

1. The Living World

1. What is Life?

A unique and complex arrangement of molecules which express themselves through many chemical reactions, which further leads to various different phenomenon like growth, development, adaptation, reproduction etc. Organisms exhibiting growth, development and other characteristics of life are called as living beings. Every living being has its own specific character like shape, size, structure etc. Based upon these characteristics, living and non-living can be identified.

2. Characteristics of Living Beings

2.1 Growth

- (1) The increase in the mass and number of cells of an individual is characterised as “growth” in living beings. All living organisms whether unicellular or multicellular, grow by cell divisions.
- (2) In animals, growth occurs for a limited period of time, in plants growths occur throughout their life. Reproduction also occurs through cell- division. Hence growth and reproduction both are mutually inclusive events. In higher animals and plants, growth and reproduction are linked but are mutually exclusive events.
- (3) Intrinsic growth occurs in living organisms due to additions and formation of cells inside the body, such an event is called intussusceptions. A dead organism does not grow. Whereas non-living articles increase in size and show extrinsic growth, for e.g. *snow mountains grow by addition of snow on them etc. this process is called accretion.*
- (4) The growth-producing substance in living beings is of two type, Apoplasmic and protoplasmic. Apoplasmic (apo-away, plastos- formed) are non-living material made up of cells which further becomes component of tissue e.g. *bone and cartilage matrix, cell wall.* Protoplasmic substances are the component of living matter such as nucleus and cytoplasm.
- (5) Chemically occurring growth is a result of difference between anabolism and catabolism. There will be no growth if anabolism and catabolism are equal. Growth occurs only when anabolism exceeds catabolism. When catabolism exceeds anabolism then degrowth or negative growth take place.

2.2 Metabolism

Metabolism is a **defining property of living beings**. Metabolism is the sum total of all the chemical reactions occurring in an organism due to specific interaction amongst different types of molecules. No nonliving organism show metabolism. All activities taking place inside a living organism is due to metabolism such as growth, reproduction etc. These metabolic reactions can be carried out outside the body and such reactions are neither living nor non-living. The in-vitro metabolic reactions are known as biological reactions. There are two types of metabolism, Catabolism and Anabolism

- (1) **Anabolism**-The metabolic processes which involve the synthesis of molecules are called “anabolism” (the constructive metabolism) E.g. formation of starch and glucose etc.
- (2) **Catabolism** (the destructive metabolism) involve breakdown of larger molecules into simple units for e.g. respiration.

Anabolism	Catabolism
Kinetic energy changes into potential energy	Potential energy changes into kinetic energy
It stores energy	It releases energy
It is required for growth, storage and maintenance	It is required for performing various activities in living beings
Destructive process	Constructive process

2.3 Cellular structure and protoplasm

All organisms consist of one or more cells. Cells further divide to form tissue and tissue divides into organs. All cells are made up of protoplasm, which is also known as living matter. The composition of living matter is known. Cellular structure and protoplasm are absent in viruses. Protoplasm is also called physical basis of life because each cell contains protoplasm.

2.4 Form and size

A definite shape and size are given to every living organism, which helps in differentiating them. For e.g. *an elephant can be identified as a huge creature bearing a big trunk.*

2.5 Reproduction

The production of new individuals of the same kind by the grown-up individuals is known as reproduction. It is needed for the perpetuation of a population.

There are two types of reproduction- Asexual and Sexual.

- (1) **Sexual reproduction** (biparental) involves the fusion of two parental gametes, fusion further result into formation of the zygote and then offspring e.g. human being, dog etc.
- (2) **Asexual reproduction** (uniparental) involves the production of new organism through a specialized or unspecialized part of the single parent e.g. *euglena*, *amoeba* etc. No nonliving has this power of reproduction.

2.6 Energy

Living beings perpetually need energy not solely to perform numerous activities of the body however conjointly to beat entropy or tendency to randomness. The supply of energy is food. It's needed by each cell of the body.

2.7 Respiration

The chemical change by that energy is discharged from the food you eat is termed respiration. The stored energy inside an organism is in the form of ATP (adenosine triphosphate). Respiration takes place altogether organisms each plant and animals. All living organisms offer out carbon dioxide throughout respiration. Non-living things don't respire.

2.8 Consciousness

All the living beings from prokaryotes to eukaryotes have the ability to Sense. The ability of sensing and self-awareness is known as sensitivity. This can be physical, biological and chemical. Higher animals have sense organs like eyes, nose, ears etc. plants do not possess any sense organ. However, they do respond to external factors such as water, temperature, light etc. Human beings have the special additional faculty of "consciousness".

2.9 Homeostasis

(Homois-alike; stasis- standing) – Maintenance of a favourable dynamic consistency of internal environment of the body is called Homeostasis. It occurs in all multicellular organisms. There are two types of organism- ectothermic and endothermic organisms.

- (1) **Ectothermic** – Body temperature of these organisms varies with surroundings and also known as cold-blooded organisms.
- (2) **Endothermic** – The body temperature remains constant for these organisms. E.g. *mammals*, *birds* etc.

2.10 Excretion

All living cells produce some waste products that need to be removed outside of the body as it can cause toxicity. Excretion is the process responsible for the removal of these waste products. Water, carbon dioxide, nitrogenous wastes are the major waste products.

