

Question Bank

- Q1/ Illustrate the role of plants in the earth changing.
- Q2/ Write about the plant importance to humans.
- Q3/ How you can classify any plant?
- Q4/ Illustrate the meaning of the taxon and rank by an example.
- Q5/ What are the characters that use in plant taxonomy?
- Q6/ Who is the Father of Botany? What do you know about his works?
- Q7/ Who is the Father of Plant Taxonomy? What are the names of his important books? Mention the first half of his system of classification.
- Q8/ Who is the Father of Plant Taxonomy? What are the names of his important books? Mention the second half of his system of classification.
- Q9/ What is the sexual system in plant classification? Who devised it? In this system, mention the states that depend on stamen numbers only.
- Q10/ Do Bryophytes have roots? For any stage of plant they belong, compare them with Phanerophytes.
- Q11/ What is the fate of a bud? Reinforce your answer by a figure.
- Q12/ Write about the plant habitat.
- Q13/ Do Mosses have leaves? For any stage of plant they belong, compare them with flowering plants.
- Q14/ What is the origin of stem? Reinforce your answer by a figure.
- Q15/ What are rootstocks? Define and draw their types.
- Q16/ Define the following: Botany, Leaf primordia, Cone, Vine, Primary roots, Aerial roots, Pneumatophores, Bulbils, Caudiciform stem, Thorn.
- Q17/ Define the following: Plant Systematics, Heterosporous plants, Flower, Geophytes, Tree, Adventitious roots, Contractile roots, Bud primordium, Bulbels, Pachycaul.
- Q18/ Define the following: Plant Taxonomy, Fruit, Shrub, Tap root system, Haustoria, Cormels, Cladode, Spine, Pseudobulb, Tendril.

Q19/ Define the following: Buds, Herb, Subshrub, Prop roots, Areole.

Q20/ Write about the following: Description, Dioscorides, Stolon, sympodial stem.

Q21/ Write about the following: Identification, Brunfels, Reproductive stems, acaulescent plant.

Q22/ Write about the following: Nomenclature, Bauhin, John Ray, Short shoots.

Q23/ Write about the following: Cesalpino, monopodial stem.

Q24/ Draw the bud types of a stem?

Q25/ Draw the scar types on a woody, deciduous twig?

Q26/ Define: ocrea, ligule, epicalyx bract, phyllary, glochidium, Tentacular leaves, indeterminate shoot

Q27/ Define: Stipels, Pulvinus, paleae, spathe, Pitcher leaf, Trap leaves, determinate shoot

Q28/ Compare between Lycophylls and Euphylls

Q29/ Compare between plant taxonomy and systematics. Which of them is more acceptable? Why

Q30/ What is the meaning of DINC. In any case we can use N?

Q31/ What do you know about dichotomous key, give an example.

Q32/ Which plant organs have an important role in separation the plant species? Why

Q33/ What do we mean by sporophyte and gametophyte? Compare between Bryophytes and Phanerophytes.

Q34/ What do we mean by vine? Compare it with liana.

Q35/ Where are thorn and prickle found, what is the different between them?

Q36/ Compare between bulb and pseudobulb.

Q37/ Give an example (scientific name) for the following terms: tree, shrub, herb, annual plant, perennial plant, perfect plant, imperfect plant, monocot plant, dicot plant, Monandria, Diandria, Triandria, Pentandria,

Icosandria, Polyandria, Didynamia, Tetradynamia, Monadelphia,
Diadelphia, Polyadelphia, Syngenesia, Gynandria, Monoecia, Dioecia,
Polygamia. Q38a/

Fill the following blanks:

- 1- Plants included those organisms that possess photosynthesis, cell walls, spores.
- 2- As a critical mass of oxygen accumulated in the atmosphere, selection for oxygen dependent respiration occurred.
- 3- An oxygen-rich atmosphere permitted the establishment of an upper atmosphere ozone layer.
- 4- The compounds that photosynthetic species produce are utilized, directly or indirectly, by non-photosynthetic, heterotrophic organisms.
- 5- Land plants make up the so-called primary producers in the food chain.
- 6- The survival of plants is essential to maintaining the health of ecosystems.
- 7- We utilize all plant parts as food products: roots, e.g. carrots; stems, e.g. potatoes; leaves, e.g. cabbage, (celery, lettuce).
- 8- We utilize all plant parts as food products: flowers e.g. broccoli
- 9- We utilize all plant parts as food products: grains such as rice, wheat (corn, barley, and oats); legumes such as beans and peas, and fruits such as bananas, tomatoes (peppers, pineapples, apples, cherries, peaches, melons, citrus, olives)
- 10- Plants that are used as savoring agents, such as herbs and spices, as stimulating beverages, such as chocolate, coffee (tea)
- 11- Woody trees of both conifers and flowering plants are used structurally for lumber and for pulp products such as paper.
- 12- In tropical regions, bamboos, palms, serve in the construction of human dwellings.
- 13- Agriculture and horticulture deal with improving the yield or disease

resistance of food crops or cultivated ornamental plants.

14- Forestry is concerned with the cultivation and harvesting of trees used for lumber and pulp.

15- Pharmacognosy deals with crude natural drugs, often of plant origin.

16- Plant anatomy dealing with cell and tissue structure and development.

17- Plant chemistry and physiology, dealing with biochemical and biophysical processes and products.

18- Plant molecular biology, dealing with the structure and function of genetic material.

19- Plant ecology, dealing with interactions of plants with their environment.

20- Plant science is the study of plants, treated as equivalent to land plants.

21a- Botany is the study of most organisms traditionally treated as plants, including virtually all eukaryotic photosynthetic organisms

21b- Systematics is defined as a science that includes and encompasses traditional taxonomy, the description, identification, nomenclature, and classification of organisms and that has as its primary goal the reconstruction of phylogeny, or evolutionary history of life.

21c- Systematics is founded in the principles of evolution, its major premise being that there is one phylogeny of life. The goal of systematists is, to discover that phylogeny.

