents
(a) a group of related species having more characters in common in comparison to species of other genera
(b) a group of related genera with less number of similarities as compared to genus and species
(c) a type of category that includes related order
(d) a group of individuals with fundamental similarities.

**11.** Choose the correct statements from following:

(i) Taxonomic hierarchy includes seven obligate categories.
(ii) Each taxon represents a unit of classification.
(iii) In unicellular algae, reproduction is synonymous with growth.
(a) (i) & (ii) (b) (ii) & (iii)
(c) (i) & (iii) (d) All are correct

**12.** Which of the following statements are correct?
(i) Characterization and classification are one of the processes that are basic to taxonomy.
(ii) In the case of Amoeba, reproduction is not synonymous with growth.
(iii) Potato and brinjal belongs to genus *Solanum*
(iv) Species included in a genus resemble in many features.
(a) (i), (ii) and (iii) (b) (i) and (iv)
(c) (i), (iii) and (iv) (d) (ii), (iii) and (iv)

**13.** Which of the following statements is incorrect?
(a) Conservative characters are more useful in classification.
(b) Linnaeus is regarded as the father of taxonomy.
(c) Binomial names are Latinised or derived from Latin irrespective of their origin.
(d) Species are aggregates of closely related genus.

**14.** Select the wrong statements.
(i) Lower the taxon, more are the characteristics that the members within the taxon share
(ii) Order is the assemblage of genera which exhibit a few similar characters
(iii) Cat and dog are included in the same family Felidae
(iv) Binomial nomenclature was introduced by Carolus Linnaeus
(a) (i), (ii) and (iii) (b) (ii), (iii) and (iv)
(c) (i) and (iv) (d) (ii) and (iii)

**15.** Which of the following statements are incorrect?
(A) In a binomial name, first letter of specific epithet is capitalised.
(B) Taxa can indicate categories at different levels.
(C) Reproduction is a well-defined feature of living organisms.
(D) In binomial nomenclature, only the first word should be printed in italics.
(a) (A), (B) and (C) (b) (B), (C) and (D)
(c) (A), (C) and (D) (d) (A), (B) and (D)

**16.** Choose the correct statement(s) among the following.
(a) Genus *Felis* includes cats.
(b) The scientific name of mango is written as *Mangifera nigrum*.
(c) Families are characterized on the basis of both vegetative and reproductive features of plant species.
(d) Both (a) and (c)

**17.** Arrange the following taxonomic categories in ascending order of hierarchy:
(a) Family (b) Order
(c) Genus (d) Class
Choose the correct sequence from the options given below:
(a) (c), (a), (b), (d) (b) (c), (a), (d), (b)
(c) (a), (c), (b), (d) (d) (d), (b), (a), (c)

**18.** Which of the following are essential processes for defining living organisms?
(a) Metabolism
(b) Reproduction
(c) Growth
(d) Ability to sense the environment
(e) Cellular organization
Choose the correct group of processes from the options given below:
(a) (a), (b), and (c) only
(b) (a), (d) and (e) only
(c) (b), (c), and (d) only
(d) (a), (c), and (e) only

**19.** Which of the following are examples of genus *Panthera*?
(a) Lion (b) Tiger
(c) Leopard (d) Cat
(e) Dog
**Options:**
(a) (a), (b), (c) (b) (b), (c), (d)
(c) (c), (d), (e) (d) (a), (c), (c)

**20.** Read the following statements and select the correct ones.
(a) Increase in mass and increase in number of individuals are twin characteristics of growth.
(b) Metabolic reactions can be demonstrated outside the body in an isolated cell-free system.
(c) In bacteria, reproduction is synonymous with growth.
(a) (a) and (b) (b) (b) and (c)
(c) (a) and (c) (d) All of these

**21.** Select the incorrect statement with respect to the taxon, 'genus'.
(a) It is a group or assemblage of related species.
(b) Genus has more characters in common than a species
(c) Lion, Tiger, Leopard are closely related species which have been placed in the genus *Panthera*

and are respectively named as *Panthera leo*, *P. tigris* and *P. pardus.*

(d) *Solanum*, *Mangifera*, *Musca* and *Triticum* are the examples of genera.