2.11 Adaptation (Ad- towards, apt- adjust)

Inheritable traits that allow an organism to meet the specific requirement of environmental changes are called adaptations. It can be physiological, structural or behavioral.

- (1) **Long-term adaptation:** The permanent inheritable changes in the structure and function of an organism due to evolution. Mimicry is an example of long-term adaptation.
- (2) **Short-term adaptation:** The temporary changes produced in response to the specific condition. E.g. *hibernation*, *aestivation*.

2.12 Movement

Living beings show movements of their parts. Some are able to move from place to place. The phenomenon is called locomotion.

2.13 Ageing and death

Ageing occurs in all organisms. It is progressive deterioration of function and structure of cells, organs, tissues and it leads to death, which is a stoppage of life activities.

- (1) **Biological death:** it takes place when body parts and brain degenerates.
- (2) **Clinical death:** It occurs when all the vital functions of the body stopped. Such as heartbeat, breathing, pulses etc.

2.14 Lifespan

Every living organism has a definite lifespan of birth, growth, maturity, senescence and death. Some organisms possess short lifespan like a mayfly. Some have a longlifespan such as turtle.

3. Diversity in Living World

It is evaluated that more than 5 millions species are available on earth. This variety of species is called biodiversity. Species possess distinct geographical locations. Each geographical location has its own fauna and flora.

3.1. Classification

“The tool to study living organisms”. For the sake of study, species are placed in groups on the basis of their characteristics. This arrangement of species into different groups or categories based upon their features is known as classification.

(1) Importance of classification

- Discovery of new organisms
- Convenience of study
- Knowledge of phylogenetic relationships

(2) Advantages of Classification

- It helps in identification of organisms
- It make study easier
- Help in the study of evolution and evolutionary relationships among the organisms.

3.2. Taxonomy

The process of nomenclature, identification and classification is known as taxonomy. A unit of classification, which represents a rank called a **taxon** e.g. a class, order etc.

(1) Branches of Taxonomy

- Morphotaxonomy: Study of the morphology of organisms.
- Natural taxonomy: It is based on natural similarities among organisms.
- Chemotaxonomy: Study of presence or absence of chemicals in cells or tissues.
- Numerical taxonomy: depend upon the number of shared characters of various organisms.
- Karyotaxonomy: Nuclear and chromosomal studies.
- Classical taxonomy: Based on the morphological trait.
- Experimental taxonomy: Experimental determination of genetic inter-relationships.
- Practical taxonomy: Based upon the utility of the organism.
- Cytotaxonomy: Cytological studies.
- Phylogenetic taxonomy: Study of evolutionary history of a species.

3.3. Systematics

It is the science that deals with nomenclature, classification, identification and evolutionary history of an organism. Therefore, it includes taxonomic characters along with evolutionary history of an organism.

3.4. Nomenclature

The science of providing proper names to the organisms, which help in the distinction between species. These names can be scientific or common names. International Code for Botanical Nomenclature (ICBN) and International Code for Zoological Nomenclature (ICZN) were advanced to appoint scientific names for animals and plants separately.

Common names: The names we use to call animals in our local area, local language. Common names vary from place to place.

Scientific names: Name given to an organism by biologist based upon agreed rules, criteria and principles. These are acceptable all over the world.

(1) Binomial system of nomenclature :Linnaeus used this nomenclature system for the first time on large scale and proposed scientific name of all the plants and animals. Linnaeus proposed the scientific name of animals in his book “Systema Naturae”(10th edition). This 10th edition of Systema Naturae was published on 1 August 1758. So initiation of binomial system for animals is believed to be started on 1 Aug 1758.

• Rules for Nomenclature

- According to the binomial system name of any species consists of two epithets -
- Generic epithet - Name genus, Specific epithet - Trivial name E.g. *Solanum tuberosum*(Potato) *Mangifera indica* (mango)
- The expressions of the name ought to be independently underlined when manually written and ought to be in Italics when printed.
- All the names have words in Latin or Greek.
- The author name is written after specific epithet in an abbreviated form.
- Date of publication can be added.
- Generic name start with capital letter and specific name start with small letter.
- Specific and generic name can be same.

(2) Trinomial system of nomenclature

According to this system name of any plant or species is composed of three names –

- Generic name
- Specific name
- Subspecific name (name of variety)

When members of any species have large variations then the Trinomial system is used. On the basis of dissimilarities, this species is classified into subspecies—e.g. *Brassica oleraceavar. botrytis* (Cauliflower).

(3) Polynomial system of nomenclature

According to this system, each name of organisms made up off several Latin words, e.g. – *Caryophyllum saxatilis folis gramineus umbellatis corumbis*.

3.5. Hierarchy of taxonomy

The arrangement of taxonomic categories in a descending/ascending order during classification of an organism. It is also called Linnaeus hierarchy as it was proposed by Carolus Linnaeus, the father of Systematic Botany. He used following categories-

Kingdom
Phylum
Class
Order
Family
Genus
Species

Besides these, all other are an intermediate e.g. cohort, subdivision, suborder, subfamily, tribe, subtribe, etc. They are not regularly used. They are used only when they are needed.