22- Taxonomy is a major part of systematics that includes four components: Description, Identification, Nomenclature, and Classification.

23- The general subjects of study are taxa (singular, taxon), which are defined as groups of organisms.

24- Ideally, taxa should have a property known as monophyly.

25- Description is the assignment of features or attributes to a taxon.

26- The features are called characters. Two or more forms of a character are character states.

27- Identification is the process of associating an unknown taxon with a known one, or recognizing that the unknown is new to science.

28- Plant taxa can be identified in many ways; a taxonomic key is perhaps the most utilized of identification devices.

29- Of the different types of taxonomic keys, the most common, used in all Floras, is a dichotomous key.

30- A dichotomous key consists of a series of two contrasting statements, each statement is a lead; the pair of leads constitutes a couplet.

31- Nomenclature is the formal naming of taxa according to some standardized system.

32- For plants, algae, and fungi, the rules and regulations for the naming of taxa are provided by the International Code of Botanical Nomenclature.

33- The fundamental principle of nomenclature is that all taxa may bear only one scientific name.

34- The scientific name of a species traditionally consists of two parts, the genus name plus the specific epithet.

35- Species names are known as binomials and this type of nomenclature is called binomial nomenclature, first formalized in the mid-18th century by Carolus Linnaeus.

36- Taxonomists have traditionally agreed upon a method for classifying organisms that utilizes categories called ranks, these taxonomic ranks are hierarchical.

37- Phenetic classification is that based on overall similarities.

38- Phylogenetic classification is that which is based on evolutionary history, or pattern of descent.

39- One of the aspects of systematics is that it may utilize data from all fields of biology: morphology, anatomy, embryology. (ecology, geography, chemistry, physiology, genetics, and molecular biology).

40- The Cytotaxonomy and Chemotaxonomy locate under cell structure; involve qualitative and quantitative structure of cell sap components and the different parts of living and non-living of the cell.

41-

Arrangement, Types and Morphology of Cells, all these characters locate under plant anatomy.

42- The different shapes, colors and dimensions of stems and leaves, flowers positions, all these characters locate under Gross Morphology.

43- The study of external features of seeds and pollen grains locate under micro-morphology.

44- Theophrastus was a student of Aristotle and known as the Father of Botany. He classified all the plants to trees, shrubs, undershrubs, and herbs, and distinguished between annual, biennial, perennial duration.

45- Pliny was a scientist from Italy, he classified the tree plant to forest, fruit, and un-familiar trees.

46- From the plant names which was used by Dioscorides and still use nowadays: *Aloe*, *Anemone* (*Phaseolus*, *Aristolochia*).

47- Otto Brunfels Born in Germany, his book Herbarium considered as a beginning of modern plant taxonomy. He was the first person who recognized the perfecti and imperfecti plants based on the presence and absence of flowers respectively.

48- Andrea Cesalpino was an Italian scientist. He classified the plant in to woody and herbaceous plants.

49- For the first time, Casper Bauhin used the binomial nomenclature (although he didn't use it inclusively).

50- John Ray was an English scientist, he divided plants as the following:

- 1- Herbae: (herbs) A- Imperfectae: Algae, Fungi, Bryopsida, Pteridophyta
 B- Perfectae: a -Monocotyledonae b- Dicotyledonae
- 2- Arborae: (trees and shrubs): a -Monocotyledonae b- Dicotyledonae
- 51- Carolus Linnaeus was a Sweden scientist, considered by the others as the father of plant taxonomy. Two of his books have been regarded from the very important books in this field, the first one called *Genera Plantarum*, the second book called *Species Plantarum*.
- 52- Monandria means stamens one. *Lemna, Scirpus*; Diandria. means Stamens two. *Veronica, Salvia*
- 53- Triandria. means Stamens three. *Iris, Sisyrinchium*; Tetrandria. means Stamens four. *Mentha, Ulmus, Cornus*
54. Pentandria. means Stamens five. *Primula, Myosotis*; Hexandria. means Stamens six. *Rumex, Alisma, Berberis*
- 55- Heptandria. means Stamens seven. *Aesculus*; Octandria. means Stamens eight. *Fagopyrum*
- 56- Enneandria. means Stamens nine. *Rheum, Ranunculus*; Decandria. means Stamens ten. *Acer, Kalmia*
- 57- Dodecandria. means Stamens 11-19. *Euphorbia, Calla*
- 58- Icosandria. means Stamens twenty or more, episepalous. *Rosa, Rubus, Spiraea*
- 59- Polyandria. means Stamens twenty or more, attached to axis. *Tilia, Papaver, Nymphaea*
- 60- Didynamia. means Stamens didynamous. *Linaria, Monarda, Linnaea*
- 61- Tetrodynamia. means Members of the Cruciferae
- 62- Monadelphia. Malvaceae, Geraniaceae
- 63- Diadelphia. *Lathyrus, Trifolium*
- 64- Polyadelphia. *Hypericum*
- 65- Syngenesia. Compositae, *Viola, Lobelia*

66- Gynandria. Orchidaceae, *Aristolochia*

67- Monoecia. *Typha*, *Quercus*, *Thuja*

68- Dioecia. *Salix*, *Urtica*, *Juniperus*

69- Polygamia. *Empetrum*, many Compositae

70- Cryptogamia. Algae, fungi, mosses, ferns

71- Plant morphology is a field of study dealing with the external and gross internal structure of plant organs.

72- The basic structural components, or organs, of plants are delimited by and strongly correlated with their specific functions.

73- Among the liverworts, hornworts, and mosses, plant organs are components of the haploid gametophyte.

74- The gametophyte of liverworts, hornworts, and mosses, contain rhizoids, which are uniseriate, filamentous chains of cells functioning in water/mineral absorption.

75- The basic body of the gametophyte can either be a flat mass of cells, termed a thallus (found in some liverworts and all hornworts) or a shoot, consisting of a generally cylindrical stem bearing leaves (found in some liverworts and all mosses).

76- The major organs of vascular plants are sporophytic roots and shoots.

77- Roots are present in almost all vascular plants and typically function in absorption of water and minerals.