**22.** Read the following statements:

(a) The taxonomic hierarchy for wheat can written as Plantae → Angiospermae Monocotyledonae → Poales → Poaceae *Triticum* → *T. aestivum*.

(b) Species name starts with a capital letter while genus name starts with a small letter.

(c) Lower the taxa, more are the characteristics that the members within taxon share.

(d) The sum total of all the chemical reactions occurring in our body is metabolism.

Which of the following combinations of above statements are correct?

(a) (a) and (b) (b) (a) and (c)
(c) (c) and (d) (d) (a), (c) and (d)

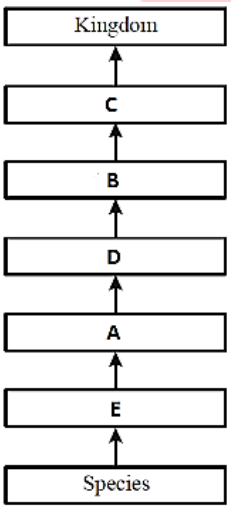
**23.** Study the following order with Family; Order, Class and Phylum/Division.

(a) Hominidae - Primata - Mammalia - Chordata
(b) Muscidae - Diptera - Insecta - Arthropoda
(c) Anacardiaceae-Sapindales-Dicotyledonae-Angiospermae
(d) Poaceae - Poales - Monocotyledonae - Angiospermae

The correct sequences are

(a) (a) & (b)
(b) (b), (c) & (d)
(c) (a) & (d)
(d) (a), (b), (c) & (d)

**24.** In the following flow diagram, identify the correct categories.




I. Wheat and mango belong to same category B.
II. Potato and brinjal belong to same category E.
III. Muscidae, Anacardiaceae and angiospermae belong to category A.
IV. Gorilla, gibbon and chimpanzee belongs to same category D.
V. Dicotyledonae and monocotyledonae belongs to category C.

Select the correct statement:

(a) IV, II, III (b) I, III, V
(c) II, IV (d) V, II, IV

**25.** Two plants belong to same species if they -

(a) Have more than 90% similar genes
(b) Look similar and possess identical secondary metabolites
(c) Have similar number of chromosomes
(d) Can reproduce freely with each other and form seeds

**26.** In referring to an organism in writing, such as in a newspaper, textbook, or lab report, which of these rules should be followed?

1. Underline or italicize genus
2. Underline or italicize species
3. First letter of species should be uppercase
4. First letter of genus should be uppercase

(a) 1, 2, 4 (b) 1, 2, 3
(c) 2, 3, 4 (d) 1, 3, 4

**27.** Which of the following statements about classification is not true?

I. Members of a family are less similar than members of an included genus
II. An order has more members than the number of members in an included genus
III. Families have more members than phyla
IV. Members of a family share a common ancestor in the more distant past than members of an included genus
V. The number of species in a taxon depends on their relative degree of similarity.

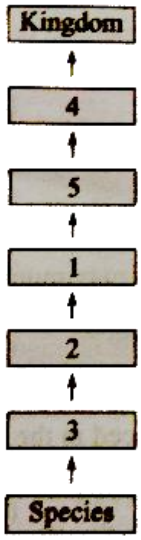
(a) Only III (b) Only IV
(c) Only V (d) None

**28.** Arrange the following taxa to form the correct sequence of classification of man:

(i) Primata
(ii) Chordata
(iii) Mammalia
(iv) Hominidae

(a) i, iii, iv, ii (b) ii, iii, i, iv
(c) iv, ii, i, iii (d) iii, ii, iv, i

**29.** In the following flow diagram, identify the correct categories according to the taxonomic hierarchy.




I Primata, diptera and carnivora belong to category 1.
II. Petunia, Datura and Solanum belongs to same category 2.
III. Angiospermae belongs to category 5.
VI. Man and dog shows maximum similarity at category 4.
V. Category 3 is same for lion, tiger and leopard.
Select the correct statement:
(a) I, II, IV, V (b) II, III, IV, V
(c) I, II II, IIL (d) I, II, V

