



THE LIVING WORLD

Contents

Topic	Page No.
Exercise	
The Living World	01 - 06
Notes	07 - 07
Plant Taxonomy	08 - 08
Nomen Clature (Binomial)	10 - 10
Tri-Nomial Nomenclature	11 - 11
Type-Specimen (Herbarium Shut)	12 - 12
Taxonomic Hierarchy	13 - 13
Taxon	14 - 14
Species Concept	15 - 16
Taxonomical Aids	

Syllabus

THE LIVING WORLD

Plant Taxonomy, Nomen Clature (Binomial), Tri-Nomial Nomenclature, Type-Specimen (Herbarium Shut), Taxonomic Hierarchy, Taxon, Species Concept, Taxonomical Aids

Name : _____ Contact No. _____

ETOOSINDIA.COM

India's No.1 Online Coaching for JEE Main & Advanced

“3rd Floor, H.No.50 Rajeev Gandhi Nagar, Kota, Rajasthan, 324005

HelpDesk : 92-14-233303

Topic 1 THE LIVING WORLD

LEVEL - I

1. Basis of life is C secrate of life.
(A) Lipid (B) Protein (C) Nuclic acid (D) Nucleoprotein
2. Binomial nomenclature given by.
(A) Linnaeus (B) Darwin (C) Lamarck (D) Hackel
3. ICBN shows
(A) International council for Batonical nomenclature
(B) Internation code of botanical nomenclature
(C) Indian code of botanical nomenclature
(D) None of these
4. Listing of flora based on -
(A) Practical classification (B) Artificial classification
(C) Emperical classification (D) Natural classification
5. Economical importance based classification -
(A) Artificial (B) Practical (C) Natural (D) Numerical
6. Plant classification based on alphabetical order -
(A) Rational (B) Emperical (C) Numerical (D) 1 & 2
7. Phylogenic term given by -
(A) Lamarck (B) Linnaeus (C) Darwin (D) Haeckel
8. Phylogemic concept given by -
(A) Linnaeus (B) Hackel (C) Lamarck (D) Darwin
9. Taxonomic catagones number is -
(A) 6 (B) 7 (C) 5 (D) 8
10. Taxonomic name for plant given by -
(A) H. J. Lan (B) Adolf Mayer (C) Lan & Mayer (D) Hooker
11. Suffix-Phytina use for -
(A) Class (B) Division (C) Sub division (D) Family
12. Species concept given by -
(A) Mayer (B) Lamarck (C) Linnaeus (D) John ray

13. Smallest Taxonomic graph is -
 (A) Geuus (B) Species (C) Tribe (D) Division
14. Taxonomic tools whice based on centrasing charaetristics -
 (A) Key (B) Herbaria (C) Botanical garden (D)
15. Taxonomy related with -
 (A) Plant taxonomy (B) A affinities
 (C) Plant nomenclature (D) All of above
16. Duplicate of holotype is -
 (A) Isotype (B) Syntype (C) Neotype (D) Paratype
17. Standard size of harabarium swet -
 (A) 11.5"-17.5" (B) 10.5"-16.5" (C) 11.5"-16.5" (D) 11.5"-18.5"
18. Binomen elature based book is -
 (A) species plantarum (B) Genera plantanim
 (C) Pinax Theatre botanica (D) 1 and 3
19. Correct name is -
 (A) Mangitera mangitera (B) Naza Naza
 (C) Isoetes Isoetes (D) Naza naza
20. Which option mismatch -
 (A) species (B) class (C) Phylum (D) Glumawe

Answer Key

- | | | | | | |
|-------|-------|-------|-------|-------|-------|
| 1. C | 2. A | 3. B | 4. C | 5. B | 6. B |
| 7. A | 8. B | 9. B | 10. A | 11. C | 12. D |
| 13. B | 14. A | 15. D | 16. A | 17. C | 18. D |
| 19. D | 20. D | | | | |