78- Roots consist of an apical meristem that gives rise to a protective root cap, a central endodermis-bounded vascular system, absorptive epidermal root hairs, and endogenously developed lateral roots.

79- The sporophytic shoots of vascular plants consist of stem plus leaves.

80- Shoots contain an apical meristem of actively dividing cells that, through continued differentiation, result in the elongation of the stem and formation of leaves and buds.

81- Stems typically function in conduction of water and minerals from

the roots and in support and elevation of both leaves and reproductive structures.

82- The leaf is that organ of the shoot that is generally dorsiventrally flattened and that usually functions in photosynthesis and transpiration.

83- Leaves are derived from leaf primordia within the shoot apex and are often variously modified.

84- In vascular plants, leaves contain one to many vascular bundles, the veins; in some mosses, the gametophytic leaves may contain a veinlike costa.

85- Buds are immature shoot systems, typically located in the axils of leaves.

86- Buds may grow to form lateral vegetative branches or reproductive structures.

87- Among reproductive plant organs, the sporangium is the basic spore-producing part of all land plants.

88- In heterosporous plants (including all of the seed plants) sporangia are of two types: male (microsporangium) or female (megasporeangium).

89- The sporangium of liverworts, hornworts, and mosses is known as a capsule and typically makes up most of the sporophyte.

90- A cone, also called a strobilus, is a modified, determinate, reproductive shoot system of many nonflowering vascular plants, consisting of a stem axis bearing sporophylls.

91- An ovule is a megasporeangium enveloped by one or more protective integuments.

92- A seed is the mature ovule of the seed plants, consisting of an internal embryo surrounded by nutritive tissue (endosperm) and enveloped by a protective seed coat.

93- The reproductive organ of angiosperms is the flower, a modified, determinate shoot bearing sporophylls called stamens and carpels, with or

without outer modified leaves (the perianth).

94- An inflorescence is an aggregate of one or more flowers, the boundaries of which generally occur with the presence of vegetative leaves.

95- A fruit is the mature ovary of flowering plants, consisting of the pericarp (mature ovary wall), seeds, and (if present) accessory parts.

Q38b/ Fill the following blanks:

1- Plant habit refers to the general form of a plant such as stem duration and branching pattern, development, or texture.

2- A herb is a plant in which any aboveground shoots, whether vegetative or reproductive, die back at the end of an annual growth season.

3- Although the aboveground shoots are annual, the herb itself may be annual, biennial, or perennial, the last by means of long-lived underground rootstocks.

4- Perennial herbs, having a bulb, corm, rhizome, or tuber as the underground stem, are termed geophytes.

5- A vine is a plant with elongate, weak stems that are generally supported by means of scrambling, twining, tendrils, or roots.

6- Vines may be annual or perennial, herbaceous or woody.

7- A liana (also spelled liane) is a vine that is perennial and woody.

8- Lianas are major components in the tree canopy layer of some tropical forests.

9- A shrub is a perennial, woody plant with several main stems arising at ground level.

10- A subshrub is a short shrub that is woody only at the base and that seasonally bears new, non-woody, annual shoots above.

11- A tree is defined as a generally tall, perennial, woody plant having one main stem (the trunk) arising at ground level.

- 12- Plant habitat refers to the general environment where the plant is growing.
- 13- General habitat terms include whether the plant is terrestrial, growing on land; aquatic, growing in water; or epiphytic, growing on another plant.
- 14- If a plant is aquatic, it can be emersed, occurring under water; floating, occurring at the water surface; or emergent, having roots or stems anchored to the substrate under water and aerial shoots growing above water.
- 15- Plant habitat include the type of substrate that the plant is growing in (e.g., whether on sandy, loam, clay, gravelly, or rocky).
- 16- Roots are plant organs that function in anchorage and in absorption of water and minerals.
- 17- Roots are found in all of the vascular land plants except for the Psilophytes *Psilotum* and relatives.
- 18- Roots, like shoots, develop by the formation of new cells within the actively growing apical meristem of the root tip.
- 19- The apical meristem of the root is covered on the outside by a root cap, functioning both to protect the root apical meristem and to provide lubrication as the root grows into the soil.
- 20- The epidermal cells away from the root tip develop hair like extensions called root hairs; these function in greatly increasing the surface area available for water and mineral absorption.
- 21- Roots of many (if not most) species of plants have an interesting symbiotic interaction with a species of fungus, known as mycorrhizae.
- 22- Roots have a central vascular cylinder of conductive cells, xylem and phloem. 23- The vascular cylinder in root is surrounded by a special cylinder of cells known as the endodermis.

24- Lateral roots develop by cell divisions within the pericycle, a cylindrical layer of parenchyma cells located just inside the endodermis.

25- The first root to develop in a vascular plant is the radicle of the embryo.

54- If the radicle continues to develop after embryo growth, it is known as the primary root.

26- Roots that arise from other roots are called lateral roots.

27- Roots that arise from a non-root organ (stem or leaf) are adventitious roots.

28- If the primary root becomes dominant, it is called a tap root.

29- If the primary root soon withers and subsequent roots are adventitious.

30- Several plant species, particularly those that are biennials, have storage roots. 31- Many plants that are epiphytic, particularly tropical members of the monocot families Araceae and Orchidaceae, have aerial roots.

32- Many plant species with bulbs or corms have contractile roots, roots that actually contract vertically, functioning to pull the rootstock further into the soil.

33- Parasitic plants have specialized roots called haustoria that penetrate the tissues of a host plant.

34- Some adventitious roots called prop roots grow from the base of the stem and function to further support the plant.

35- Some plant species that grow in swamps or marshes have pneumatophores, roots that grow upwardly from soil to air that function to obtain additional oxygen.

36- Buttress roots are enlarged, horizontally spreading and often vertically thickened roots at the base of trees that aid in mechanical support.

