Chapter-1 : The Living World

1. **(d)** Classification involves hierarchy of steps in which each step represents a rank or category. Each category, referred to as a unit of classification, represents a rank and is commonly termed as taxon (pl. taxa).

2. **(a)** The suffix "-ales" is used at the end of the name of orders of plants, fungi, and algae. The family names of plants, fungi, and algae end with the suffix "-aceae" and the name of a botanical tribe ends with suffix "-eae".

3. **(a)** All living organisms can be classified into different taxa based on characteristics. This process of classification is taxonomy. Characterisation, identification, classification and nomenclature are the processes that are basic to taxonomy.

4. **(c)** **5.** **(d)** **6.** **(d)** **7.** **(c)**

8. **(c)**

9. **(c)** In case of plants, classes with a few similar characters are assigned to a higher category called Division.

10. **(d)** Increase in body mass (by cell division) and increase in number of individuals (by reproduction) are considered as twin characteristics of growth. As non-living organisms also grow and many living organisms are unable to reproduce, therefore, growth and reproduction are not considered as defining characteristics of living organisms. All organisms, from primitive prokaryotes to most advanced and complex eukaryotes, are able to sense and respond to environmental factors. The stimuli are perceived by sense organs in higher animals through sensory receptors *e.g.*, eyes, ears, nose. Plants do not possess such sense organs. However, they do respond to external factors such as light, water, temperature, pollutants, other organisms, etc. Human beings have an additional facility of self consciousness (awareness of self). Consciousness and response to stimuli are said to be the defining properties of living organisms. The sum total of all the chemical reactions occurring in our body is called metabolism. Non-living objects do not exhibit metabolism. Metabolic reactions can be demonstrated outside the body in cell-free system.
An isolated metabolic reaction outside the body of an organism, performed in a test tube is neither living nor non-living. Cellular structure is the defining property of living beings as each living being is a complex entity which is formed of one or more cells.

11. **(a)** The kingdom is the highest rank in the taxonomic hierarchy followed by phylum, class, order, family, genus, and species. Species is the lowest rank in the hierarchy. It contains the least general characters as compared to other categories or it shares very specific characteristics. Kingdom contains the most general characters of organisms under it.

12. **(d)** A class is made of one or more related orders. For example, the class Dicotyledonae of flowering plants includes all dicots which are grouped into several orders such as Rosales, Passiflorales, Asterales, Sapindales, etc. Similarly class Mammalia of animals includes all mammals.

13. **(d)** A botanical garden exclusively growing trees and shrubs is called as arboretum.

14. **(a)**

15. **(b)** The original scientific names were taken from Latin and Greek languages. New names are now derived either from Latin language or are latinised. This is because Latin language is dead and therefore, it will not change in form or spellings with the passage of time.

16. **(d)** According to ICBN, the name of different categories must end in the standard suffixes for plants as given below:

Category	Suffix
Division	phyta
Sub-division	phytina
Class	phyceae or opsida or ae
Order	ales
Sub-order	incae
Family	aceae
Sub-family	oideae
Tribe	eae

Suffixes used in animal kingdom are:

Super-family	–	oidea
Family	–	idae
Sub-family	–	inae
Tribe	–	ini

Tribe is an intermediate category between sub-family and genus.

17. **(c)** Trinomial nomenclature is employed to name the subspecies. In classification, the subspecies is a category below the species. The subspecific name is also a Latin or Latinised word and follows the name of the species to which it belongs. For example, the specific name of the house crow, which occurs throughout India, Pakistan, Burma and Sri Lanka is *Corvus splendens*. The house crows of India and Pakistan, Burma and Sri Lanka differ with each other in minute morphological features and are thus, separated as distinct subspecies. The Indian and Pakistani house crow has been assigned the subspecific name *Corvus splendens splendens*, the Burmese house crow is *Corvus splendens insolens* and the Sri Lankan house crow is *Corvus splendens protegatus*. Mostly in botanical literature, the third name represents variety whereas in zoological literature, the third name represents subspecies.