LEVEL - II

1. Term new systematics given by -
(A) Huxley (B) Linnaeus (C) Bentham (D) Huchinsan
2. Most approved concept for species -
(A) Static concept (B) Biological concept (C) Genetical concept (D) Typological concept
3. First step of Taxonomy -
(A) Identification (B) Nomenclature (C) Taxonomy (D) Affinities
4. When we lost Holotype, see on holotype from original plant is known as -
(A) Lectotype (B) Neotype (C) Paratype (D) Syntype
5. Species belong to different geographical areas is known as -
(A) Allochronic (B) Siblings (C) Allopatric (D) Siblings
6. Correct name is -
(A) Solanum tuberosum (B) Solanum Tuberosum
(C) Solanum tuberosum Linn. (D) All the above
7. Morphologically same but reproductively isolated species are known as -
(A) Sibling (B) Microspecies (C) Sympatric (D) Allochronic
8. Cauliflower cabbage & knob-knob are -
(A) Ecotypes (B) Ecotype (C) Biotype (D) All of these
9. Species are continuously changeable according to -
(A) Static concept (B) Biological concept (C) Dynamic concept (D) Typological concept
10. Development in systematic order is known as -
(A) Phylogeny (B) Genology (C) Phenology (D) All of above
11. Taxonomy based on morphology, origin & development -
(A) α -taxonomy (B) β -taxonomy (C) Omega taxonomy (D) cytology
12. Enquiry into plants books written by -
(A) Thophrastus (B) Linnaeus (C) Aristotle (D) Hooker
13. Linnaeus book not -
(A) Systema nature (B) Genera plantarum
(C) Species plantarum (D) Historia plantarum
14. Theories elementaire de la Botanique written by -
(A) Linnaeus (B) Bentham (C) A.P De Candolle (D) Theophrastus

15. 'Cohort' use for -
 (A) Species related graph (B) upper position
 (C) Between species & order graph (D) All the above
16. Taxon given in following -
 (A) Genus (B) Family (C) Genus (D) None of above
17. Linnaeus plant classification is -
 (A) Artificial (B) Natural (C) Phylogenetic (D) None
18. Plant phylogenetic classification given by -
 (A) Linnaeus (B) Huchinsan (C) Menta (D) Hooker
19. Binomial nomenclature based on -
 (A) First name genus and species
 (B) Genus first letter in capital & small letter in species
 (C) Variety name given after species name
 (D) All of above
20. Brinjal, potato, Ginger related -
 (A) Chemical composition of cytoplasm (B) Cell organelles
 (C) cytochrome (D) Cell shape & size

Answer Key

- | | | | | | |
|-------|-------|-------|-------|-------|-------|
| 1. A | 2. D | 3. A | 4. A | 5. C | 6. C |
| 7. A | 8. C | 9. C | 10. B | 11. A | 12. A |
| 13. D | 14. C | 15. D | 16. D | 17. A | 18. B |
| 19. D | 20. C | | | | |

LEVEL - III

1. Smallest taxon is -
(A) Class (B) Order (C) Genue (D) Species
2. Taxon is -
(A) Group of same species
(B) Texonomical hieraracly any series
(C) group of same genus
(D) Name of above
3. Taxonomy natural system based on -
(A) Morphology (B) Phylogeny (C) Morphology & Affinities (D) Ontogany
4. Nicotiana is a -
(A) Variety (B)Subspecies (C) Species (D) Geneus
5. Cohort related group of -
(A) Species (B) Gevra (C) Family (D) Order
6. Word 'cladistics' of plant taxonomy related with -
(A) Phylogenic classification (B) Artificial classification
(C) Natural classification (D) Sexual classification
7. Specific properties of plant which absent in animals -
(A) Metal bolism (B) Sexual reproduction (C) Autotropny (D) Asexual reproduction
8. Binomial classification of plant effective from -
(A) 1-8-1758 (B) 1-5-1753 (C) 1-8-1736 (D) 1-5-1758
9. Selecty correct option -
(A) Apsi indica (B) Trypasoma (C) Ficus Bengalensis (D) Mangifera indica
10. Organnism with highest number -
(A) Genus (B) Family (C) Phylam (D) Class
11. Two similar holotype know as -
(A) mesotype (B) Meotype (C) Syntype (D) Isotype
12. Systema naturae written by -
(A) Lamarck (B) Aristotle (C) Linnaeus (D) Hacale
13. 'Biological Nomenclature' interanatical apply for -
(A) Plants (B) Animal (C) Both plant & Animal (D) None of the above

14. Animal classification related term phylum given by -
 (A) Haukel (B) John ray (C) Quiver (D) Linnaeus
15. 'Systematics' derved from -
 (A) Greek word (B) Latin word (C) Both (D) none
16. Polytypic species related with -
 (A) Biotype (B) Ecotype (C) Ecades (A) All
17. All living related with mostly -
 (A) Ecades (B) Biotype (C) Ecotypes (D) Linnean species
18. Select correct order of Taxonomic categories
 (A) Class - Genus - class - order - division
 (B) Species - Genus - class - order - division
 (C) Division - order - class - species - Geneus
 (D) Division - class - order - family - geneus - species
19. 'Theory of special cration' given by -
 (A) Linnaeus (B) Joyn ray (C) Lamarck (D) Aristotle
20. Morphological same but reproductively isolated species is -
 (A) Sibling (B) Sympatiric (C) Allopatric (D) Microspecies

