

BIOLOGY



Important Questions

➤ Multiple Choice Questions:

Question 1. Which one of the following is not a characteristic of root?

- (a) Absence of buds
- (b) Presence of chlorophyll
- (c) Presence of root cap
- (d) Presence of Unicellular hair

Question 2. Roots that grow from any part of the plant body other than the radicle are called

- (a) Tap roots
- (b) Adventitious roots
- (c) Modified roots
- (d) Aerial roots

Question 3. The place on stem or branch form where one or more leaves arise is called

- (a) Apex
- (b) Bud
- (c) Internode
- (d) Node

Question 4. Which one of the following underground, fleshy structure is a stem?

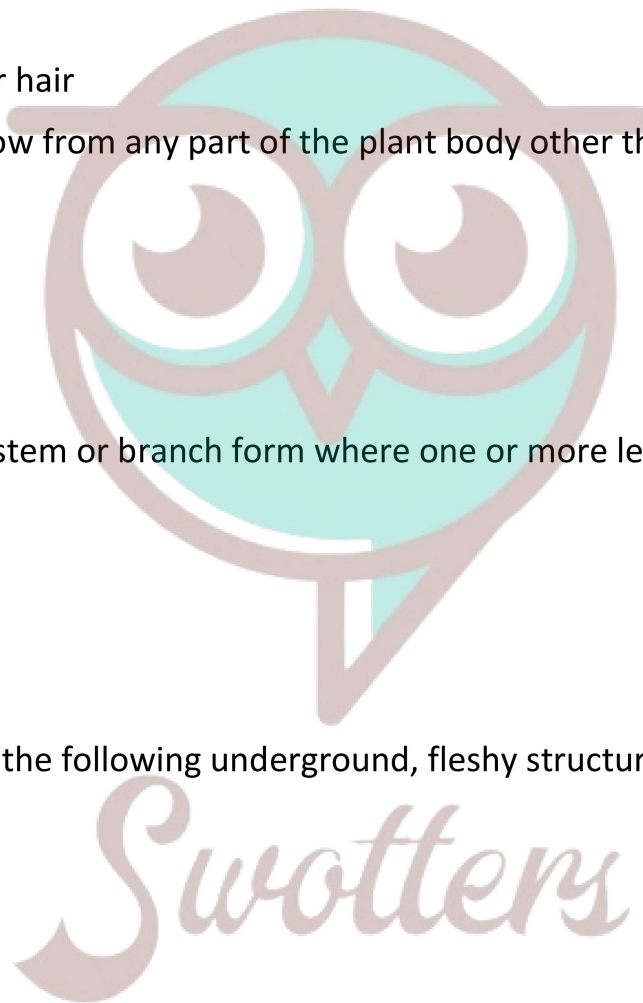
- (a) Carrot
- (b) Potato
- (c) Turnip
- (d) Sweet Potato

Question 5. Phyllode is a modification of

- (a) Root
- (b) Flower
- (c) Petiole
- (d) Bud

Question 6. Potato tubers are formed at the tips of

- (a) Primary roots



- (b) Adventitious roots
- (c) Petiole
- (d) Stolons

Question 7. Mesocarp and endocarp is the edible part of the fruit of

- (a) Apple
- (b) Mango
- (c) Banana
- (d) Litchi

Question 8. Drupe is recognised by

- (a) Stony mesocarp
- (b) Fleshy seed coat
- (c) Thin seed coat
- (d) Stony endocarp

Question 9. What do you eat in coconut?