(1) **Species:** The smallest and fundamental unit of classification. Species is defined as a group of individuals having physiological, morphological and biochemical similarities. Species can freely breed in between themselves but are not capable of breeding in other species.

(2) **Genus :**Genus comprises a group of closely related species. For example, Lion (*Panthera Leo*), leopard (*P.pardus*) and tiger (*P.tigris*) with several common features are all species of the genus *Panthera*.

(3) **Family :**This category of taxonomy includes various genus which shares some resemblance among themselves. However, the number of similarities decrease compared to species and genus. The family is characterised on the basis of both vegetative and reproductive features. For example, three different genera *Solanum*, *petunia* and *Datura* are placed in the family *Solanaceae*.

(4) **Order :**Order being a higher category, is the assemblage of families which exhibit a few similar characters. A group of families showing somewhat few similarities forms an order. For example, the order of carnivores i.e., Carnivore includes families like *Felidae* and *Canidae*.

(5) **Class :**A group of related orders. For example, order Primata comprising monkey, gorilla and gibbon is placed in class mammalian along with order Carnivora that includes animals like tiger, cat and dog. Class *Mammalia* has other orders also.

(6) **Phylum :**A number of Classes are clubbed up to form one Phylum. Animals like fishes, amphibians, reptiles, birds along with mammals constitute the next higher category called phylum. All these, based on the common features like presence of notochord and dorsal hollow neural system, are included in phylum Chordata.

In case of plants, classes with a few similar characters are assigned to a higher category called Division.

(7) **Kingdom :**Kingdom is also known as highest taxonomic category. All animals are placed in the kingdom – Animalia and all plants are placed in kingdom-Plantae.

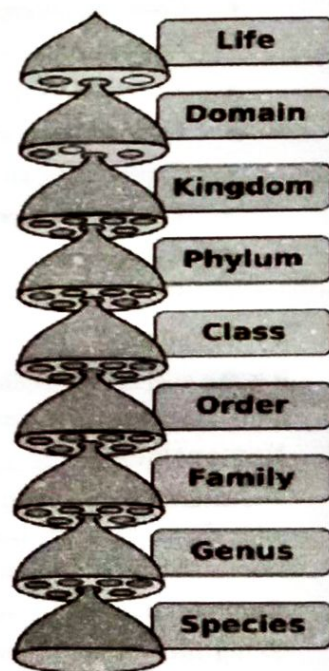


Table: Organisms with their Taxonomic Categories

Common name	Biological name	Genus	Family	Order	Class	Phylum/Division
Man	<i>Homo sapiens</i>	<i>Homo</i>	Hominidae	Primata	Mammalia	Chordata
Housefly	<i>Muscadomestica</i>	<i>Musca</i>	Muscidae	Diptera	Insecta	Arthropoda
Mango	<i>Mangifera Indica</i>	<i>Mangifera</i>	Anacardiaceae	Sapindales	Dicotyledonae	Angiospermae
Wheat	<i>Triticum Aestivum</i>	<i>Triticum</i>	Poaceae	Poales	Monocotyledonae	Angiospermae

3.6 Taxonomical aids

Techniques, Procedures and Stored Information that are useful in Identification and classification of organisms are called taxonomic aids. The collection of actual specimens of plant and animal species is essential and is the prime source of taxonomic studies. Biologists have established certain procedures and techniques to store and preserve the information as well as the specimens. Some of these are explained to help you understand the usage of these aids.

- (1) **Herbarium** :Herbarium is a place where dried and pressed plants specimens, mounted on sheets are kept systematically according to a widely accepted system of classification. Some plant parts are also kept in preservative liquids if they cannot be dried and pressed.

Table: Important Herbariums in the World: Some

Herbarium	Number of Specimens
Royal Botanical Gardens, Kew (London) (largest herbarium)	6.5 million
Museum of natural history (Paris)	Over 6.0 million
Conservatories at jardin botanique de Geneve (Geneva)	Over 5.0 million
New York Botanical Garden (New York)	4.0 million

- (2) **Museums** :They preserve plants and animals specimen for study and reference. Museums provide information about the flora and fauna of different areas. Museums are generally set-up in educational institutes. Skeletons of animals and humans are preserved in museums. Specimens are preserved as dry specimens, birds and mammals are usually stuffed preserved.

Name of some important museums is given below

- Natural History Museum, London
- United States National Museums, Washington
- Field Museums of Natural History, Chicago
- Zoology Museum, Amsterdam

- (3) **Botanical garden** :These specialized gardens have collections of living plants for reference. There are various important roles of botanical garden listed below

- Conservation
- Public services
- Providing living plant material for systematic work.
- Seed exchange
- On-site teaching

Table: Name of some major botanical gardens

Name of Botanical garden	Location
New York Botanical Garden	New York, USA
Indian Botanical Garden	Kolkata, India
Pisa Botanical Garden	Pisa, Italy
Botanical Garden	Dehradun, India

