Chapter 1 (THE LIVING WORLD)

Multiple Choice Questions

Single Correct Answer Type

Q1. As we go from species to kingdom in a taxonomic hierarchy, the number of common characteristics

(a) Will decrease (b) Will increase

(c) Remain same (d) May increase or decrease

Ans: (a) As we go higher from species to kingdom, the number of common characteristics goes on decreasing. Lower the taxa, more are the characteristics that the members within the taxon share. Higher the category, greater is the difficulty of determining the relationship to other taxa at the same level.

Q2. Which of the following 'suffixes' used for units of classification in plants indicates a taxonomic category of family'?

(a) —Ales (b) —Onae (c) —Aceae (d) —Ae

Ans: (c)

(a) —Ales —» Order (plant) .

(b) —Onae —» Class (plant)

(c) —Aceae —> Family (plant)

(d) —Ae —> Phylum (plant)

Q3. The term 'systematics' refers to

(a) Identification and classification of plants and animals •

(b) Nomenclature and identification of plants and animals

(c) Diversity of kinds of organisms and their relationship

(d) Study of habitats of organisms and their classification

Ans: (c) Human beings were, since long, not only interested in knowing more about different kinds of organisms and their diversities, but also the relationships among them. This branch of study was referred to as systematics. Systematics takes into account evolutionary relationships between organisms.

Q4. Genus represents .

(a) An individual plant or animal

(b) A collection of plants or animals

(c) Group of closely related species of plants or animals

(d) None of these

Ans: (c) Genus comprises a group of related species which has more characters in common in comparison to species of other genera.

Q5. The taxonomic unit 'Phylum' in the classification of animals is equivalent to which hierarchical level in classification **of plants?**
(a) Class (b) Order (c) Division (d) Family
Ans: (c) Classes comprising animals like fishes, amphibians, reptiles, birds along with mammals constitute the next higher category called Phylum. All these classes are included in the phylum chordata. In case of plants, classes with a few similar characters are assigned to a higher category called Division.

Q6. Botanical gardens and zoological parks have
(a) Collection of endemic living species only
(b) Collection of exotic living species only
(c) Collection of endemic and exotic living species
(d) Collection of only local plants and animals
Ans: (c) Botanical gardens and zoological parks have collection of endemic and exotic living species.

Q7. Taxonomic key is one of the taxonomic tools in the identification and classification of plants and animals. It is used in the preparation of
(a) Monographs (b) Flora
(c) Both (a) and (b) (d) None of these
Ans: (c) .
• Flora contains the actual account of habitat and distribution of plants
of a given area. These provide the index to the plant species found in a particular area. . .
• Manuals are useful in providing information for identification of names of species found in an area. Monographs contain information on any one taxon, i.e. any one genus or family at a particular time. They also help in correct identification.

Q8. All living organisms are linked to one another because
(a) They have common genetic material of the same type
(b) They share common genetic material but to varying degrees
(c) All have common cellular organization

(d) All of the above

Ans: (b) All living organisms—present, past and future are linked to one another by the sharing of the common genetic material, but to varying degrees.

Q9. Which of the following is a defining characteristic of living organisms?

(a) Growth (b) Ability to make sound

(d) Reproduction (d) Response to external stimuli

Ans. (d) Response to external stimuli is a defining characteristic of living organisms.

Q10. Match the following and choose the correct option.

A.	Family	(0	tuberosum
B.	Kingdom	(ii)	Polymoniales
C.	Order	(iii)	Solarium
D.	Species	(iv)	Plantae
E.	Genus	(v)	Solanaceae

Options:

(a) D—(i), C—(ii), E—(iii), B—(iv), A-(v)

(b) E—(i), D—(ii), B—(iii), A—(iv), C-<v)

(c) D-C), E—(ii), B—(iii), A—(iv), C-(v)

(d) E—(i), €—(ii), B—-(iii), A-(iv), D-(v)

Ans: (a)

D.	Species	(i)	tuberosum
C.	Order	(ii)	Polymoniales
E.	Genus	(iii)	Solatium
B.	Kingdom	(iv)	Plantae
A.	Family	(v)	Solanaceae

Very Short Answer Type Questions

Q1. Linnaeus is considered as Father of Taxonomy. Name two other botanists known for their contribution to the field of plant taxonomy.

Ans: Natural system of classification for flowering plants was given by George Bentham and Joseph Dalton Hooker, in three volume of Genera Plantarum.