**30.** *Felis*, *Panthera*→A
Solanaceae, Convolvulaceae →B.
Identify A and B and choose-the correct option:-
(a) A = Canidae, B = Poales
(b) A = Felidae, B = Polymoniales
(c) A = Felidae, B = Sapindales
(d) A = Canidae, B = Polymoniales

# Exercise-03 Level -03

## Assertion & Reason Based Questions

**1.** **Assertion:** Living organisms show internal as well as external growth.
**Reason:** Growth is considered as a defining feature of living things.
(a) If both assertion and reason are true and reason is the correct explanation of assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of assertion.
(c) If assertion is true but reason is false.
(d) If both assertion and reason are false.

**2.** **Assertion:** Metabolism refers to the sum total of all the chemical reactions that occur within living organisms.
**Reason:** Isolated metabolic reactions in vitro are not living things but surely living reactions.
(a) If both assertion and reason are true and reason is the correct explanation of assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of assertion.
(c) If assertion is true but reason is false.
(d) If assertion is false but reason is true.

**3.** **Assertion:** System of providing name with two components is called binomial nomenclature.
**Reason:** Each name consists first of a specific name and second of a generic name.
(a) If both assertion and reason are true and reason is the correct explanation of assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of assertion.
(c) If assertion is true but reason is false.
(d) If assertion is false but reason is true.

**4.** **Assertion:** Both the words in a biological name when handwritten, are separately underlined or printed in italics.
**Reason:** This is done to indicate their Latin origin.
(a) Both Assertion and Reason are True and the Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are True but Reason is not a correct explanation of the Assertion.
(c) Assertion is True but the Reason is False.
(d) Assertion is False but the Reason is True.

**5.** **Assertion:** The order for mango is Sapindales.
**Reason:** Wheat belongs to the class Dicotyledonae.
(a) Both Assertion and Reason are True and the Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are True but Reason is not a correct explanation of the Assertion.
(c) Assertion is True but the Reason is False.
(d) Assertion is False but the Reason is True.

**6.** **Assertion:** Cats and dogs have some similarities.

**Reason:** Cats and dogs belong to the same order Carnivora.

(a) If both assertion and reason are true and reason is the correct explanation of assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of assertion.
(c) If assertion is true but reason is false.
(d) If assertion is false but reason is true.

**7.** **Assertion:** Order is a taxonomic category that includes one or more genera.
**Reason:** All the genera in a family have some similar features and co-related characters.
(a) If both assertion and reason are true and reason is the correct explanation of assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of assertion.
(c) If assertion is true but reason is false.
(d) If assertion is false but reason is true.

**8.** **Assertion:** Systematics is defined as the science of diversity of organisms in evolutionary context.
**Reason:** Systematics include interrelationship between organisms.
(a) If both assertion and reason are true and reason is the correct explanation of assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of assertion.
(c) If assertion is true but reason is false.
(d) If assertion is false but reason is true.

**9.** **Assertion:** Conservative characters are more useful in classification.
**Reason:** These characters do not change during evolution. Therefore, their similarities show relationships among organisms.
(a) If both assertion and reason are true and reason is the correct explanation of assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of assertion.
(c) If assertion is true but reason is false.
(d) If assertion is false but reason is true.

**10.** **Assertion:** Consciousness is considered as the defining property of living organisms.
**Reason:** All organisms, from the prokaryotes to the most complex eukaryotes can sense and respond to environ stimuli.
(a) Both Assertion and Reason are True and the Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are True but Reason is not a correct explanation of the Assertion.
(c) Assertion is True but the Reason is False.
(d) Assertion is False but the Reason is True.