Answer Key

- | | | | | | |
|-------|-------|-------|-------|-------|-------|
| 1. D | 2. B | 3. C | 4. D | 5. C | 6. A |
| 7. C | 8. B | 9. D | 10. C | 11. D | 12. C |
| 13. C | 14. C | 15. A | 16. D | 17. A | 18. D |
| 19. A | 20. A | | | | |

PLANT TAXONOMY

PLANT TAXONOMY :

The word was proposed by **A.P. de Candolle** in his book "**Theories elementaire de la botanique**" (Theory of elementary botany)

Taxonomy includes study of following 4 points

- (1) **Identification** - Identification of living organism
- (2) **Nomenclature** - Nomenclature of living organism
- (3) **Classification** - Classification of living organism in groups
- (4) **Affinities** - Study of inter relationship between living organism

Systematics :- (Branch related with taxonomy)

- (1) The term "**Systematics**" was proposed by **Linnaeus**
- (2) It includes description of morphological character of plants or living organism.
e.g. Morphological character of Root, Stem, Leaves, Flowers
- (3) This description is used to know inter relationship between living organism.

New systematics or Neo systematics or Biosystematics :-

- (1) **Neo - systematics** - A new branch - Name given by **J. Huxley**
- (2) It includes description of all the characters including morphological characters of plants or living organism.
e.g. Anatomical character, Histological characters
Embryological characters, Cytological characters
- (3) It is used to know the inter relationship between living organism,

Significance of taxonomy :-

- (1) With the help of taxonomy diversity of living being can be studied easily.
- (2) At present, 300 lakh (30 million) type of living organism are found on our earth.
- (3) 17 lakh (1.7 million) type of living organism have been discovered still now. Out of them 12 lakh are animal and 5 lakh type are plant.
- (4) Maximum diversity of living beings are found in tropical rain forest.
 - ☛ These forest have heavy rain fall whole year.
 - ☛ In India maximum tropical rain forest are found in Andaman & Nicobar and in all eastern states of India (Assam, Meghalaya, West Bengal etc.)
 - ☛ In India maximum tropical rain forest are present (Tropical country)
- (5) After tropical rain forest the second maximum diversity is found in **coral reefs** (oceans)

Note :- The no. of living beings that have extincted are 50-100 times that of the living beings. Scientists discover near about 15000 type of living organism every year.

Practical significance of taxonomy :-

Practical significance of taxonomy is → **Identification**

Identification is aimed at finding the correct name and the proper position of an organism in the already established plan of classification. This is done by examining its morphological (external) and anatomical (internal) characters. Identification is accomplished with the help of **biological keys**. Use of a biological key is given later in this chapter.

NOMEN CLATURE (BINOMIAL)

BINOMIAL SYSTEM :

- (1) Binomial system first proposed by Gaspard Bauhin in his book - "**Pinax Theatree Botanica**"
- (2) **Carolus Linnaeus** :- Linnaeus used this nomenclature system firstly on large scale and proposed scientific name of all the plants and animals.
 - Linnaeus is founder of binomial system.
 - Linnaeus proposed scientific name of plants in his book "**Species Plantarum**". It was published on **1 May 1753**. So 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 name of animals in his book "**Systema Naturae**" (10th edition.)
 - The 10th edition of **Systema naturae** was first published on **1 August 1758**. So initiation of binomial system for animals is beleived to be starts on 1 Aug. 1758.

Principle of Priority :-

The nomenclature is done by principle of priority. If the two names are proposed for any plant after the 1753, the valid name is the earlier name proposed just after 1 may 1753.

