

EXAM
DRILL

The Living World

ANSWERS

1. (c) : If humans and pandas belong to the same class, then they must belong to same phylum and kingdom.

2. (a)

3. (b) : The family of dog is Canidae while *Familiaris* is the genus. Poales is the order of wheat. Dicotyledonae is the class of mango.

OR

(c)

4. There are five codes of binomial nomenclature :

- (i) ICBN
- (ii) ICZN
- (iii) ICBacN
- (iv) ICVN
- (v) ICNCP

5. Three-domain system was introduced by Carl Woese.

Three domains of life are:

- (i) Domain Archeae
- (ii) Domain Bacteria
- (iii) Domain Eukarya

6. (i) A - Genus, B - Family, C - Class, D - Phylum/Division

(ii) (a) : Scientific classification of tulsi is

- Kingdom – Plantae
- Division – Angiospermae
- Class – Dicotyledonae
- Order – Lamiales
- Family – Lamiaceae
- Genus – *Ocimum*
- Species – *sanctum*

(iii) Polytypic genus is *Solanum*.

(iv) (c) : Specificity decreases as we move high in taxonomic hierarchy.

(v) (d) : Familiaris is species, rest are families.

7. Advantages of common name are :

- (i) Common names are easy to pronounce and are short, e.g., cat or billi.
- (ii) People are familiar to these names since childhood.
- (iii) They are based on some features of organisms, e.g., Cowa (crow-Caawn-Caawn sound).

Disadvantages of common name are:

(i) All the organisms cannot be named by this method as there are organisms of different sizes, shape, e.g., microbes.

(ii) An organism may have several names in a given language, e.g., 8 Hindi names of prickly poppy and water lily has 15 English names.

(iii) Common names may have different meanings in different countries, e.g., maize, means wheat and other grains in USA and it is called corn in common wealth countries.

8. Species is the lowest of a population or basic taxonomic category, which consists of one or more individuals that resemble one another more closely than individuals of other species. The members of a species interbreed freely and are reproductively isolated from others. These features make the species a basic taxonomic category.

9. Some common names have incorrect meaning, e.g., silver fish, jelly fish, cuttle fish, star fish, all belong to different phyla and have no relationship with true fishes. A single organism is known by several names in different parts of same country. e.g., Rose is called gulab in Hindi, golap in bangala and Rojapo in Tamil.

10. (a) Last word here indicates variety or subspecies.

(b) (L) is the name of taxonomist who describes the species.

11. Hierarchy of units of classification that botanists follow while classifying plants and different 'suffixes' used for the units are as follows:

Category	Standard suffix
Kingdom	Plantae (No fixed suffix)
Division	–phyta
Class	–opsida
Order	–ales
Family	–aceae
Genus	No fixed suffix
Species	No fixed suffix

12. Brinjal and potato belong to same genus *Solanum* but they are different species *Solanum melongena* and *Solanum tuberosum* respectively. The basic criterion for defining two different species is that they cannot interbreed and produce fertile offspring. Potato and brinjal neither actually nor potentially interbreed, thus they are defined as separate species.

OR

- (i) Each organism is given only one name consisting of two words, generic and specific.
- (ii) The generic name is written first. It is followed by specific epithet and then the name of the discoverer in full or in abbreviation.
- (iii) The specific epithet can be single or compound. Usually it begins with a small letter.
- (iv) The scientific name is printed in italics. Its two words are separately underlined in handwritten description. An exception is made when the biological name is written as title or paragraph.

13. The concept of classical or old taxonomy exists since, the time of Aristotle and Theophrastus and continued upto Linnaeus. It states that :

- (i) Species is the basic unit of taxonomy, that can be described on the basis of one or few preserved specimens.
- (ii) Species are fixed and do not change with time.
- (iii) A species is delimited based on morphological features.
- (iv) Organisms are classified on the basis of some limited features such as root modification, leaf venation, floral structures, number of cotyledons in case of plants.

Due to the limited number of groups, many organisms could not be classified correctly. This finally led to artificial system of classification.

OR

The concept of modern taxonomy was given by Julian Huxley (1940). It uses evidences from all the areas of biology like morphology, anatomy, biochemistry, cell biology, physiology, genetics, evolution, etc.

The modern taxonomy is based on the following features:

- (i) The studies are done on a huge number of organisms based on all the variations.
- (ii) Study is also focused on sub-species, varieties, races and populations.
- (iii) Species are not isolated. They are related by common descent and vary from them due to accumulation of variations.
- (iv) Species is considered as dynamic and ever-changing entity.
- (v) Biological delimitation includes various branches of systematics, e.g., cytotaxonomy, experimental taxonomy, numerical taxonomy, chemotaxonomy, etc. This led to the development of phylogenetic system or cladistics of classification.