- 37- Stems function both as supportive organs and as conductive organs
- 38- A shoot is a stem plus its associated leaves.
- 39- Sporophytic shoots that are branched and bear leaves are an apomorphy for all vascular plants;
- 40- The leafy shoot like structures of mosses and some liverworts are gametophytic and not directly homologous with shoots of vascular plants.
- 41- The first shoot of a seed plant develops from the epicotyl of the embryo.
- 42- The epicotyl elongates after embryo growth into an axis (the stem) that bears leaves from its tip,
- 43- The epicotyl contains the actively dividing cells of the shoot apical meristem.
- 44- The point of attachment of a leaf to a stem is called the node. The region between two adjacent nodes is the internode.
- 45- The tissue at the upper (adaxial) junction of leaf and stem (called the axil) begins to divide and differentiate into a bud primordium.
- 46- The bud primordium matures into a bud, defined as an immature shoot system, often surrounded by protective scale leaves.
- 47- Buds have an architecture identical to the original shoot. They may develop into a lateral branch or may terminate by developing into a flower or inflorescence.
- 48- Perennial and some biennial herbs have underground stems, which are generally known as rootstocks.
- 49- Rootstocks function as storage and protective organs, remaining alive underground during harsh conditions of cold or drought.
- 50- In bulb, the shoot consists of a small amount of vertical stem tissue (bearing roots below) and a massive quantity of thick, fleshy storage leaves (e.g., *Allium* spp.)

- 51- In Corm, the shoot consists mostly of generally globose stem tissue surrounded by scanty, scale-like leaves (e.g., some *Iris* spp.)
- 52- In Rhizome, the stem is horizontal and underground, typically with short internodes and bearing scale like leaves (e.g., *Zingiber officinale*)
- 53- Tuber consists of a thick, underground storage stem, usually not upright, typically bearing outer buds and lacking surrounding storage leaves or protective scales (e.g., *Solanum tuberosum*)
- 54- Buds in the axils of the leaves of bulbs can develop into proliferative bulbels (e.g., garlic).
- 55- Some taxa (e.g., certain onions) can even form tiny, propagative bulbs within the aerial shoots or inflorescence of the plant, these termed bulbils.
- 56- Cormose plants from axillary buds, form proliferative corms, termed cormels.
- 57- A stolon or runner is a stem with long internodes that runs on or just below the surface of the ground, typically terminating in a new plantlet, as in *Fragaria* (strawberry).
- 58- Because stolons can be underground, they are sometimes termed rootstocks and resemble narrow, elongate rhizomes.
- 59- A cladode is a flattened, photosynthetic stem that may resemble and function as a leaf, found, e.g., in *Asparagus*, and *Ruscus*.
- 60- Succulent stems, contain a high percentage of parenchymal tissue that may store great quantities of water, allowing the plant to survive subsequent drought periods.
- 61- Caudiciform stem, which is a low, swollen, perennial storage stem (at or above-ground level), from which arise annual or non-persistent photosynthetic shoots
- 62- Pachycaul, which is a woody, trunk-like stem that is swollen basally, the swollen region functioning in storage

- 63- A thorn is a sharp-pointed stem or shoot.
- 64- A spine is a sharp-pointed leaf or leaf part.
- 65- A prickle is a sharp-pointed epidermal structure found anywhere on the plant.
- 66- An areole, is a modified, reduced, non-elongating shoot apical meristem bearing leaf spines. Areoles are characteristic of the cactus family.
- 67- A scape is a naked peduncle (inflorescence axis), generally arising from a basal rosette of vegetative leaves and functioning to elevate flowers well above the ground.
- 68- A culm refers to the flowering and fruiting stem(s) of grasses and sedges.
- 69- A pseudobulb is a short, erect, aerial storage or propagative stem of certain epiphytic orchids.
- 70- A short shoot or fascicle (also called a spur shoot or dwarf shoot) is a modified shoot with very short internodes from which flowers or leaves are borne.
- 71- A tendril is a long, slender, coiling branch, adapted for climbing.
- 72- Tendrils are typically found on weak stemmed vines and function in support. (most tendrils are leaves or leaf parts)
- 73- A plant with an above-ground stem is caulescent; one that lacks an above-ground stem, other than the inflorescence axis, is termed acaulescent.
- 74- Acaulescent plants bear major photosynthetic leaves only at ground level, often in a basal rosette, with the only shoot becoming aerial, being an inflorescence that eventually dies off.
- 75- Acaulescent plants are often biennial herbs, in which a storage root develops in the first year and flowering occurs in the second

76- Arborescent, tree like in appearance and size; frutescent, having the habit of a shrub, and suffrutescent, being basally woody and herbaceous apically, the habit of a subshrub.

77- The stem habit of vines can be clambering (also called scandent), sprawling across objects without specialized climbing structures.

78- The stem habit of vines can be climbing, growing upward by means of tendrils, or adventitious roots.

79- Plants that adapted to lying on the ground, can be prostrate, trailing or lying flat, not rooting at the nodes; repent, creeping or lying flat but rooting at the nodes.

80- The stem habit of vines can be decumbent, being basally prostrate but apically ascending.

81- Branching pattern is determined by the relative activity of apical meristems.

82- Both the original shoot apical meristem derived from the seedling epicotyl and apical meristems subsequently derived from lateral buds.

83- If a given shoot has the potential for unlimited growth, such that the apical meristem is continuously active, the growth is termed indeterminate.

84- If a shoot terminates growth after a period of time, with either the abortion of the apical meristem or its conversion into a flower, inflorescence or specialized structure (such as a thorn or tendril), the growth is termed determinate.

85- If a given stem axis is derived from growth of a single apical meristem, the pattern is termed monopodial.

86- If a given axis is made up of numerous units that are derived from separate apical meristems, the branching pattern is sympodial.

87- In a dichotomous branching a single apical meristem divides equally into two branches, e.g., *Psilotum*.

Q39/ Draw the followings:

Bulb, Corm, Monopodial stem, Sympodial stem

Q40/ Write about the followings:

Plant habit, Plant habitat, Root types, Rootstock types

Q41/ What is the fate of a bud? Clarify your answer by a figure.