18. (d) Phylum Arthropoda is the largest phylum of kingdom Animalia. It includes the largest number of animals with about 900,000 species. Phylum Mollusca is the second largest animal phylum, which includes over 60,000 species.

19. (b) Key is a taxonomical aid used for identification of plants and animals based on the similarities and dissimilarities. The keys are based on contrasting characters generally in a pair called couplet. It represents the choice made between two opposite options, which 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.

20. (b) The International Code of Botanical Nomenclature (ICBN) is the set of rules and recommendations dealing with the formal botanical names that are given to plants.

21. (a)

22. (c) Herbarium - Dried and pressed plant specimen.
- Key - Identification of various taxa.
- Museum - Plant and animal specimen are preserved.
- Catalogue - Alphabetical listing of species.

23. (d)

24. (a) Plantae represents the highest category, kingdom and comprises of all plants from various divisions.

25. (b) *Musca domestica* (Housefly) belongs to class Insecta of phylum Arthropoda.

26. (c) Floras, manuals, monographs, etc. are some important taxonomic aids that help in the correct identification. 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 detailed information on ony one taxon.

27. (b) Sexual reproduction, a key feature of species, results in the production of offsprings different from the parents due to recombination and mutations. This shows that the species may change with time. Thus, the species are really dynamic groups and not static as held earlier.

28. (b) Some important rules of binomial nomenclature are:
(i) Biological names are either derived from Latin language or are latinised.
(ii) The first word in a biological name represents the genus while the second word represents the species.
(iii) Both the words, in a biological name, when handwritten, are separately underlined, or printed in italics to indicate their Latin origin.
(iv) The generic epithet starts with a capital letter while the specific epithet starts with a small letter. It can be illustrated with the example of *Homo sapiens*, *Pisum sativum*, *Panthera tigris*, *Mangifera indica*, etc.
(v) 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., *Mangifera indica* Linn. It indicates that this species was first described by Linnaeus.

29. (b) Carolus Linnaeus is called the Father of Taxonomy. Taxonomy is the practice of identifying different organisms, classifying them into categories and naming them. So, the first step in taxonomy would be identification.

30. (b) 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 collections, killing and pinning. Larger animals like birds and mammals are usually stuffed and preserved. Museums often have collections of skeletons of animals too.

31. (d) Non-living objects such as mountains, boulders and sand mounds also grow if increase in body mass as a criterion for growth is considered. Growth, therefore, cannot be taken as a defining property of living organisms. Many organisms such as mules, sterile worker bees, infertile human couples, etc. do not reproduce. Hence, reproduction also cannot be an all-inclusive defining characteristic of living organisms.

32. (d)

33. (c) 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., *Ficus benghalensis* L. It indicates that this species was first described by Linnaeus.

34. (d) **35. (d)** **36. (a)** **37. (d)**

38. (a) Phyla being a higher category have more members than any lower category.

39. (d) **40. (c)** **41. (a)** **42. (c)**

43. (a) Order being a higher category is the assemblage of families which exhibit a few similar characters. The similar characters are less in number as compared to different genera included in a family.

44. (c) **45. (d)**

46. (b) *Plasmodium falciparum* – A protozoan pathogen causes the most serious type of malaria that is falciparum malaria.
Musca domestica – House fly, an insect belonging to arthropoda phylum.
Felis tigris - The Bengal tiger, well protected in Sundarbans (Tiger reserve)
E.coli - Full name *Escherichia coli,* a commonly occurring bacterium in human intestine.

47. (c) Given food items belong to following phyla/divisions:

Item		**Phylum/Division**
Wheat, banana, onion, lady's finger, potato	–	Angiospermae
Pine seeds	–	Gymnospermae
Sphagnum moss	–	Bryophyta
Porphyra (Laver), kelps	–	Thallophyta
Mushrooms	–	Basidiomycota

Thus, the given food items belong to five different phyla/divisions.

48. (c) Hierarchy of categories is the classification of organisms in a definite sequence of categories (taxonomic categories) in a descending order starting from kingdom and reaching upto species or an ascending order from species to kingdom.

49. (a) Tiger and *tigris* both are from the same genus with particular taxonomic category.

50. (d)