**11.** **Assertion:** Potato and brinjal belong to the same genus *Solanum*.
**Reason:** They have more characters in common compared to species of other genera.
(a) Both Assertion and Reason are True and the Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are True but Reason is not a correct explanation of the Assertion.
(c) Assertion is True but the Reason is False.
(d) Assertion is False but the Reason is True.

**12.** **Assertion:** Living organisms undergo the process known as reproduction.
**Reason:** Living organisms show internal growth.
(a) Both Assertion and Reason are True and the Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are True but Reason is not a correct explanation of the Assertion.
(c) Assertion is True but the Reason is False.
(d) Assertion is False but the Reason is True.

**13.** **Assertion:** Growth cannot be taken as defining property of living organisms.
**Reason:** Non-living objects may exhibit intrinsic growth.
(a) Both Assertion and Reason are True and the Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are True but Reason is not a correct explanation of the Assertion.
(c) Assertion is True but the Reason is False.
(d) Assertion is False but the Reason is True.

**14.** **Assertion:** Complexity of classification increases from kingdom to species.
**Reason:** Common characters increase from kingdom to species.
(a) Both Assertion and Reason are True and the Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are True but Reason is not a correct explanation of the Assertion.
(c) Assertion is True but the Reason is False.
(d) Assertion is False but the Reason is True.

**15.** **Assertion:** Order is a broad category which falls between class and family.

**Reason:** Order, being a higher category, is the assemblage of families which exhibit a few similar characters.

(a) Both Assertion and Reason are True and the Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are True but Reason is not a correct explanation of the Assertion.
(c) Assertion is True but the Reason is False.
(d) Assertion is False but the Reason is True.

## Statement Based Questions

**16.** **Statement I:** For identification of all living organisms, they must be described correctly.
**Statement II:** Nomenclature of living organisms is dependent upon identification.
(a) Both Statement I and Statement II are correct.
(b) Both Statement I and Statement II are incorrect.
(c) Statement I is correct but Statement Il is incorrect.
(d) Statement I is incorrect but Statement II is correct.

**17.** **Statement I:** The term 'biodiversity refers to the number and types of organisms present on earth.
**Statement II:** The biodiversity of known and described species ranges between 10-20 billion.
(a) Both statement I and statement II are correct.
(b) Both statement I and statement II are incorrect.
(c) Statement I is correct but statement II is incorrect.
(d) Statement I is incorrect but statement II is correct.

**18.** **Statement I:** We sense our environment through our sense organs.
**Statement II:** Human being is the only organism who is aware of himself, i.e., has self-consciousness.
(a) Both statements I and II are correct.
(b) Statement I is correct but statement II is incorrect.
(c) Statement I is incorrect but statement II is correct.
(d) Both statement I and II are incorrect.

**19.** **Statement I:** As we go higher from species to kingdom, number of common characteristics goes on increasing.
**Statement II:** Higher the taxa, more are the characteristics that members within the taxon share.
(a) Both statements I and II are correct.
(b) Statement I is correct but statement II is incorrect.
(c) Statement I is incorrect but statement II is correct.
(d) Both statements I and II are incorrect.

**20.** **Statement-I:** Genera aggregates distantly related species.
**Statement-II:** Families are characterised on the basis of both vegetative and reproductive features of plant species.
(a) Both Statement-I and Statement-II are correct.
(b) Both Statement-I and Statement-II are incorrect.
(c) Statement-I is correct & Statement-II is incorrect.
(d) Statement-I is incorrect & Statement-II is correct.

**21.** **Statement-I:** In binomial nomenclature, the first word is specific epithet.
**Statement-II:** In binomials, when handwritten, underlining indicates their Latin origin.
(a) Both Statement-I and Statement-II are correct.
(b) Both Statement-I and Statement-II are incorrect.
(c) Statement-I is correct & Statement-II is incorrect.
(d) Statement-I is incorrect & Statement-II is correct.