ICBN :- "International code for botanical Nomenclature"

ICBN - Book of Rules of Nomenclature

- (1) Collection of rules regarding scientific - nomenclature of plants is known as ICBN.
- (2) ICBN was firstly proposed by -
Sprague, Hitchcock, Green (1930)
- (3) ICBN was first accepted in **1961**.
- (4) 12th international congress, Leningrad revised ICBN in 1975.
- (5) After revision it was republished in **1978**. So that ICBN published two times
(1) 1961 (2) 1978

Main rules of ICBN :-

- (1) According to binomial system name of any species consists of two names -
 - (i) Generic name - Name of genus
 - (ii) Specific name - Trivial name

e.g. **Solanum tuberosum** (Potato) **Mangifera indica** (Mango)

↓ ↓

Generic name specific name

↓ ↓

Generic name Specific name
- (2) Generic names of different genus should not be same in any one kingdom.

e.g. Potato can not be named as **Mangifera**

However they can be repeated in different kingdoms,

e.g. **Bougainvillea** - It is name of a plant and also it is name of an animal
- (3) Specific name can be repeated on one kingdom.

e.g. **Saraca indica, Mangifera indica**
- (4) In plant nomenclature (ICBN) tautonyms are not valid i.e. generic name and specific name should not be same in plants.

e.g. **Mangifera mangifera**

But tautonyms are valid in animal nomenclature (ICZN) - International Code for Zoological Nomenclature)

e.g. **Naja naja** (Indian cobra), **Rattus rattus** (Rat)

- (5) Length of generic name or specific name not be less than 3 letters and not more than 12 letters.
e.g. *Mangifera indica*
Exception :- *Riccia pathankotensis* - More than 12 letters
According to ICBN this name is not valid but this name was proposed before 1961, so it is valid.
- (6) First letter of generic name should be in capital letter and first letter of specific name should be small letter.
e.g. *Mangifera indica*
But if specific name is based on the name of some person, its first letter will be in capital letter.
e.g. *Chaetomium Subramaniella*
- (7) When written with free hand or typed, then generic name and specific name should be separately underlined.
But during printing name should be italicized.
- (8) Name of scientist (who proposed nomenclature) should be written in short after the specific name
e.g. *Mangifera indica* Lin.
- (9) Name of scientist proposed wrong name then his name should be written in bracket and the scientist who corrects the name will be written after the brackets.
e.g. *Tsuga canadensis* (Lin.) Salisbury
Note : Linnaeus named this plant as ***Pinus canadensis***
- (11) Scientific names should be derived from latin or greek language because they are dead language.
- (12) Type specimen (Herbarium Sheet) of newly discovered plant should be placed in herbarium (Dry garden).

Binomial Nomenclature :-

Common names of any organism are always problematic since, many species have more than one common name and a common name can describe more than one species. When writing a scientific documents, it is the convention to use binomial nomenclature. Carolous Linnaeus (1758) introduced a shorthand designation, binomial (binomial two name) nomenclature for each organism, in which the first name indicates genus while second name indicates species. Genus always starts with capital letter while species with small latter and written in italics. For example, red alder, *Alnus rubra*; *Alnus* is the genus and *rubra* is the specific epithet. There are many species in the genus *Alnus* but only one *Alnus rubra*. A species may be further described according to sub-species or variety. For example Ponderosa pine, *Pinus ponderosa* var *ponderosa* or lodgepole pine, *Pinus contorta* sub-sp. *latifolia*. A sub-species is a morphologically distinct, often geographically separate population of a species. A variety is also a morphologically different population which may be associated with a geographic region or particular site conditions but less distinct than a sub-species. The species name should always be used in conjunction with common names so that anyone reading the document can know exactly which species you are referencing.

TRI-NOMIAL NOMENCLATURE

TRINOMIAL SYSTEM :

- (1) Proposed by **Huxely** and **Stricklandt**.
- (2) According to this system name of any plant of species is composed of three names :-
 - (i) Generic name
 - (ii) Specific name
 - (iii) Subspecific name (Name of variety)
- (3) When members of any species have large variations than trinomial system is used. On the basis of dissimilarities this species is classified into sub species :-
e.g. **Brassica oleracea** var. **botrytis** (Cauliflower)
Brassica oleracea var. **capitata** (Cabbage)
Brassica oleracea var. **caulorapa** (Knol-Khol)

Trinomial Nomenclature

Sometimes three words are also used for naming the organism, especially the animals. These include generic, specific and sub-specific parts. For example, modern man is called *Homo sapiens sapiens* and Gorilla as *Gorilla gorilla gorilla*.