Q2. What does ICZN stand for?

Ans: ICZN stand for International Code of Zoological Nomenclature.

Q3. Couplet **in taxonomic key** means .

Ans: The keys are based on the contrasting characters generally in a pair called couplet. It represents the choice made between two opposite options. This results in acceptance of only one and rejection of the other.

Q4. What is a Monograph?

Ans: Monographs contain information on any one taxon, i.e. any one genus or family at a particular time.

Q5. Amoeba multiplies by mitotic cell division. Is this phenomena growth or reproduction? Explain.
Ans: In single-celled organisms, we are not very clear about the usage of these two terms—growth and reproduction.

Q6. Define metabolism.
Ans: The sum total of all the chemical reactions occurring in our body is metabolism.

Q7. Which is the largest botanical garden in the world? Name a few well known **botanical gardens in India.**
Ans: Largest famous botanical garden of world is Royal Botanical Garden, Kew (London), England. Largest botanical garden of India is Indian Botanical Garden, Sibpur, Howrah, Kolkata, West Bengal. National Botanical Research Institute is situated at Lucknow (India).

Short Answer Type Questions
Q1. A ball of snow when rolled over snow increases in mass, volume **and size. Is this comparable to growth as seen in living organisms? Why?**
Ans: No, this is not comparable to growth as seen in living organisms. Non-living objects like snow ball also grow if we take increase in body mass as a criterion for growth. However, this kind of growth exhibited by non-living objects is by accumulation of material on the surface (accretion). In living organisms, growth is from inside. '

Q2. In a given habitat we have 20 plant species and 20 animal species. Should we call this as 'diversity' or 'biodiversity'? Justify your answer. –
Ans: In a given habitat we have 20 plant species and 20 animal species. We can call this as 'biodiversity'. Each different kind of plant, animal or organism that we see, represents a species. This refers to biodiversity or the number and types of organisms present on earth.

Q3. International Code of Botanical nomenclature (ICBN) has provided a code for classification of plants. Give hierarchy of units of classification botanists follow while classifying plants and mention different 'Suffixes' used for the units.
Ans:

Taxon	Suffixes
Kingdom T	No definite suffix
Division T	phyta/spermae
Class T	nae/opsida
Order	

r	ales
Family T	aceae
Genus T	No definite suffix
Species	No definite suffix

Q8. Brinjal and potato belong to the same genus Solarium, but to two different species. What defines them as separate species?
Ans. "Species is a group of potentially interbreeding groups that are reproductively isolated from other such groups". Brinjal and potato belong to the same genus Solarium, but to two different species as they are reproductively isolated.

Q9. Properties of cell organelles are not always found in the molecular constituents of cell organelles. Justify.
Ans. All living phenomena are due to underlying interactions. Properties of tissues are not present in the constituent cells. Similarly, properties of cellular organelles are not present in the molecular constituents of the organelle but arise as a result of interactions among the molecular components comprising the organelle. These interactions result in emergent properties at a higher level of organization. This phenomenon is true in the hierarchy of organisational complexity at all levels.

10. The number and kinds of organism is **not constant. How do you explain this statement?**
Ans. The number and kinds of organisms are variable according to the seasonal changes like, population of certain insects increases during rainy season. The IUCN Red List (2004) documents the extinction of 784 species (including 338 vertebrates, 359 invertebrates and 87 plants) in the last 500 years.

Long Answer Type Questions

Q1 .What is meant by living? Give any four defining features of life forms.
Ans: Growth, reproduction, cellular organisation, ability to sense environment and mount a suitable response, metabolism, ability to self-replicate, self-organise, interact and emergence are unique features of living organisms.
Some other characteristics of living organisms are life-span, movements, adaptations, variations and homeostasis, etc. Living organisms are self- replicating, evolving and self-regulating interactive systems capable of responding to external stimuli.
1. Metabolism: There are thousands of metabolic reactions occurring simultaneously inside all living organisms, be they are unicellular or
, multicellular. The sum total of all the chemical reactions occurring in our body is metabolism. All plants, animals, fungi and microbes exhibit metabolism. No non-living objects exhibit metabolism. Metabolic reactions can be demonstrated outside the body in cell free system. An isolated metabolic reaction(s) outside the body of an organism performed in a test tube is