**22.** **Statement-I:** Increase in mass and increase in number of individuals are twin characteristics of growth.
**Statement-II:** In plants, growth by cell division occurs continuously throughout their life span
(a) Both Statement-I and Statement-II are correct.
(b) Both Statement-I and Statement-II are incorrect.
(c) Statement-I is correct & Statement-II is incorrect.
(d) Statement-I is incorrect & Statement-II is correct.

**23.** **Statement-I:** Three different genera *Solanum*, *Petunia* and *Datura* are placed in the family Solanaceae.
**Statement-II:** Families consist of a group of related genera with fewer similarities compared to genus and species.
(a) Both Statement-I and Statement-II are correct.
(b) Both Statement-I and Statement-II are incorrect.
(c) Statement-I is correct & Statement-II is incorrect.

(d) Statement-I is incorrect & Statement-II is correct.

**24.** **Statement-I:** Cellular organisation of the body is the defining feature of life forms.
**Statement-II:** Metabolic reactions cannot be demonstrated outside the body in cell free system.
(a) Both Statement-I and Statement-II are correct.
(b) Both Statement-I and Statement-II are incorrect.
(c) Statement-I is correct & Statement-II is incorrect.
(d) Statement-I is incorrect & Statement-II is correct.

**25.** **Statement-I:** Classification systems are changing every now and then.
**Statement-II:** Ernst Mayr was called as the Darwin of 20$^{th}$ century.
(a) Both Statement-I and Statement-II are correct.
(b) Both Statement-I and Statement-II are incorrect.
(c) Statement-I is correct & Statement-II is incorrect.
(d) Statement-I is incorrect & Statement-II is correct.

**26.** **Statement-I:** Scientific names are derived from Latin.
**Statement-II:** Name of the author appears before the specific epithet in an abbreviated form.
(a) Both Statement-I and Statement-II are correct.
(b) Both Statement-I and Statement-II are incorrect.
(c) Statement-I is correct & Statement-II is incorrect.
(d) Statement-I is incorrect & Statement-II is correct.

**27.** **Statement-I:** Species included in a genus resemble in least features.
**Statement-II:** Species are group of individual organisms with fundamental similarities
(a) Both Statement-I and Statement-II are correct.
(b) Both Statement-I and Statement-II are incorrect.
(c) Statement-I is correct & Statement-II is incorrect.
(d) Statement-I is incorrect & Statement-II is correct.

**28.** **Statement-I:** The order Carnivora, includes families like Felidae, Canidae and Hominidae.
**Statement-II:** Order is the assemblage of families which exhibit a few similar characters.
(a) Both Statement-I and Statement-II are correct.
(b) Both Statement-I and Statement-II are incorrect.
(c) Statement-I is correct & Statement-II is incorrect.
(d) Statement-I is incorrect & Statement-II is correct.

**29.** **Statement-I:** Metabolism is a well defining feature of living organisms.
**Statement-II:** Metabolism is not shown by all living organisms.
(a) Both Statement-I and Statement-II are correct.
(b) Both Statement-I and Statement-II are incorrect.
(c) Statement-I is correct & Statement-II is incorrect.
(d) Statement-I is incorrect & Statement-II is correct.

**30.** **Statement I:** Reproduction cannot be considered as defining property of living organisms.
**Statement II:** There are many living organisms which do not reproduce, e.g., mules, worker bees, etc.
(a) Both statements I and II are correct.
(b) Statement I is correct but statement II is incorrect.
(c) Statement I is incorrect but statement II is correct.
(d) Both statements I and II are incorrect.