Q42/ What is the origin of the stem in the Magnoliophyta? Compare it with the Bryophyta.

Q43/ Write about the vegetative propagation of the following plants:

Allium spp., *Iris* spp., *Zingiber officinale*, *Solanum tuberosum*, *Fragaria*

Q44/ Compare between the followings:

1- tree and shrub 2- emersed and floating plants 3- apical meristem in root and stem 4- lateral and adventitious roots 5- tap and fibrous root system 6- bulbs and corms 7- bulbels and bulbils 8- thorn and spine 9- caulescent and acaulescent plant 10- arborescent and frutescent 11- clambering and climbing stems 12- prostrate and repent stems 13- indeterminate and determinate shoots 14- hapaxanthic and pleonanthic shoots 15- monopodial and sympodial stems

Q45/ Discuss the different models of stem branching pattern, clarify your answer by figures.

Q46/ Fill the following blanks:

1-Twigs are the woody, recent-growth branches of trees or shrubs.

2-Buds are immature shoot systems that develop from meristematic regions. In deciduous woody plants the leaves fall off at the end of the growing season and the outermost leaves of the buds may develop into protective bracts (modified leaves) known as bud scales.

3-The bud of a twig that contains the original apical meristem of the shoot (which by later growth may result in further extension of the shoot) is called the terminal or apical bud.

4-Buds formed in the axils of leaves are called axillary or lateral buds.

5-A given bud may be vegetative, if it develops into a vegetative shoot bearing leaves

6- A given bud may be floral or inflorescence, if it develops into a flower or inflorescence;

7- A given bud may be mixed, if it develops into both flower(s) and leaves.

8-Two or more axillary buds that are oriented sideways are called collateral buds.

9-two or more axillary buds oriented vertically are called superposed buds.

10-axillary bud assumes the function of a terminal bud, it is called a pseudoterminal bud.

11-Bud scale scars represent the point where the branch ceased elongation the previous growing season; the region between adjacent bud scale scars represents a single year's growth.

12-Bark technically comprises all the tissue outside the vascular cambium of a plant with wood.

13- The outer bark, or periderm, is the tissues derived from the cork cambium itself.

14- Morphologically, bark may refer to the outermost protective tissues of the stems or roots of a plant with some sort of secondary growth, whether derived from a true cork cambium or not.

Q47/ Fill the following blanks:

1- Leaves are derived from leaf primordia of the shoot apex.

2a- A leaf can be gametophytic, in the leafy liverworts and mosses, or sporophytic, in the vascular plants.

2b- The expanded, flat portion of the leaf, which contains the most of the

chloroplasts, is termed the blade or lamina.

3-Many leaves have a proximal stalk, the petiole or (e.g., in ferns) the stipe.

4-A leaf or leaf part (typically at the base) that partially or fully clasps the stem above the node is a leaf sheath, such as in the Poaceae and many Apiaceae.

5-A pseudopetiole is a petiole-like structure arising between a leaf sheath and blade, found in several monocots, such as bananas and bamboos.

6-Many leaves have stipules, a pair of leaf like appendages, which may be modified as spines or glands, at either side of the base of a leaf.

7-If stipules are present, the leaves are stipulate; if absent, they are exstipulate.

8-A specialized, scarious, sheath like structure arising above the node in some members of the family Polygonaceae, interpreted as modified stipules, is termed an ocrea.

9-Stipels are paired leaf like structures, which may be modified as spines or glands, at either side of the base of the leaflet of a compound leaf, as in some Fabaceae.

10-If stipels are present, the leaves are stipellate; if absent, they are exstipellate.

11-In the Rubiaceae the inner surface of the connate stipules (from opposite leaves) bear colleters, structures that secrete mucilage (aiding to protect young, developing shoots).

12-Some leaves are compound, i.e., divided into discrete components called leaflets. The stalk of a leaflet is termed the petiolule.

13. Hastula, an appendage or projection at the junction of petiole and blade, as in some palms

13. Ligule, an outgrowth or projection from the inner, top of the sheath, at its junction with the blade, as in the Poaceae

14. Pulvinus, the swollen base of a petiole or petiolule, as in some Fabaceae

15-Lycophylls are small, simple leaves with intercalary growth and a single, central vein that joins to the stem without a leaf gap (below).

16-Euphylls are larger, simple or compound leaves with marginal or apical growth, a leaf gap (region of parenchymatous tissue above the junction of the leaf and stem vasculature), and generally multiple veins. Euphylls are found in ferns, gymnosperms, and angiosperms.

17- In angiosperms bracts are typically associated with flowers or the axes of inflorescences.

18-A bractlet or bracteole (also called a prophyll or prophyllum) is a smaller or secondary bract often borne on the side of a pedicel in flowering plants.

19-The term scale is used for a small, non-green leaf.

20-A group of bracts resembling sepals immediately below the true calyx is termed an epicalyx, found, e.g., in many members of the Malvaceae.

21-Bracts subtending individual flowers of composites (Asteraceae) are collectively termed chaff or paleae.

22-glumes, the two bracts occurring at the base of a grass spikelet.

23-lemma, the outer and lower bract at the base of the grass floret.

24-palea, the inner and upper bract at the base of the grass floret.

25-A phyllary is one of the involucre bracts subtending a head, as in the Asteraceae.

26-A spathe is an enlarged, sometimes colored bract subtending and usually enclosing an inflorescence, e.g., that subtending the spadix of the Araceae.

27-Phyllodes are leaves that consist of a flattened, bladelike petiole.

28-A tendril is a coiled and twining leaf or leaf part, usually a modified rachis or leaflet.

29- Glochidium is a very small, deciduous leaf spine with numerous, retrorse barbs along its length

30-A unifacial leaf is isobilateral, i.e., flattened side-to-side and having a left and right side, except at the base, where they are often sheathing.

31-A centric leaf is one that is cylindrical in shape, e.g., *Fenestraria* of the Aizoaceae.

32-Pitcher leaves are those that are shaped like a container, which bears an internal fluid and functions in the capture and digestion of small animals.