- (a) Mesocarp
- (b) Fruit wall
- (c) Entire seed
- (d) Embryo

Question 10. The positions of shoot apex in monocot embryo is

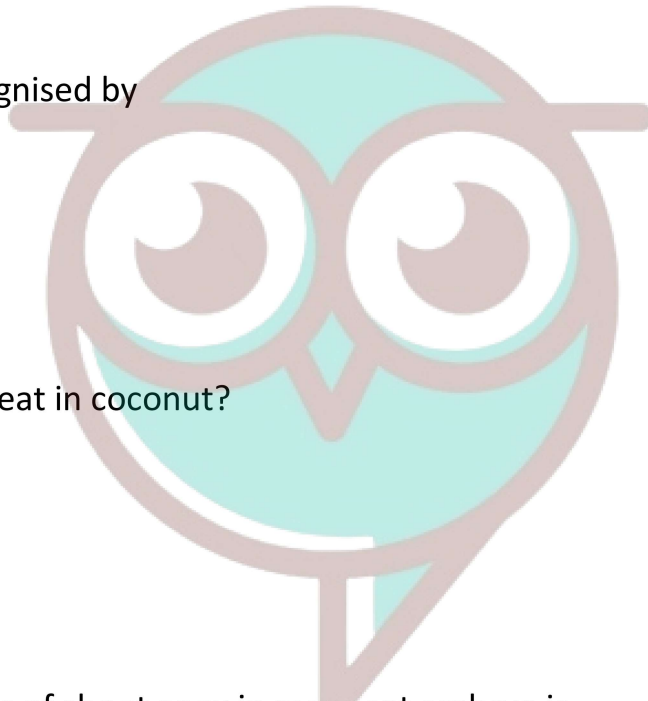
- (a) Lateral
- (b) Basal
- (c) Sub-terminal
- (d) Terminal

Question 11. In which one of the following plants the oil is stored in endosperm

- (a) Coconut
- (b) Ground nut
- (c) Sesame
- (d) Soyabean

Question 12. In maize, the flower are

- (a) Bisexual
- (b) Unisexual but on the same plant



Swotters

- (c) Absent
- (d) Unisexual but on different plants

Question 13. Epipetalous is condition of

- (a) Aestivation of petal
- (b) Placentation
- (c) Stamens
- (d) Position of ovary

Question 14. A characteristic of angiosperm is

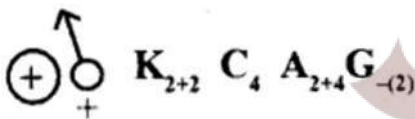
- (a) Flower
- (b) Root
- (c) Seed
- (d) All of these

Question 15. An aspect of flower shown in floral formula but not in floral diagram is

- (a) Aestivation
- (b) Floral symmetry
- (c) Position of ovary
- (d) Cohesion of floral parts

➤ Fill In the Blanks:

1. Solanaceae is a large family, commonly called as the '.....'
2. Fabaceae family was earlier called, a sub family of family
3. The following floral formula represents the (Family: Brassicaceae)



4. In the floral formula, 'K' for 'P' for 'A' for
5. The outer covering of endosperm separates the embryo by a layer called
6. The embryo consists of one large and shield shaped cotyledon known as and a short axis with a and a radicle

➤ True or False:

1. The study of external features of plants is known as external morphology and that of internal features as anatomy.
2. The knowledge of external morphology of flowering plants is not essential for the study of all

branches of botany.

3. The root is covered at the apex by a thimble-like structure called the root cap
4. A few millimetres above the root cap is the region of meristematic activity.
5. Tap roots of carrot, turnip and adventitious roots of sweet potato, get swollen and store food.
6. The main function of the stem is spreading out branches bearing leaves, flowers and fruits. It conducts water, minerals and photosynthates.

➤ Very Short Question:

1. What do you mean by morphology?
2. What are the hanging roots of a banyan tree called?
3. In which type of plants, the primary root is short-lived and is replaced by a large number of roots?
4. Name one plant which has a fibrous root system.
5. Name one plant which has adventitious roots?
6. What is a root cap?
7. Name the region a few millimetres above the root cap?
8. What is the function of root hairs?
9. Name two plants whose taproots store food.
10. Name one plant whose roots come out of the ground and grow vertically upwards.