14. Division or Phylum is a category higher than that of class. The term phylum is used for animals while division is commonly employed for plants. A division or phylum is formed of one or more classes. The phylum chordate of animals contains not only the class mammalia but also aves (birds), reptilia (reptiles), amphibia (amphibians), cyclostomata, chondrichthyes, osteichthyes (fishes), etc. The

division spermatophyta in plants has similarly seven classes of gymnosperms and two classes of angiosperms.

15. (a) Scientific classification of leopard cat:

Kingdom — Animalia
 Phylum — Chordata
 Class — Mammalia
 Order — Carnivora
 Family — Felidae
 Genus — *Prionailurus*
 Species — *bengalensis*

(b) Scientific classification of egg plant:

Kingdom — Plantae
 Phylum/Division — Angiospermae
 Class — Magnoliopsida
 Order — Solanales
 Family — Solanaceae
 Genus — *Solanum*
 Species — *melongena*

16. Basics of systematic study are:

- (i) Description (Characterisation) - The organisms to be studied are described for all its morphological and other characteristics.
- (ii) Identification - Based on the studied characteristics, the identification of the organism is carried out to know whether it is similar to any of the known group or taxa.
- (iii) Classification - The organism is now classified on the basis of its resemblance to different taxa. It is possible that the organism may not resemble any known taxa or groups. A new group or taxa is raised to accommodate it.
- (iv) Nomenclature - After placing the organism in various taxa, its correct name is determined. If the organism is new to systematics, it is given a new name based on rules and conventions of nomenclature.

17. Revision of group - It is the grouping of species into distinct taxa on the basis of their resemblances and differences, development of complexity or simplicity and hence evolutionary relationships. First of all criteria are selected for delimiting a species. In case of sexually reproducing organisms, interbreeding is used as the basic criterion. In case of others, morphology, physiology, cytotaxonomy and molecular biology including DNA-matching is restored to. The species are then grouped into higher taxonomic categories on the basis of certain common features called correlated characters.

18. Advantages of binomial nomenclature are :

- (i) Binomial names are universally acceptable and recognised.
- (ii) They remain same in all languages.
- (iii) The names are small and comprehensive.

(iv) There is a mechanism to provide a scientific name to every newly discovered organism.

(v) The names indicate relationship of a species with others present in the same genus.

(vi) A new organism can be easily provided with a new scientific name.

19. The scientific names are generally in Latin and written in italics. They are Latinised or derived from Latin irrespective of their origin.

The first word in a biological name represent the genus while, the second component denotes the specific epithet. Both the words in a biological name, when handwritten are separately underlined or printed in italics to indicate their Latin origin.

The first word denoting the genus starts with capital letter while, the specific epithet starts with a small letter, *e.g.*, *Mangifera indica*.

20. (a) P - Species

Q - Family

R - Order

S - Phylum/Division

(b) Genus comprises a group of related species, which have more characters common in comparison to species of other genera. In other words, genera are aggregates of closely related species.

(c) A plant family (Q) ends has a suffix –aceae while an animal family (Q) has a suffix –idae.

21. (a) Taxonomy (GK taxis - arrangement, nomos - law, de Candolle) is defined as the science dealing with identification, nomenclature and classification of organisms. It is the study of rules, principles and practices of classification, identification and nomenclature of organisms.

(b) The fundamental components of taxonomy are:

(i) Identification, (ii) Classification and (iii) Nomenclature.

(c) Types of taxonomy are as follows:

- Alpha taxonomy – Identification and classification of organisms on the basis of only morphological characters.
- Beta taxonomy – β taxonomy (given by Turill) involved not only gross morphological features but also genetical, anatomical, cytological, palynological (pollen and pores study), physiological and other characters. It is also called biosystematics.
- Gamma taxonomy is based on evolutionary sequence, intraspecific variations and interpretation of organic diversity.

OR

(a) The basic processes for taxonomic studies are:

- (i) Organisms are described on the basis of morphology and other characteristics.
- (ii) The description of characteristics helps in the placement of the organisms in various taxa.
- (iii) A new taxon can be framed if the organism is different from the existing taxa.
- (iv) The correct naming of an organism can be done after placing it in various taxon. A new organism can be given a new name after following the standardised rules.

(b) According to the old taxonomy,

- (i) Species is the basic unit of taxonomy and can be described on the basis of one or few preserved specimens.
- (ii) Organisms are classified on the basis of some limited features.

As more knowledge was gathered about organisms based on variations, many more characters were used to correlate affinities. Due to this, biologists felt the need of modern taxonomy.