33-Several taxa have pitcher leaves, including *Darlingtonia*, *Nepenthes*, and *Sarracenia*, the pitcher plants.

34-Tentacular leaves are those bearing numerous, sticky, glandular hairs or bristles that function in capturing and digesting small animals; these are characteristics of *Drosera* spp., the sundews.

35-Trap leaves are those that mechanically move after being triggered, in the process capturing and digesting small animals; trap leaves are found in *Dionaea muscipula*, the Venus fly trap.

Q48/ Fill the following blanks:

1- The pattern of division of a leaf into discrete components or segments is termed leaf type.

2- A simple leaf is one bearing a single, continuous blade.

3-A compound leaf is one divided into two or more, discrete leaflets.

4-For either compound or divided leaves of ferns, the first (largest) division of a leaf is termed a pinna;

5-the ultimate divisions are termed pinnules.

6- Simple leaves were the ancestral condition in the vascular plants.

7-Angiosperms have the greatest diversity of leaves, ranging from simple to highly compound.

8-Compound leaves are defined based on the number and arrangement of leaflets.

9-A pinnately compound or pinnate leaf is one with leaflets arranged (either oppositely or alternately) along a central axis, the rachis.

10-If a pinnate leaf has a terminal leaflet (and typically an odd number of leaflets), it is imparipinnate;

11-if it lacks a terminal leaflet (and has an even number of leaflets), it is paripinnate.

12-A bipinnately compound or bipinnate leaf is with two orders of axes, each of which is pinnate (equivalent to a compound leaf of compound leaves).

13-the lateral axes that bear leaflets are termed rachillae (singular rachilla).

14-a compound leaf with three orders of axes, each pinnate, is termed tripinnately compound or tripinnate; etc.

15-A compound leaf, in which four or more leaflets arise from a common point, typically at the end of the petiole, is termed palmately compound or palmate.

16-A costa-palmate leaf type is one that is essentially palmately compound to divided, but has an elongate, rachis like extension of the petiole (termed the costa), as occurs in some palms.

17-A compound leaf with only three leaflets is termed trifoliolate or ternately compound.

18-A leaf with two orders of axes, each ternately compound, is termed biternately compound.

19-palmate-ternate, in which the three leaflets join at a common point (whether petiolulate or sessile).

20-Rarely, ternately compound leaves can be pinnate-ternate, in which the terminal leaflet arises from the tip of a rachis. Pinnate-ternate leaves

are actually derived (by reduction) from an ancestral pinnately compound leaf; they are found, e.g., in some members of the Fabaceae.

21-Decomound is a general term for a leaf that is more than once compound, i.e., with two or more orders, being bi-, tri-, etc. pinnately, palmately, or ternately, compound.

22-A compound leaf consisting of only two leaflets is termed geminate.

23-A compound leaf with two rachillae, each bearing two leaflets, is termed bigeminate.

24-A compound leaf with two rachillae, each of these bearing a pinnate arrangement of leaflets, is termed geminate-pinnate.

25-a very specialized type of leaf is one that appears superficially to be simple, but actually consists of a single leaflet attached to the apex of a petiole, the junction between them clearly defined. This leaf type, known as unifoliolate, is interpreted as being derived by reduction of an ancestrally compound leaf. In some taxa, e.g., many Araceae.

26-heteroblasty (adjective, heteroblastic), in which the juvenile leaves are distinctly different in size or shape from the adult leaves (making species identification difficult).

27-leaves may be petiolate, with a petiole.

28- leaves may be sessile, without a petiole.

29-Sessile or petiolate leaves can have a sheathing leaf attachment, in which a flattened leaf base (the sheath) partially or wholly clasps the stem, typical of the Poaceae and many Apiaceae.

30-If a leaf appears to extend down the stem from the point of attachment, as if fused to the stem, the leaf attachment is decurrent (e.g., as in many Cupressaceae).

31- If a leaf is sessile and clasps the stem most, but not all, of its circumference, the attachment is termed amplexicaul.

32-If the leaf is sessile with the base of the blade completely surrounding the stem, it is termed perfoliate.

33-A special case of the perfoliate (involving fusion of leaves) is connate-perfoliate, whereby typically two opposite leaves fuse basally, such that the blade bases of the fusion product completely surrounds the stem.

Q49/ Fill the following blanks:

1-The sporophytic leaves of vascular plants contain vascular bundles, known as veins.

2-Venation refers to this pattern of veins and vein branching.

3-The major vein (or veins) of a leaf, with respect to size, is termed the primary vein.

4-From the primary vein(s), smaller, lateral veins may branch off, these known as secondary veins.

5-from secondary veins, even smaller tertiary veins may arise.

6-If a simple leaf has a single, primary vein, that vein is termed the midrib or costa. 7-The central, primary vein of the leaflet of a compound leaf is termed the midvein. 8- Uninervous, in which there is a central midrib with no lateral veins, e.g., as in the lycophytes, psilophytes, and equisetophytes, as well as many conifers.

9- Dichotomous, in which veins successively branch distally in to a pair of veins of equal size and orientation, e.g., in *Ginkgo biloba*, in which there is no actual midrib.

10- Parallel venation, in which the primary and secondary veins are essentially parallel to one another, the ultimate veinlets being transverse (at right angles), e.g., in most Monocots.

11- Netted or reticulate venation, in which the ultimate veinlets form an interconnecting netlike pattern, e.g., most non-monocot flowering plants.

12-Reticulate leaves can be pinnately veined (pinnate-netted), with secondary veins arising along length of a single primary vein (the midrib or, in a compound leaf, midvein);

13- palmately veined (palmate-netted), with four or more primary veins arising from a common basal point.

14- ternately veined (ternate-netted), with three primary veins arising from a common basal point.

15-Similar to parallel venation in having transverse ultimate veinlets are penni-parallel (also called pinnate-parallel), with secondary veins arising from a single primary vein region, the former essentially parallel to one another (e.g., the Zingiberales).

16-palmate-parallel, with several primary veins (of leaflets or leaf lobes) arising from one point, the adjacent secondary veins parallel to these (e.g., fan palms).