- (4) **Zoological parks** :A Zoo is a place where various living animals are kept within enclosures display to the public and may be used for the study. Animals may also Bred. Zoological parks enable us to learn about their food habits and behaviour. Animals are kept under human care and also provided conditions same as their natural habitats.
- (5) **Monographs** :It is a highly useful taxonomic aid. It is a book or essay which gives a comprehensive account of all the available information about a genus, family or higher category (or any other particular subject) of grouping at the time of its publication.
- (6) **Keys** :Key is another 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. Keys are generally of two types given below
- **Bracketed keys**: It gives one pair of contrasting statement for a given character.
 - **Indented keys**: It has a sequence of forms of different characters.
- (7) **Manuals** :It helps in correct identification as it provides information for the identification of species name found in a particular area.
- (8) **Flora** :Flora is a book or other work, describing the plants of a specific habitat or region. It provides information about nomenclature, habitat. Taxonomy and distribution in a particular area. It also gives information about the morphology and biology of the taxa.

1. The Living World – Multiple Choice Questions

1. Nature and Scope of Biology

- Aquaculture does not include
 - Pisces
 - Prawns
 - Silkworm
 - Shell fishery
- Animals that rely on the heat from the environment, rather than of metabolism, to raise their body temperature are, in the strict sense, called
 - Ectothermic
 - Poikilothermic
 - Homeothermic
 - Endothermic
- Branch of Zoology dealing with the study of fishes is known as
 - Herpetology
 - Ichthyology
 - Mammalogy
 - Ornithology
- The term "biology" was introduced by
 - Aristotle
 - Darwin
 - Lamarck and Treviranus
 - Linnaeus
- What is the name of the book written by Aristotle
 - Histoire Naturella
 - Systema Nature
 - Historia Animalia
 - Philosophie Zoologique
- Crick, one of the discoverer of DNA double helical structure, was the man of
 - Physics
 - Chemistry
 - Zoology
 - Botany
- Which branch study about remains of plant life
 - Palaentology
 - Palaeobotany
 - Eugenics
 - Palynology
- Melvin Calvin was professor of
 - Botany
 - Plant physiology
 - Chemistry
 - Biochemistry
- Biometry refers to
 - Measurement of evolutionary rate in humans
 - Measurement of living things and processes
 - Measurement of fertility and mortality rate
 - None of these
- All living organisms are linked to one another because
 - They have common genetic material of the same type
 - They share common genetic material but to varying degrees
 - All have common cellular organization
 - All of above
- Study of ecology of population is called
 - Autecology
 - Synecology
 - Ecotype
 - Demecology
- Study of snakes is called
 - Herpetology
 - Ichthyology
 - Entomology
 - Serpentology
- William Harvey is known for the discovery of
 - Digestion
 - Respiration
 - Blood clotting
 - Blood circulation
- Study of behaviour of animals is called
 - Ethology
 - Parapsychology
 - Euphenics
 - Etiology
- Name the scientist who was awarded the Nobel Prize for his genetic studies on the linear arrangement of genes on the chromosomes in the fruitfly, *Drosophila melanogaster*
 - C.F. Wolff
 - T.A. Knight
 - J. Swammerdam
 - T. H. Morgan

16. Study of Ticks and Mites is called

- Acarology
- Entomology
- Malacology
- Carcinology

17. K. Esau dominated in the field of plant biology up to the age of 99 years. She contributed mainly in the field of

- Morphology of flowering plants
- Anatomy of seed plants
- Classification of flowering plants
- Physiology of seed plants

2. Understanding Life

1. Anabolism is

- Endergonic process
- Exergonic process
- Bidirectional process
- Destructive process

2. Organisms which display properties of both living and nonliving

- Viruses
- Diatoms
- Lichens
- Bacteria

3. The type of linkage present in carbohydrates is

- Peptide
- Glycosidic
- Amide
- Phosphate bonds

4. Animals spending winter in dormant conditions is referred as under

- Hibernation
- Aestivation
- Mimicry
- Camouflage

5. Some plants having pleasant odour and attractive colours for

- Hydrophily
- Anemophily
- Entomophily
- None of these

6. Which of the following is the main adaptation for a plant to survive in xerophytic condition

- Spines
- No stomata
- Stipular leaves
- None of the above

7. The total heat content of a system is

- Entropy
- Free energy
- Enthalpy
- Kinetic energy

8. Maltose, lactose and sucrose are

- Disaccharides
- Trisaccharides
- Monosaccharides
- Polysaccharides

9. Which one is hexose sugar

- Mannose
- Galactose
- Both (a) and (b)
- Cellulose

10. Among the energy values or nutrients, 9.3 calories is that of

- Fats
- Proteins
- Vitamins
- Carbohydrates

11. The process in which excess energy is lost by light waves is called

- Photolysis
- Fluorescence
- Photo-oxidation
- Photophosphorylation

12. The basis of life (secret of life) is

- Lipid
- Protein
- Nucleic acid
- Nucleoprotein

13. In the organisms which show bioluminescence, the chemical energy of cell is converted into

- Light energy
- Thermal energy
- Radiant energy
- Mechanical energy

14. Maintenance of internal favourable conditions, despite changes in external environment is
 - (a) Entropy
 - (b) Steady state
 - (c) Enthalpy
 - (d) Homeostasis
15. In ATP high energy bond is present
 - (a) Between nucleoside and phosphate group
 - (b) Between sugar and phosphate group
 - (c) Between base (Adenine) and phosphate group
 - (d) None of these
16. The bond formed between the first phosphate group and adenosine in ATP is
 - (a) Phosphoester bond
 - (b) Adenophosphate bond
 - (c) Nitrophosphate bond
 - (d) Phosphoanhydride bond
17. Which one of the following sequences is true
 - (a) Observations, problem defining, hypothesis, experiment
 - (b) Experiment, hypothesis, problem defining, observation
 - (c) Observation hypothesis problem defining, experiment
 - (d) Problem defining, observation, hypothesis, experiment