## Match up Based Questions

**31.** Match column I with column II and select the correct option from the codes given below.

| | Column I | | Column II |
|---|---|---|---|
| A. | Yeast | i. | Binary fission |
| B. | Fungi | ii. | Asexual spores |
| C. | Planaria | iii. | Budding |
| D. | Amoeba | iv. | True regeneration |
| | | v. | Fragmentation |

(a) A - (i) B - (ii) C - (iii), D - (iv)
(b) A - (iii) B - (ii) (v), C - (iv), D - (i)
(c) A - (ii) B - (v) C - (i) D - (iv)
(d) A - (v) B - (ii) (i), C - (iii), D - (iv)

**32.** Study the following table which shows different organisms with their taxonomic categories.

| Common name | Family | Order | Class | Phylum/ Division |
|---|---|---|---|---|
| Man | Hominidae | **A** | Mammalia | Chordata |

| | | | | |
|---|---|---|---|---|
| House fly | Muscidae | Diptera | **B** | Arthropoda |
| Mango | **C** | Sapindales | Dicotyledonae | Angiospermae |
| Wheat | Poaceae | Poales | **D** | Angiospermae |

Select the correct option for A, B, C, and D

(a) A– Primata, B–Insecta, C–Anacardiaceae, D–Monocotyledonae
(b) A–Animalia, B–Arachnida, C–Anacardiaceae, D–Monocotyledonae
(c) A–Chordata, B–Arachnida, C–Polygonaceae, D–Monocotyledonae
(d) A–Non-chordata, B–Insecta, C–Anacardiaceae, D–Dicotyledonae

**33.** Select the mismatched pair.

| | | | |
|---|---|---|---|
| (a) | Worker bees and mules | – | Do not reproduce |
| (b) | *Musca domestica* | – | Belongs to order Insecta |
| (c) | *Systema Naturae* | – | Linnaeus |
| (d) | *Solanum tuberosum* | – | A dicotyledonous plant |

**34.** Match the order in column I with family in column II and select the correct option given below.

| | **Column I (Order)** | | **Column II (Family)** |
|---|---|---|---|
| A. | Primata | i. | Felidae |
| B. | Carnivora | ii. | Anacardiaceae |
| C. | Diptera | iii. | Hominidae |
| D. | Sapindales | iv. | Muscidae |

(a) A-(iii), B-(i), C - (iv) D - (ii)
(b) A-(ii), B - (iv) C - (i) D - (iii)
(c) A - (iii) B - (iv) C - (i) D-(ii)
(d) A-(iii), B-(i), C - (ii) D - (iv)

**35.** Match the following and choose the correct option.

| | | | |
|---|---|---|---|
| i. | *tuberosum* | A. | Family |
| ii. | Polymoniales | B. | Kingdom |
| iii. | *Solanum* | C. | Order |
| iv. | Plantae | D. | Species |
| v. | Solanaceae | E. | Genus |

(a) i – D, ii – C, iii – E, iv – B, v – A
(b) i – E, ii – D, iii – B, iv – A, v – C
(c) i – D, ii – E, iii – B, iv – A, v – C
(d) i – E, ii – C, iii – B, iv – A, v – D

**36.** Match column I with column II for housefly classification and select the correct option using the codes given

| | **Column I** | | **Column II** |
|---|---|---|---|
| A. | Family | i. | Diptera |
| B. | Order | ii. | Arthropoda |
| C. | Class | iii. | Muscidae |
| D. | Phylum | iv. | Insecta |

(a) A-(iii), B - (i) C-(iv), D - (ii)
(b) A - (iv) B-(iii), C-(ii), D - (i)
(c) A-(iii), B - (ii) C - (iv) D - (i)
(d) A - (iv) B-(ii), C - (i) D-(iii)

**37.** Match the columns and find out the correct combination:

| **Column-I (Common name)** | | **Column-II (Biological name)** | |
|---|---|---|---|
| a. | Leopard | i. | *Mangifera indica* |
| b. | Potato | ii. | *Triticum aestivum* |
| c. | Mango | iii. | *Panthera pard*us |
| d. | Wheat | iv. | *Solanum tuberosum* |
| | | | *Solanum melongena* |

(a) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)
(b) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)
(c) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
(d) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

**38.** Match the columns and find out the correct combination:

| | **Column-I** | | **Column-II** |
|---|---|---|---|
| a. | Family | i. | Felis |
| b. | Kingdom | ii. | Sapindales |
| c. | Order | iii. | *Solanum* |
| d. | Genus | iv. | Animalia |
| | | v. | Anacardiaceae |