Q50/Draw the bud types of a stem?

Q51/ Draw the scar types on a woody, deciduous twig?

Q52/ Define: acaulescent plant- indeterminate shoot- determinate shoot.

Q53/ write about: acaulescent plant- monopodial stem- sympodial stem.

Q54/Define: ocrea- Stipels- Ligule, Pulvinus, epicalyxbract, paleae, phyllary, spathe, glochidium, Pitcher leaf, Tentacular leaves, Trap leaves.

Q55/ Compare between Lycophylls and Euphylls

Q56/ Define: pinna, rachilla, biternately compound leaf, bigeminate compound leaf, sheathing leaf attachment, amplexicaul leaf attachment, perfoliolate leaf attachment, connate-perfoliate leaf attachment,

Q57/ Draw an imparipinnate compound leaf.

Q58/ Draw a bigeminate compound leaf.

Q59/ Draw a geminate-pinnate compound leaf.

Q60/ Define: midvein, secondary veins, tertiary veins.

Q61/ Fill the following blanks:

- 17-A flower is a modified reproductive shoot, basically a stem with an apical meristem that gives rise to leaf primordia.
- 18-Flowers are unique, differing, e.g., from the cones of gymnosperms, in that the sporophylls develop either as stamens or carpels.
- 19-The basic parts of a flower, from the base to the apex, are as follows. The pedicel is the flower stalk.
- 20-If a pedicel is absent, the flower attachment is sessile.
- 21-Flowers may be subtended by a bract, a modified, generally reduced leaf;
- 22-a smaller or secondary bract, often borne on the side of a pedicel, is termed a bracteole or bractlet (also called a prophyll or prophyllum).
- 23-In some taxa, a series of bracts, known as the epicalyx, immediately subtends the calyx, as in Hibiscus and other members of the Malvaceae.
- 24-The receptacle is the tissue or region of a flower to which the other floral parts are attached.
- 25- The perianth (also termed the perigonium) is the outermost, non-reproductive group of modified leaves of a flower.
- 26-If the perianth is relatively undifferentiated, or if its components intergrade in form, the individual leaf-like parts are termed tepals.
- 27-In most flowers the perianth is differentiated into two groups. The calyx is the outermost series or whorl of modified leaves. Individual units of the calyx are sepals, which are typically green, leaf-like, and function to protect the young flower. The corolla is the innermost series or whorl of modified leaves in the perianth. Individual units of the corolla are petals, which are typically colored (non green) and function as an attractant for pollination.
- 28-Some flowers have a hypanthium (floral tube), a cuplike or tubular structure, around or atop the ovary, bearing along its margin the sepals, petals, and stamens.

- 29-Many flowers have a nectary, a specialized structure that secretes nectar.
- 30-The androecium refers to all of the male organs of a flower, collectively all the stamens.
- 31-A stamen is a microsporophyll, which characteristically bears two thecae (each theca comprising a pair of microsporangia).
- 32-Stamens can be leaf like (laminar), but typically develop as a stalk like filament, bearing the pollen-bearing anther,
- 33-The gynoecium refers to all of the female organs of a flower, collectively all the carpels.
- 34-A carpel is the unit of the gynoecium, consisting of a modified megasporophyll that encloses one or more ovules.
- 35-A pistil is that part of the gynoecium composed of an ovary, one or more styles (which may be absent), and one or more stigmas.
- 36-In some taxa, e.g. Aristolochiaceae and Orchidaceae, the androecium and gynoecium are fused into a common structure, known variously as a column, gynandrium, gynostegium, or gynostemium.
- 37- A stalk that bears the androecium and gynoecium is an androgynophore, e.g., Passifloraceae.
- 38-Flower sex refers to the presence or absence of male and female parts within a flower.
- 39-Most flowers are perfect or bisexual, having both stamens and carpels.
- 40-Many angiosperm taxa have imperfect or unisexual flower sex. In this case, flowers are either pistillate/female, in which only carpels develop, or staminate/male, in which only stamens develop.
- 41-Plant sex refers to the presence and distribution of perfect or imperfect flowers on individuals of a species.
- 42-A hermaphroditic plant is one with only bisexual flowers.

43-A monoecious plant is one with only unisexual flowers, both staminate and pistillate on the same individual plant; e.g., *Quercus* spp., oaks.

44-A dioecious plant is one with unisexual flowers, but with staminate and pistillate on separate individual plants (i.e., having separate male and female individuals; e.g., *Salix* spp., willows).

45-Polygamous is a general term for a plant with both bisexual and unisexual flowers.

46-Andromonoecious refers to a plant with both staminate and perfect flowers on the same individual,

46- gynomonoecious is a plant with both pistillate and perfect flowers on the same individual.

47-Trimonoecious refers to a plant with pistillate, staminate, and perfect flowers on the same individual.

48-Androdioecious refers to a plant with male flowers on some individuals and perfect flowers on other individuals.

49-Gynodioecious refers to a plant with female flowers on some individuals and perfect flowers on other individuals.

50-Trioecious refers to a plant with pistillate, staminate, and perfect flowers on different individuals.

Q62/ Define: receptacle, tepals, nectary, stamen, carpel, gynandrium

Q63/ Fill the following blanks:

1-Flower attachment is pedicellate, having a pedicel; sessile, lacking a pedicel; or sessile, having a short, rudimentary pedicel.

2-The terms bracteate, with bracts, and ebracteate, lacking bracts, may also be used with respect to flower attachment.

3-Flower cycle refers to the number of cycles (series or whorls) of floral parts. 4-The two basic terms used are complete, for a flower having all four major series of parts (sepals, petals, stamens, and carpels)

5-incomplete, for a flower lacking one or more of the four major whorls of parts (e.g., any unisexual flower, or a bisexual flower lacking a corolla).

6-Flower symmetry is an assessment of the presence and number of mirror-image planes of symmetry.

7-Actinomorphic or radial symmetry (also called regular) is that in which there are three or more planes of symmetry, such that there is a repeating structural morphology when rotated less than 360° about an axis.