3. Systematics

1. The branch of Botany concerned with the classification, nomenclature and identification of plants is
 - (a) Systematic Botany
 - (b) Ecology
 - (c) Morphology
 - (d) Physiology
2. The science of naming the plant is known as
 - (a) Classification
 - (b) Identification
 - (c) Nomenclature
 - (d) Taxonomy
3. Who amongst the following is regarded as the "Father of Taxonomy"
 - (a) Takhtajan
 - (b) Linnaeus
 - (c) Bentham and Hooker
 - (d) Theophrastus
4. In a hierarchical system of plant classification, which one of the following taxonomic ranks generally ends in 'aceae'
 - (a) Family
 - (b) Genus
 - (c) Order
 - (d) Class
5. Which of the following taxonomical ranks contain organisms least similar to one another
 - (a) Class
 - (b) Genus
 - (c) Family
 - (d) Species
6. When organism is in same class but is not in same family, the taxonomic term is called as
 - (a) Order
 - (b) Genus
 - (c) Species
 - (d) Family
7. In Botanical nomenclature of plants
 - (a) Genus is written after the species
 - (b) Both in genus and species the first letter is a capital letter
 - (c) Genus and species may be same name
 - (d) Both genus and species are printed in italics
8. Who proposed phylogenetic classification of plants
 - (a) Linnaeus
 - (b) Hutchinson
 - (c) Bentham and Hooker
 - (d) Mehta
9. Brinjal, potato, tomato, onion, ginger belongs to
 - (a) Single family
 - (b) Species
 - (c) Genera
 - (d) Same genus
10. *Systema Naturae* is concerned with
 - (a) Solar system
 - (b) Ecosystem
 - (c) Classification of plants and animals
 - (d) Natural selection
11. Which of the following is excluded in Whittaker's five kingdom system of classification
 - (a) Viruses
 - (b) Algae
 - (c) Fungi
 - (d) Bacteria
12. The non-nucleated, unicellular organisms of Whittaker's (1969) classification are included in the kingdom
 - (a) Protista
 - (b) Monera
 - (c) Animalia
 - (d) Plantae
13. The third name of the trinomial nomenclature is of
 - (a) Sub-genus
 - (b) Species
 - (c) Sub-species
 - (d) Type
14. Who developed the "key" for identification of animals
 - (a) John Ray
 - (b) Goethe
 - (c) Georges Cuvier
 - (d) Theophrastus
15. Aristotle classified the animals into two groups. Mark the correct one
 - (a) Vertebrata and invertebrata
 - (b) Chordata and non-chordata
 - (c) Protozoa and metazoa
 - (d) Enema and anaemia
16. *Oryza sativa* is the binomial name of the rice plant, the *sativa* stands for
 - (a) Specific name
 - (b) Specific epithet
 - (c) Species name
 - (d) Specific nomenclature
17. Which structure is present in both prokaryotic and eukaryotic plant cells
 - (a) Cell wall
 - (b) Nucleus
 - (c) Chloroplast
 - (d) Mitochondria
18. Interbreeding natural population of animals are referred to as belonging to the same
 - (a) Family
 - (b) Species
 - (c) Genus
 - (d) Variety
19. In zoological name of an organism the first word will be
 - (a) Generic name
 - (b) Specific name
 - (c) Name of the order
 - (d) Family name
20. Four kingdom classification was proposed by
 - (a) Whittaker
 - (b) Copeland
 - (c) Haeckel
 - (d) Linnaeus
21. The term 'biosystematics' was coined by
 - (a) Gaspard Bauhin
 - (b) Camp and Gilly
 - (c) Karl Prantl
 - (d) Robert Brown
22. Classical systematics embodies/concept of classical taxonomist is
 - (a) Biological concepts
 - (b) Species concept
 - (c) Typological concept
 - (d) All the above
23. Two plants are taxonomically related if
 - (a) They store carbohydrate in the same type of molecule
 - (b) Both obtain energy from hydrolysis of ATP into ADP and inorganic phosphate
 - (c) Both have similarly lobed palmate leaves
 - (d) Both have pinnately veined leaves
24. A group of related genera, with still less number of similarities as compared to the genus and species, constitutes
 - (a) Order
 - (b) Class
 - (c) Family
 - (d) Division