neither living nor non-living.
Hence, while metabolism is a defining feature of all living organisms without exception, isolated metabolic reactions in vitro are not living things but surely living reactions.
2. Cellular Organisation: All living organisms are composed of cells and products of cells. Hence, cellular organization of the body is the defining feature of life forms.
3. Consciousness: Perhaps, the most obvious and technically complicated feature of all living organisms is this ability to sense their surroundings or environment and respond to these environmental stimuli which could be physical, chemical or biological. All organisms, from the prokaryotes to the most complex eukaryotes can sense and respond to environmental cues. All organisms handle chemicals entering their bodies. All organisms ' therefore are aware of surroundings. Plants respond to external factors like light, water, temperature, other organisms, pollutants, etc. Photoperiod affects reproduction in seasonal breeders, both plants and animals. Consciousness, therefore, becomes the defining property of living organisms.
4. Interactions: All living phenomena are due to underlying interactions. Properties of tissues are not present in the constituent cells. Similarly, properties of cellular organelles- are not present in the molecular constituents of the organelle but arise as a result of interactions among the molecular components comprising the organelle. These interactions result in emergent properties at a higher level of organization. This phenomenon is true in the hierarchy of organisational complexity at all levels.

Q2. A scientist has come across a plant which he feels is a new species. How will he go about its identification, classification **and** nomenclature? .
Ans: Obviously, nomenclature or naming is only possible when the organism is described correctly. This is identification. Reference collections of plant specimens are collected into herbarium and identified. Most plant parts are dried, pressed, mounted on herbarium sheets and stored.

. Classification is the process by which anything is grouped into convenient categories based on some easily observable characters. The earliest systems of classification used only gross superficial morphological characters such as habit, colour, number and shape of leaves, etc. They were based mainly on vegetative characters or on the androecium structure (system given by Linnaeus). Such systems were artificial.
• Natural classification systems is based on natural affinities among the organisms and consider, not only the external features, but also internal features, like ultra-structure, anatomy, embryology and phytochemistry. Natural system of classification for flowering plants was given by George Bentham and Joseph Dalton Hooker, in three volume of Genera Plantarum.
• At present phylogenetic classification systems basad on evolutionary relationships between the various organisms are acceptable. This assumes that organisms belonging to the same taxa have a common ancestor. First phylogenetic system was proposed by Engler and Prantlin monograph 'Die NaturlichenPflanzenFamilien'.
• In order to facilitate the study, number of scientists have established procedures to assign a scientific name to each known organism. This is acceptable to biologists all over the world. The system of providing scientific names is called Binomial nomenclature.
• Each name has two components—the Generic name and the specificepithet. This system of providing a name with two components is called Binomial nomenclature. This naming system given by Carolus Linnaeus is being practiced by biological all over the world. This naming using a two word format was found convenient.

Q3. Brassica compestris **Linn**
a. Give the common name of the plant.
b. What do the first two parts of the name denote?
c. Why are they written in italics?
d. What is the meaning of Linn written at the end of the name?

Ans: a. Mustard
b. The first word in a biological name represents the genus while the second component denotes the specific epithet.
c. Both word in a biological name, when handwritten, are separately underlined, or printed in italics to indicate their Latin origin.
d. Name of the author appears after the specific epithet, i.e. at the end of
the biological name and is written in an abbreviated form, e.g., Brassica compestris Linn. It indicates that this species was first described by Linnaeus.

Q4. What are taxonomical aids? Give the importance of herbaria and museums. How are Botanical gardens and Zoological parks useful in conserving biodiversity?
Ans: Taxonomic studies of various species of plants, animals and other organisms are useful in agriculture, forestry, industry and in general in knowing our bio-resources and their diversity.
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• Herbarium is a store house of collected plant specimens that are dried, pressed and preserved on sheets. Further, these sheets are arranged according to a universally accepted system of classification.
• The herbarium sheets carry a label providing information about date and place of collection, English, local and botanical names, family, collector's name, etc. Herbaria also serve as quick referral systems in taxonomical studies.
• Biological museums are generally set up in educational institutes such as schools and colleges. Museums have collections of preserved plant and animal specimens for study and reference. Specimens are preserved in the containers or jars in preservative solutions. Plant and animal specimens may also be preserved as dry specimens.
• Insects are preserved in insect boxes after collecting, killing and pinning. Larger animals like birds and mammals are usually stuffed and preserved. Museums often have collections of skeletons of animals too.
• Biodiversity conservation may be in-situ as well as ex -situ. However when there are situations where an animal and plant is endangered or threatened and need urgent measure to save it from extinction, ex-situ conservation is the desirable approach.
• In ex-situ conservation threatened animals and plants are taken out from natural habitat and placed in special place where they can be protected and given special care. Zoological park, botanical garden and wildlife safari park serve these purpose.