(a) (a)-(v), (b)-(iv), (c)-(ii), (d)-(iii)
(b) (a)-(iii), (b)-(ii), (c)-(iv), (d)-(v)
(c) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
(d) (a)-(iv), (b)-(v), (c)-(iii), (d)-(ii)

**39.** Match the columns and find out the correct combination:

| | | | |
|---|---|---|---|
| a. | Angiospermae | i. | Phylum |
| b. | Anacardiaceae | ii. | Genus |
| c. | *Triticum* | iii. | Family |
| d. | Chordata | iv. | Division |
| e. | Dicotyledonae | v. | Class |

(a) (a)-(ii), (b)-(v), (c)-(ii), (d)-(i), (e)-(iv)
(b) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii), (e)-(v)
(c) (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv), (e)-(v)
(d) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i), (e)-(v)

**40.** Match the following columns and select the correct option from the codes given below-

| | **Column-I (Terms)** | | **Column-II (Descriptions)** |
|---|---|---|---|
| a. | Nomenclature | i. | The process of describing an organism accurately so that its name can be correctly attached to it. |

| | | | |
|---|---|---|---|
| b. | Identification | ii. | A system of naming each organism with two components: the Generic name and the specific epithet. |
| c. | Binomial Nomenclature | iii. | A standardised process for naming living organisms. |
| d. | Generic name | iv. | The initial part of the scientific name of an organism that tells us the genus to which it belongs. |

(a) (a)-(iii), (b)- (i), (c)- (ii), (d)- (iv)
(b) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)
(c) (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)
(d) (a)-(i), (b)-(iv), (c)-(ii), (d)-(iii)

**41.** Which of the following is not correctly matched?
(a) Order Primata - monkey, gibbon, gorilla
(b) Order Carnivora - tiger, cat, dog
(c) Phylum Chordata - housefly, lizard, human
(d) Order Polymoniales - potato, brinjal, *Petunia*

**42.** Which among the following is matched incorrectly?
(a) Taxonomy - characterisation, identification, classification and nomenclature
(b) Lion, tiger and dog – Family Felidae
(c) Binomial nomenclature - Carolus Linneaus
(d) Aggregation or assemblage of classes of animals - Phylum

**43.** Which one of the following animals is correctly matched with its particular taxonomic category?
(a) Tiger - *tigris*, species
(b) Mango - Anacardiaceae, class
(c) Humans - Primata, family
(d) Housefly - Musca, order

**44.** Match the order in column I with family in column II and select the correct option given below.

| | Column I | | Column II |
|---|---|---|---|
| A. | Polymoniales | i. | Felidae |
| B. | Carnivora | ii. | Anacardiaceae |
| C. | Diptera | iii. | Convolvulaceae |
| D. | Sapindales | iv. | Muscidae |

(a) A-(iii), B-(i), C-(iv), D-(ii)
(b) A-(iv), B-(iii), C-(i), D-(ii)
(c) A-(ii), B-(iv), C-(i), D-(iii)
(d) A-(iii), B-(i), C-(ii), D-(iv)

**45.** Match the given organisms in column I with family in column II Sto which they belong.

| | Column I (Organisms) | | Column II (Family) |
|---|---|---|---|
| A. | Human | i. | Anacardiaceae |
| B. | Housefly | ii. | Poaceae |
| C. | Wheat | iii. | Muscidae |
| D. | Mango | iv. | Hominidae |

(a) A–(i) B–(ii) C–(iii) D–(iv)
(b) A–(iv) B–(i) C–(iii) D–(ii)
(c) A–(iv) B–(iii) C–(ii) D–(i)
(d) A–(i) B–(iii) C–(ii) D–(iv)