25. Plant classification proposed by Carolus Linnaeus was artificial because it was based on
 (a) Only a few morphological characters
 (b) Evolutionary tendencies which are diverse
 (c) Anatomical characters which are adaptive in nature
 (d) Physiological traits alongwith morphological characters
26. Taxonomy based on determination of genetic relationships is
 (a) Cytotaxonomy (b) Numerical taxonomy
 (c) Biochemical taxonomy (d) Experimental taxonomy
27. Mayr's biological concepts of species is mainly based on
 (a) Morphological traits
 (b) Reproductive isolation
 (c) Modes of reproduction
 (d) Morphology and reproduction
28. Algae with photosynthetic pigments possess nutrition
 (a) Holozoic (b) Saprophytic
 (c) Holophytic (d) Parasitic
29. Characteristics which delimit a family are more general than those which delimit a
 (a) Cohort (b) Phylum
 (c) Class (d) Genus
30. What is correct
 (a) *Apisindica* (b) *trypanosome gambiense*
 (c) *Ficus Bengalensis* (d) *Mangifera indica*
31. Five kingdom classification includes
 (a) Monera, Protista, Fungi, Plantae, Animalia
 (b) Algae, Fungi, Bryophyta, Pteridophyta, Gymnosperms
 (c) Virus, Prokaryota, Fungi, Plantae, Animalia
 (d) Monera, Protista, Animalia, Plantae, Algae
32. Which covers the largest number of organisms
 (a) Genus (b) Family
 (c) Phylum (d) Class
 (e) Order
33. In hierarchical classification class is interpolated between
 (a) Family and genus (b) Phylum and order
 (c) Order and family (d) Kingdom and phylum
34. Who published the book *Species Plantarum* and provided a basis for classification of plants
 (a) Charles Darwin (b) Robert Hook
 (c) Carolus Linnaeus (d) Anton Leeuwenhoek
35. 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) Different kinds of organisms and their classification
36. 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
37. 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
38. 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
39. 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
40. 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
41. Match the following and choose the correct option
 (A) Family (i) *tuberosum*
 (B) Kingdom (ii) Polymonials
 (C) Order (iii) *Solenum*
 (D) Species (iv) Plantae
 (E) Genus (v) Solanaceae
 (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
42. Which one of the taxonomic aids can give comprehensive account of complete compiled information of any one genus or family at a particular time
 (a) Taxonomic key (b) Flora
 (c) Herbarium (d) Monograph
 (e) Dictionary
43. When generic name is repeated in specific name of a plant it is called
 Or
 In fish, *Catlacatla* the specific name is identical with the generic name, thus it is an example of
 (a) Synonyms (b) Antonyms
 (c) Tautonyms (d) None of the above
44. Institution which encourages publication of local flora is
 (a) NBRI (b) FRI
 (c) BSI (d) IARI
45. Number of criteria used in classifying organisms in five-kingdom classification is
 (a) 5 (b) 4
 (c) 3 (d) 2
46. If a botanist has to nomenclate a similar species, he will use
 (a) Syntype (b) Neotype
 (c) Mesotype (d) Isotype
47. Match the following
 (A) *Genera Plantarum* (1) Aristotle
 (B) *Species Plantarum* (2) Linnaeus
 (C) *Historia Generalis Plantarum* (3) Bentham and Hooker
 (D) *Scala Naturae* (4) Pliny
 (5) John Ray
 (a) A - 4, B - 2, C - 5, D - 3
 (b) A - 4, B - 2, C - 1, D - 3
 (c) A - 4, B - 2, C - 3, D - 1
 (d) A - 3, B - 2, C - 5, D - 1

48. In Bentham and Hooker's classification what was positioned in between dicots and monocots
 (a) Gymnosperms (b) Bryophytes
 (c) Algae (d) Pteridophytes
49. Read the statements given below and identify the incorrect statement
 (a) Scientific names are used all over the world
 (b) Scientific names are often descriptive and tell us some important character of an organism
 (c) Scientific names indicate relationship between species
 (d) Scientific names favour multiple naming for the same kind of an organism
50. Binomial system of nomenclature for plants is effective from
 (a) 5.8.1771 (b) 1.5.1753
 (c) 1.8.1758 (d) 6.7.1736
51. *Nicotiana* is
 (a) Variety (b) Subspecies
 (c) Species (d) Genus
52. Which of the following combinations is correct for wheat
 (a) Genus : *Triticum*, Family :Anacardiaceae, Order : Poales, Class :Monocotyledonae
 (b) Genus : *Triticum*, Family :Poaceae, Order : Poales, Class :Dicotyledonae
 (c) Genus : *Triticum*, Family :Poaceae, Order : Sapinadales, Class :Monocotyledonae
 (d) Genus : *Triticum*, Family :Poaceae, Order : Poales, Class :Monocotyledonae

4. NEET-APIMT

1. In history of biology, human genome project led to the development of [2011]
 (a) Bioinformatics (b) Biosystematics
 (c) Biotechnology (d) Biomonitoring
2. The book 'Genera plantarum' was written by [1999, 2001]
 (a) Bessy (b) Hutchinson
 (c) Engler and Prantl (d) Bentham and Hooker
3. Which one of the following aspects is an exclusive characteristic of living things [2011]
 (a) Perception of events happening in the environment and their memory
 (b) Increase in mass by accumulation of material both on surface as well as internally
 (c) Isolated metabolic reactions occur in vitro
 (d) Increase in mass from inside only
4. Biological organisation starts with [2007]
 (a) Submicroscopic molecular level
 (b) Cellular level
 (c) Organismic level
 (d) Atomic level
5. Cause of mimicry is [2002]
 (a) Isolation (b) Attack
 (c) Protection (d) Both (b) and (c)
6. The living organisms can be unexceptionally distinguished from the non-living things on the basis of their ability for [2007]
 (a) Responsiveness to touch
 (b) Interaction with the environment and progressive evolution
 (c) Reproduction
 (d) Growth and movement