Q5. Define a taxon. What is meant by taxonomic hierarchy? Give a flow diagram from the lowest to highest category for a plant and an animal. What happens to the number of individuals and number of shared characters as we go up the taxonomical hierarchy?
Ans: Taxon is a taxonomic group of plants and animals with similar traits of any ranking. These taxonomic groups/categories are distinct biological entities and not merely morphological aggregates.
Classification is not a single step process but involves hierarchy of steps in which each step represents 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.

Taxon	Suffix
Kingdom	No definite suffix
↑	
Division	phyta/spermae
↑	
Class	nae/opsida
↑	
Order	ales
↑	
Family	aceae
↑	
Genus	No definite suffix
↑	
Species	No definite suffix

As we go higher from species to kingdom, the number of common characteristics goes on decreasing. Lower the taxa, more are the characteristics that the members within the taxon share. Higher the category, greater is the difficulty of determining the relationship to other taxa at the same level. As we go higher from species to kingdom, the number of individuals goes on increasing.

Q6. A student of taxonomy was puzzled when told by his professor to look for a key to identify a plant. He went to his friend to clarify what 'Key' the professor was referring to? What would the friend explain to him?

Ans: In reference of this question, 'Key' Stands for taxonomic keys. Key is the taxonomical aid used for identification of plants and animals based on the similarities and dissimilarities. The keys are based on the contrasting characters generally in a pair called couplet. It represents the choice made between two opposite options. This results in acceptance of only one and rejection of the other. –

Each statement in the key is called a lead. Separate taxonomic keys are required for each taxonomic category such as family, genus and species for identification purposes. Keys are generally analytical in nature.

Q7. Metabolism is a defining feature of all living organisms without exception. Isolated metabolic reactions in vitro are not living things but surely living reactions. Comment.

Ans: All-living organisms are made of chemicals.

• There are thousands of metabolic reactions occurring simultaneously inside all living organisms, be they are unicellular or multicellular. The sum total of all the chemical reactions occurring in our body is metabolism. All plants, animals, fungi and microbes exhibit metabolism.

• No non-living objects exhibit metabolism. Metabolic reactions can be demonstrated outside the body in cell free system. An isolated metabolic reaction(s) outside the body of an organism, performed in a test tube is neither living nor non-living. '

Hence, while metabolism is a defining feature of all living organisms without exception, isolated metabolic reactions in vitro are not living things but surely living reactions.

Q8. Do you consider a person in coma-living or dead?

Ans: Human being is the only organism who is aware of himself, i.e. has self-consciousness. We sense our environment through our sense organs (like ear, nose, eye, etc.). When it comes to human beings, it is all the more difficult to define the living state.

We observe patients lying in coma in hospitals virtually supported by machines which replace heart and lungs. The patient is otherwise brain- dead. The patient has no self-consciousness. So on this basis the person is considered as dead, but there are thousands of metabolic reactions occurring in the body, hence on the basis of metabolism the person is considered as living. So we can say that the person that lying in coma is neither living nor dead.

Q9. What is the similarity and dissimilarity between "whole moong daal" and "broken moong daal" in terms of respiration and growth? Based on these parameters classify them into

living or nonliving?

Ans: Whole moong daal has intact embryo which respire at slow rate during dormancy phase. When whole moong daal absorb water it resumes growth and germinate to form a new plant. Broken moong daal does not have intact embryo, so it cannot respire and do not germinate/grow. As whole moong daal can grow hence it is living while broken moong daal cannot grow hence non-living.

Q10. Some of the properties of tissues are not the constituents of its cells. Give three examples to support the statement.

Ans: Bone is a specialised connective tissue which is made up of osteocytes (bone cells). Bones provide mechanical support which is not provided by osteocytes.

• Dry surface of skin is a compound epithelium tissue that is made up of epithelial cells. Epithelial tissue protect skin from chemical and mechanical stresses while this property is not found in epithelial cells.

• Blood is a specialised connective tissue which is made up of RBCs, WBCs and Platelets. Blood help in the transport of nutrients inside the body while blood cells do not play a role in transport of nutrients.