# Exercise-04 Previous Year Questions

**1.** In the taxonomic categories which hierarchial arrangement in ascending order is correct in case of animals? **(2022)**
(a) Kingdom, Class, Phylum, Family, Order, Genus, Species
(b) Kingdom, Order, Class, Phylum, Family, Genus, Species
(c) Kingdom, Order, Phylum, Class, Family, Genus, Species
(d) Kingdom, Phylum, Class, Order, Family, Genus, Species

**2.** Which one of the following belongs to the family Muscidae? **(2021)**
(a) Grasshopper
(b) Cockroach
(c) Housefly
(d) Fire fly

## Answer keys

### TOPIC CENTRIC EXERCISE -01 Answer Key

| | | | | |
|---|---|---|---|---|
| **1.** (b) | **2.** (a) | **3.** (d) | **4.** (a) | **5.** (b) |

### TOPIC CENTRIC EXERCISE -02 Answer Key

| | | | | |
|---|---|---|---|---|
| **1.** (d) | **2.** (d) | **3.** (b) | **4.** (b) | **5.** (a) |

### TOPIC CENTRIC EXERCISE -03 Answer Key

| | | | | |
|---|---|---|---|---|
| **1.** (c) | **2.** (b) | **3.** (d) | **4.** (c) | **5.** (b) |

### Exercise-01 Level -01 Answer Key

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **1.** (a) | **6.** (b) | **11.** (c) | **16.** (a) | **21.** (b) | **26.** (c) | **31.** (d) | **36.** (c) | **41.** (b) | **46.** (c) |
| **2.** (d) | **7.** (b) | **12.** (d) | **17.** (c) | **22.** (d) | **27.** (b) | **32.** (b) | **37.** (c) | **42.** (d) | **47.** (b) |
| **3.** (b) | **8.** (a) | **13.** (c) | **18.** (d) | **23.** (c) | **28.** (b) | **33.** (b) | **38.** (d) | **43.** (a) | **48.** (b) |
| **4.** (c) | **9.** (a) | **14.** (a) | **19.** (b) | **24.** (d) | **29.** (a) | **34.** (c) | **39.** (a) | **44.** (d) | **49.** (b) |
| **5.** (c) | **10.** (c) | **15.** (b) | **20.** (d) | **25.** (c) | **30.** (c) | **35.** (c) | **40.** (a) | **45.** (a) | **50.** (b) |

### Exercise-02 Level -02 Answer Key

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **1.** (c) | **4.** (a) | **7.** (d) | **10.** (c) | **13.** (d) | **16.** (d) | **19.** (a) | **22.** (d) | **25.** (d) | **28.** (b) |
| **2.** (d) | **5.** (b) | **8.** (c) | **11.** (d) | **14.** (d) | **17.** (a) | **20.** (d) | **23.** (d) | **26.** (a) | **29.** (d) |
| **3.** (b) | **6.** (c) | **9.** (c) | **12.** (c) | **15.** (c) | **18.** (b) | **21.** (b) | **24.** (d) | **27.** (a) | **30.** (b) |

### Exercise-03 Level -03 Answer Key

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **1.** (d) | **6.** (a) | **11.** (a) | **16.** (a) | **21.** (d) | **26.** (c) | **31.** (b) | **36.** (a) | **41.** (c) |
| **2.** (b) | **7.** (d) | **12.** (b) | **17.** (c) | **22.** (a) | **27.** (d) | **32.** (a) | **37.** (b) | **42.** (b) |
| **3.** (c) | **8.** (b) | **13.** (c) | **18.** (a) | **23.** (a) | **28.** (d) | **33.** (b) | **38.** (a) | **43.** (a) |
| **4.** (a) | **9.** (a) | **14.** (d) | **19.** (d) | **24.** (c) | **29.** (c) | **34.** (a) | **39.** (d) | **44.** (a) |
| **5.** (c) | **10.** (a) | **15.** (a) | **20.** (d) | **25.** (a) | **30.** (a) | **35.** (a) | **40.** (a) | **45.** (c) |

### Exercise-04 Previous Year Questions

**1.** (d)
**2.** (c)