7. The total number of species included in the animal kingdom are about [1992]
 (a) 1 million (b) 2 million
 (c) 10 million (d) 1 billion
8. Carbohydrates, the most abundant biomolecules on earth, are produced by [2005]
 (a) Some bacteria, algae and green plant cells
 (b) Fungi, algae and green plant cells
 (c) All bacteria, fungi and algae
 (d) Viruses, fungi and bacteria
9. Which one is wrongly matched [2018]
 (a) Unicellular organism - Chlorella
 (b) Gemma cups - Marchantia
 (c) Biflagellate zoospores - Brown algae
 (d) Uniflagellate gametes - Polysiphonia
10. ICBN stands for [2007]
 (a) International Council for Botanical Nature
 (b) International Code of Botanical Nomenclature
 (c) Indian Code of Botanical Nomenclature
 (d) None of the above
11. A group of plants with similar traits of any rank is [1990, 92, 96, 97; 2002]
 (a) Species (b) Genus
 (c) Order (d) Taxon
12. Which is a taxon [1992; 1998]
 (a) Genera (b) Family
 (c) Class (d) None of these
13. A system of classification in which a large number of traits are considered is [1999]
 (a) Artificial system (b) Synthetic system
 (c) Natural system (d) Phylogenetic system
14. Who proposed the Binomial Nomenclature System [1994]
 (a) Whittaker (b) Mendel
 (c) Carl Linnaeus (d) Tippo
15. Binomial nomenclature system of Linnaeus means that every organism has [1994]
 (a) One name given by two scientists
 (b) Two names one Latin and other of a person
 (c) Two names one scientific and other popular
 (d) One scientific name with generic and other with specific epithet
16. Linnaeus system of plant classification is [1989]
 (a) Artificial (b) Natural
 (c) Phylogenetic (d) None of the above
17. In five kingdom system, the main basis of classification is [2002]
 (a) Nutrition (b) Nucleus structure
 (c) Cell wall structure (d) Asexual reproduction
18. Which of the following is grouped under phanerogams [2000]
 (a) Pteridophytes (b) Gymnosperms
 (c) Angiosperms (d) Both (b) and (c)
19. Single-celled eukaryotes are included in [2010]
 (a) Monera (b) Protista
 (c) Fungi (d) Archaea
20. Most important criteria used for the present day classification of living organisms is based on [1991]
 (a) Presence and absence of notochord
 (b) Resemblances in external features
 (c) Breeding habits
 (d) Anatomical and physiological characteristics

21. The term 'New systematics' was introduced by [1988]
 (a) Adolf Engler (b) Karl prantl
 (c) George Bentham (d) Julian Huxley
22. In the five-kingdom classification, *Chlamydomonas* and *Chlorella* have been included in [2012]
 (a) Protista (b) Algae
 (c) Plantae (d) Monera
23. Which one of the following organisms is scientifically correctly named, correctly printed according to the International Rules of Nomenclature and correctly described [2012]
 (a) *Muscadomestica*- The common house lizard, a reptile
 (b) *Plasmodium falciparum* - A protozoan pathogen causing the most serious type of malaria
 (c) *Felistigris* - The Indian tiger, well protected in Gir forests
 (d) *E.coli*- Full name *Entamoeba coli*, a commonly occurring bacterium in human intestine
24. The term "phylum" in animal classification was coined by [1992]
 (a) E. Haeckel (b) John Ray
 (c) G.L. Cuvier (d) Carolus Linnaeus
25. Sequence of taxonomic categories is [1992]
 (a) Class – phylum – tribe – order – family – genus – species
 (b) Division – class – family – tribe – order – genus – species
 (c) Division – class – order – family – tribe – genus – species
 (d) Phylum – order – class – tribe – family – genus – species
26. Which one possess characters of both plants and animals [1995]
 Or
 A unicellular organism often considered connecting link between plants and animals is
 (a) Bacteria (b) *Mycoplasma*
 (c) *Paramecium* (d) *Euglena*
27. In the five kingdom system of classification, which single kingdom out of the following can include blue-green algae, nitrogen fixing bacteria and methanogenic archaeobacteria [1998]
 (a) Monera (b) Fungi
 (c) Plantae (d) Protista
28. Floral features are commonly used for identification of angiosperms because [1998]
 (a) Reproductive parts are more conservative
 (b) Flowers can be safely pressed
 (c) Flowers are nice to work with
 (d) Flowers have various colours and scents
29. Which of the following is less general in characters as compared to genus [2001]
 (a) Species (b) Family
 (c) Class (d) Division
30. Species are considered as [2003]
 (a) Real units of classification devised by taxonomists
 (b) Real basic units of classification
 (c) The lowest units of classification
 (d) Artificial concept of human mind which cannot be defined in absolute terms
31. Phenetic classification of organisms is based on [2004]
 (a) Dendrogram based on DNA characteristics
 (b) Sexual characteristics
 (c) Observable characteristics of existing organisms
 (d) The ancestral lineage of existing organisms
32. The common characteristics between tomato and potato will be maximum at the level of their [2013]
 (a) Family (b) Order
 (c) Division (d) Genus
33. Artificial system of classification was first used by [1989, 90]
 (a) Linnaeus (b) De Candolle
 (c) Theophrastus (d) Bentham and Hooker
34. Static concept of species was put forward by [1988]
 (a) De Candolle (b) Linnaeus
 (c) Theophrastus (d) Darwin
35. Which of the following statements regarding universal rules of nomenclature is wrong [2016]
 (a) The first word in a biological name represents the genus
 (b) The first word denoting the genus starts with a capital letter
 (c) Both the words in a biological name, when handwritten, are separately underlined
 (d) Biological names are generally in Greek and written in italics
 (e) The second component in a biological name denotes the specific epithet
36. Barophilic prokaryotes [2005]
 (a) Grow slowly in highly alkaline frozen lakes at high altitudes
 (b) Occur in water containing high concentrations of barium hydroxide
 (c) Grow and multiply in very deep marine sediments
 (d) Readily grow and divide in sea water enriched in any soluble salt of barium
37. Biosystematics aims at [2003]
 (a) Identification and arrangement of organisms on the basis of their cytological characteristics
 (b) The classification of organisms based on broad morphological characters
 (c) Delimiting various taxa of organisms and establishing their relationships
 (d) The classification of organisms based on their evolutionary history and establishing their phylogeny on the totality of various parameters from all fields of study
38. Which of the following are correctly matched with respect to their taxonomic classification [2013]
 (a) Spiny anteater, sea urchin, sea cucumber – Echinodermata
 (b) Flying fish, cuttlefish, silverfish – Pisces
 (c) Centipede, millipede, spider, scorpion – Insecta
 (d) Housefly, butterfly, tsetse fly, silverfish – Insecta