Edujournal.in

TYPE SPECIMEN (HERBARIUM SHUT)

TYPE SPECIMEN (HERBARIUM SHEET) ARE OF DIFFERENT TYPE

Holotype	-	Herbarium sheet on which the first description of plant is based.
Lectotype	-	In case the holotype is lost, second herbarium sheet prepared from the original plant is called lectotype.
Neotype	-	In case the holotype and original plant is lost, then herbarium sheet prepared from some other plant of same species is called neotype.
Syntype	-	In case the holotype and original plant is lost then many herbarium sheet prepared from many plants of same species is called syntype.
Isotype	-	Duplicate of holotype - In presence of holotype a second herbarium sheet prepared from the original plant is called isotype.
Pratype	-	Nomenclature is invalid in absence of type specimen.

Types of specimen

Holotype	Nomenclature type
Isotype	Duplicate of holotype
Paratype	Any other specimen described along with holotype
Syntype	Any one of the two or more specimens cited by author, when there is no holotype
Lectotype	Specimen selected from original material to serve as nomenclature type, where there is no holotype
Neotype	New nomenclatural type, when the original material is missing.
Topotype	A specimen collected from the same locality from which the holotype was originally collected.

TAXONOMIC HIERARCHY

TAXONOMIC HIERARCHY

Descending order / arrangement of taxonomic categories is known as hierarchy

There are 7 main categories

1. Kingdom - Largest unit
2. Division / phylum
3. Class
4. Order
5. Family
6. Genus
7. Species - Smallest / basic unit

		Human	Housefly	Mango	Wheat
1	Kingdom	Animalia	Animalia	Plantae	Plantae
2	Division/phylum	Chordata	Arthropoda	Angiospermae	Angiospermae
3	Class	Mammalia	Insecta	Dicotyledoneae	Monocotyledonae
4	Order	Primata	Diptera	Sapindales	Poales
5	Family	Hominidae	Muscidae	Anacardiaceae	Poaceae
6	Genus	Homo	Musca	Mangifera	Triticum
7	Species	Sapiens	Domestica	Indica	Aestivum

Taxonomic Hierarchy

It is the grouping of the species into higher categories on the basis of their similarities and dissimilarities, complexity and simplicity and hence, evolutionary relationships.

Species

It is the basic unit of classification. It is a group of individuals which are alike morphological and reproductive characters so that they are able to interbreed freely and produce fertile offspring.

Genus

A group of species having common characteristics is called genus. It is first higher category above the species level.

Order

A group of families which share a number of common characteristics. The family-Felidae (Lion, leopard, tiger, cats) and Canidae (Dog, wolf, fox) are included in the same order Carnivora.

Class

A group of related orders is class. For example, all the insects are included in class-Insecta. They are characterized by the presence of three pairs of jointed legs and trachea. Similarly, members of class-Aves (birds) are characterized by the presence of feathers which are modified forelimbs.

Phylum

Classes having at least a few characters in common, collectively constitute a phylum. For example, Nereis, Pheretima and Hirudinaria belong to different classes but have been grouped in a single phylum-Annelida.

Kingdom

It is the highest category in taxonomic system and includes phyla (or Divisions in plants) which are related at least in one character. Linnaeus system of classification includes only two kingdoms-Animalia and Plantae. But Whittaker's system of classification includes five kingdoms-Monera, Protista, Fungi, Plantae and Animalia.

TAXON

TAXON

Taxon is a unit of classification which may represent any level of grouping of organisms. The term was introduced by ICBN (International Code of Botanical Nomenclature) during 1956. Mayr (1964) has defined taxon to be a taxonomic group of any rank that is sufficiently distinct to be worthy of being assigned to a definite category. Simpson (1961) recognizes taxon to be a group of real organisms recognized as a formal unit at any level of hierarchical classification.

Taxon - Plant or animal groups included in categories are called as taxon.

Mayer - First proposes the term taxon for animal

H.S. Lan First proposes the term taxon for plants

Suffix for taxon

- | | | | |
|----|----------|---|-----------------------|
| 1. | Kingdom | - | x |
| 2. | Division | - | phyta |
| 3. | Class | - | opsida / phyceae / ae |
| 4. | Order | - | ales |
| 5. | Family | - | aceae |
| 6. | Genus | - | x |
| 7. | Species | - | x |

Species - smallest taxonomic categories

SPECIES CONCEPT

SPECIES CONCEPTS

Species is the fundamental or smallest unit of classification. The term species was recognized from genus by **John Ray**. **Ernst Mayr** defined species as. A group of potentially inter-breeding natural populations of closely resembling organisms. **Carlous Linnaeus** proposed **static concept of species** or **morphological concept** of species. He considered species as a **fixed and iminutable** entity.