8-Biradial symmetry means having two (and only two) planes of symmetry.

9-Zygomorphic or bilateral symmetry (also called irregular) is that in which there is only one plane of symmetry.

10-An asymmetric flower lacks any plane of symmetry, usually the result of twisting of parts.

10-Flower maturation refers to the time of development of flowers or flower parts.

11-Anthesis is the general time of flowering, the opening of flowers with parts available for pollination.

12-Protandrous refers to stamens developing, or pollen release occurring, prior to the maturation of carpels or stigmas being receptive.

13-Protogynous is the reverse, with carpels or stigmas developing before stamens mature or pollen is released.

14-Both protandry and protogyny may function to promote outcrossing (and thus inhibit selfing) within individuals of a species.

15-Two flower maturation terms dealing with the relative direction of development of parts can be important in describing taxonomic groups.

Centrifugal refers to developing from the center toward the outside or periphery,

- 16- centripetal is development from the outside or periphery toward the center region.
- 17-The perianth (or perigonium) is the outermost, non-reproductive group of modified leaves of a flower.
- 18-Various specialized terms are used for parts of the perianth. These include the following: anterior or ventral, referring to the lower, abaxial lobe(s) or side, toward a subtending bract;
- 19- beard, a tuft, line, or zone of trichomes on a perianth or perianth part;
- 20-claw, an attenuate base of a sepal or petal;
- 21-corona, a crown-like outgrowth between stamens and corolla, which may be petaline or staminal in origin;
- 22-hypanthium or floral cup, a generally tubular or cup shaped structure at the top rim of which are attached the calyx, corolla, and androecium;
- 23-labellum, a modified, typically expanded, median petal, tepal, or perianth lobe, such as in the Orchidaceae;
- 24-limb, the expanded portion of corolla or calyx above the tube, throat, or claw;
- 25-lip, either of two variously shaped parts in to which a calyx or corolla is divided, usually in to upper (posterior) and/or lower (anterior) lips, such as most Lamiaceae, Orchidaceae
- 26- lobe, a segment of a synsepalous calyx or sympetalous corolla;
- 27-petal, a corolla member or segment; a unit of the corolla;
- 28-posterior or dorsal, referring to the upper, adaxial lobe(s) or side, nearest to the axis, away from the subtending bract;
- 29-sepal, a calyx member or segment, a unit of the calyx;
- 30-spur, a tubular, rounded or pointed projection from the calyx or corolla, functioning to contain nectar;

31-tepal, a perianth member or segment not differentiated into distinct sepals or petals;

32-throat, an open, expanded region of a perianth, usually of a sympetalous corolla;

33-tube, a cylindrically shaped perianth or region of the perianth, usually of a sympetalous corolla.

34- In some taxa, such as some magnolias and water lilies, the perianth parts have a spiral arrangement, i.e., spirally arranged with only one perianth part per node, not in distinct whorls.

35-Typically, flowers with a spiral perianth arrangement have parts that are either undifferentiated (similar to one another) or that grade from an outer, sepal-like form to an inner petal-like form. In either case, the term tepal is used to describe undifferentiated or intergrading perianth parts.

36-In most flowering plants the perianth parts have a whorled arrangement, in which the parts appear to arise from the same nodal region.

37- perianth cycle is biseriate (also called dicyclic), in which there are two discrete whorls, an outer (= lower) and inner (= upper).

38-A less common condition in flowering plants is a uniseriate perianth cycle, with perianth parts in a single whorl.

39-If it is known that the calyx was evolutionarily lost, what remains should be called a corolla; if the corolla was lost, what remains should be termed a calyx. 40-If this directionality is not known, a uniseriate perianth is usually termed a calyx by tradition (although it may simply be called a perianth).

41-Perianths may also rarely be triseriate (or tricyclic) = three-whorled,

45-tetraseriate (or tetracyclic) = four-whorled, etc.

46-The term multiseriate may be used to mean composed of three or more whorls.

47- Dichlamydeous describes a perianth composed of a distinct outer calyx and inner corolla; in most cases, a dichlamydeous perianth is also biseriate, but it may be multiseriate (i.e., the calyx or corolla containing more than one whorl). 48-Homochlamydeous refers to a perianth composed of similar parts, each part a tepal. Most monocots have a homochlamydeous perianth, whereas most eudicots have a dichlamydeous one.

49-perianth merosity is the number of parts per whorl of the perianth.

50-General terms for perianth merosity are isomerous, having the same number of members in different whorls (e.g., five sepals and five petals) and

51- anisomerous, having a different number of members in different whorls (e.g., two sepals and five petals).

52-Perianth, calyx, or corolla merosity is usually designated as a simple number, although terms such as bimerous (a whorl with two members),

53-trimerous (a whorl with three members),

54-tetramerous (a whorl with four members),

55-pentamerous (a whorl with five members), etc., can be used.

56-Terms for absence of parts include achlamydeous, lacking a perianth altogether,

57-apetalous, having no petals or corolla, and asepalous, having no sepals or calyx.

Q64/Does the leaf venation can be assessed in the flower parts? Why

Q65/ Mention the very general venation classes.

Q66/ Draw the very general venation classes.

Q67/ Do the Bisexual flowers are the ancestral condition in angiosperms?

What derived from it?

Q68/ Write about Plant sex.

Q69/Draw a unisexual flower.

Q70/Define: incomplete flower, Actinomorphic flower, Zygomorphic flower, asymmetric flower, Anthesis, labellum, spur, Dichlamydeous flower, Homochlamydeous flower,

Q71/Draw the flower symmetry types.

Q72/ What do know about flower maturation.

Q73/ Numerate the perianth parts.

Q74/ Does the biseriata perianth is ancestral condition in angiosperms?

What derived from it?

Q75/ Write about the perianth Merosity

Q76/Draw a biseriata-tetramerous flower

Q77/Draw a dichlamydeous-biseriata/trimerous flower

Q78/ Draw a homochlamydeous-biseriata/trimerous flower