39. Which one of the following is not a correct statements

[2013]

- (a) Key is taxonomic aid for identification of specimens
- (b) Herbarium houses dried, pressed and preserved plant specimens
- (c) Botanical gardens have collection of living plants for reference
- (d) A museum has collection of photographs of plants and animals

40. Nomenclature is governed by certain universal rules. Which one of the following is contrary to the rules of nomenclature

[2016]

- (a) Biological names can be written in any language
- (b) The first word in a biological name represents the genus name, and the second is a specific epithet
- (c) The names are written in Latin and are italicized
- (d) When written by hand, the names are to be underlined

41. "Taxonomy without phylogeny is similar to bones without flesh" is the statement of

[1994]

- (a) Oswald Tippo
- (b) John Hutchinson
- (c) Takhtajan
- (d) Bentham and Hooker

42. Match the items given in Column I with those in Column II and select the correct option given below

Column I

Column II

- | | | |
|---------------|-------|--|
| (1) Herbarium | (i) | It is a place having a collection of preserved plants and animals |
| (2) Key | (ii) | A list that enumerates methodically all the species found in an area with brief description aiding identification |
| (3) Museum | (iii) | Is a place where dried and pressed plant specimens mounted on sheets are kept |
| (4) Catalogue | (iv) | A booklet containing a list of characters and their alternates which are helpful in identification of various taxa |

[2018]

(1) (2) (3) (4)

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

5. AIIMS

1. The scientist who created the group Protista for both unicellular plants and animals is

[1993]

- (a) Haeckel
- (b) Pasteur
- (c) Lister
- (d) Koch

2. A person who studies about the origin, evolution and variations in plants and also about the classification of plants, is called as

[1992]

- (a) Classical taxonomist
- (b) Herbal taxonomist
- (c) α -taxonomist
- (d) β -taxonomist

3. First act in taxonomy is

[1990]

- (a) Description
- (b) Identification
- (c) Naming
- (d) Classification

4. Specimen used for original publication by the author is

[1996]

- (a) Holotype
- (b) Isotype
- (c) Syntype
- (d) Lactotype

6. Assertion & Reason

Read the assertion and reason carefully to mark the correct option out of the options given below :

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

1. Assertion : Whittaker's classification for algae is not acceptable.

Reason : Whittaker grouped algae in different kingdoms.

2. Assertion : Acaraniatia is a group of organisms which do not have distinct cranium.

Reason : It includes small marine forms without head.

3. Assertion : Living organisms possess specific individuality with the definite shape and size.

Reason : Both living and non living entities resemble each other at the lower level of organization.

4. Assertion : Systematics is the branch of biology that deals with classification of living organisms.

Reason : The aim of classification is to group the organisms.

5. Assertion : To give scientific name to plant, there is ICBN.

Reason : It uses articles, photographs and recommendations to name a plant.

6. Assertion : The hierarchy includes seven obligate categories.

Reason : Intermediate categories are used to make taxonomic positions more informative.

7. Assertion : Bacteria, Protista do not have circulatory system.

Reason : These organisms live in moist and watery environment.