1. **Dynamic concept of species** was proposed by **Lamarck**, who considered species as a **mutable** and **dynamic** entity.
2. **Biological concept of species** was proposed by **Ernst Mayr**. According to this concept, a species is a group of individuals who resemble each other in morphological, physiological biochemical and behavioural characters and capable in interbreeding.
3. **Morphospecies** are the species erected on the basis of morphological characters only.
4. **Taxonomic species** are the species having a binomial name.
5. **Sibling species** are true species which do not interbreed but are otherwise difficult to separate on the basis of morphological characters alone.
6. **Allopatric species** Two or more species which are inhabitive different area or geographical condition.
7. **Sympatric species** are species having overlapping areas of geographical distribution.
8. **Parapatric species** are species with adjacent geographic ranges meeting in a very narrow zone of overlap.
9. **Neontological species** are living species.
10. **Allochronic species** are species belonging to different time periods.
11. **Polytypic species** are species, which have more than one ideal types according to their geographical isolated areas.
12. **Linnaean species** is a taxonomic species distinguished on morphological grounds.
13. **Biospecies** is a species erected on the basis of reproductive and genetic isolation of a natural population.
14. **Macrospecies** is a large polymorphic species with several sub-divisions.
15. **Microspecies** or **Jordan's species** is a true breeding genetic unit below the rank of species.
16. **Agamospecies** is a species reproducing only asexually, e.g., Euglena and Amoeba.
17. **Gamospecies** are sexually reproducing species.
18. **Palaeospecies** are species know from fossils only.
19. **Monotypic species** are species without differentiation of sub-species or varieties.
20. **Keystone species** is a species that plays a key role or central role in the ecology of a place.
21. Mule, Hinny, Tigon and Linger are **exception** to **biological species concept**. **Mule** is the offspring of male donkey and female horse and **hinny** is the offspring of female donkey and male horse. Both Mule and Hinny are sterile. **Tigon** is the offspring of male tiger and female lion and **linger** is of female tiger and male lion. Both tigon and linger are fertile.
22. **Synchronic species** are species belonging to a same period or time.

TAXONOMICAL AIDS

TAXONOMICAL AIDS

Taxonomical aids are techniques and produces to store information as well as specimen or identification and classification of organism -

All the information is used in classification of an organism

Important Taxonomical Aids

- | | | |
|--------------------|------------------------|------------|
| 1. Herbarium | 2. Botanical gardens | 3. Museums |
| 4. Zoological park | 5. Key | 6. Hora |
| 7. Manograph | 8. Mammals & catalogus | |

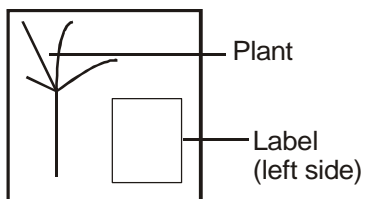
(A) Herbarium

- (i) Herbarium is a store house of collected plant specimen's that are dried, lonessed & pressened an sheets.
- (ii) Standard size of herbarium shut is 11.5 × 16.5"

Uses of herbaria

- (i) used for identification of plant
- (ii) Help in knowing the morphological variations Found in species
- (iii) Herbaria useful for research in plant taxonomy
- (iv) useful for locating wild varietes

(III) = Form of harbarium shut



- (i) Collecting date
- (ii) Collecting place
- (iii) English name
- (iv) Local & scientific name
- (v) Family of plant
- (vi) Name of collecting reason

Botanical garden

- (i) Living plant collecting in botanical garden
- (ii) Plant species identify in B.G.
- (iii) Tegging a label with plant label given information name of family & plant botanical name
- (iv) Important botanical garden

- (A) Royal botanical garden - kew (london)
- (B) Indian botanical garden - Hawra (India)
- (C) National botanical research institute - Lucknow (India)

Museums

- (i) Museums is place for collections of preserved plants and animals specimen for study
- (ii) Universities & educational institute manage their museums
- (iii) Dead organism are placed in museum

Zoological park

- (i) Wild living animal must be placed.
- (ii) Zoological parks provide natural habitat to the animal
- (iii) 200 zoological park in india
- (iv) The zoos are managed by the central zoo authority of india

Key

- (i) Key is also a taxonomical aid used for identification of plants & animal based on the similarities & dissimilarities.
- (ii) Key helps identification of plant & animal by selecting & eliminating the characters according to their presence or absence in the organism under study
- (iii) The keys are generally use two contrasting characters
- (iv) One contrasting character accepted other contrasting character rejected.

Edujournal.in