➤ Short Questions:

1. What are the functions of the root system?
2. Write a note on different types of root systems.
3. Write a short note on the stem.
4. What are the main functions of the stem?
5. Describe the main parts of a leaf.
6. What are the functions of petiole and lamina?
7. What do you mean by venation?
8. Explain the two types of compound leaves.

➤ Long Questions:

1. Write a note on the regions of the root.
2. Write a note on different types of leaves and phyllotaxy.

3. Write in details about a flower.

Assertion Reason Question-

1. In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

- (a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) If Assertion is true but Reason is false.
- (d) If both Assertion and Reason are false.

Assertion: Apical meristem of root is subterminal.

Reason: At the terminal end of root, root cap is present.

2. In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

- (a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) If Assertion is true but Reason is false.
- (d) If both Assertion and Reason are false.

Assertion: Fibrous root stem.

Reason: Fibrous root system is found in dicots only.

Case Study Based Question-

1. In majority of the dicotyledonous plants, the direct elongation of the radicle leads to the formation of primary root which grows inside the soil. It bears lateral roots of several orders that are referred to as secondary, tertiary, etc. roots. The primary roots and its branches constitute the tap root system, as seen in the mustard plant. In monocotyledonous plants, the primary root is short lived and is replaced by a large number of roots. These roots originate from the base of the stem and constitute the fibrous root system, as seen in the wheat plant. In some plants, like grass, Monstera and the banyan tree, roots arise from parts of the plant other than the radicle and are called adventitious roots. The main functions of the root system are absorption of water and minerals from the soil, providing a proper anchorage to the plant parts, storing reserve food material and synthesis of plant growth regulators.

The root is covered at the apex by a thimble-like structure called the root cap. It protects the tender apex of the root as it makes its way through the soil. A few millimetres above the root cap is the region of meristematic activity. The cells of this region are very small, thin-walled and with dense protoplasm. They divide repeatedly. The cells proximal to this region undergo rapid elongation and enlargement and are responsible for the growth of the root in length. This region

is called the region of elongation. The cells of the elongation zone gradually differentiate and mature. Hence, this zone, proximal to region of elongation, is called the region of maturation. From this region some of the epidermal cells form very fine and delicate, thread-like structures called root hairs. These root hairs absorb water and minerals from the soil.

Roots in some plants change their shape and structure and become modified to perform functions other than absorption and conduction of water and minerals. They are modified for support, storage of food and respiration. Tap roots of carrot, turnip and adventitious roots of sweet potato, get swollen and store food. In some plants such as Rhizophora growing in swampy areas, many roots come out of the ground and grow vertically upwards. Such roots, called pneumatophores, help to get oxygen for respiration.

1.) Identify incorrect statement

Statement 1 – The root is covered at the apex by a thimble-like structure called the root cap

Statement 2 – Elongation of the radicle leads to the formation of primary root.

Statement 3 – Pneumatophores are roots come out of the ground and grow vertically upwards

Statement 4 – Root hairs absorb water and minerals from the soil.

a.) Only 1

b.) Only 3

c.) Both 2 & 3

d.) None of the above

2.) Which of the following is feature of primary roots

a.) Short lived.

b.) Originate from the base of the stem

c.) Constitute the fibrous root system.

d.) All of the above.

3.) What is the function of roots?

4.) What are adventitious roots?

5.) Explain root modification and give any two example of root modification?

6.) What is pneumatophores?

2. The leaf is a lateral, flattened structure borne on the stem. It develops at the node and bears a bud in its axil. The axillary bud later develops into a branch. Leaves originate from shoot apical meristems and are arranged in an acropetal order. They are the most important vegetative organs for photosynthesis.

A typical leaf consists of three main parts: leaf base, petiole and lamina. The leaf is attached to the stem by the leaf base and may bear two lateral small leaf like structures called stipules. In monocotyledons, the leaf base expands into a sheath covering the stem partially or wholly. In some leguminous plants the leaf base may become swollen, which is called the pulvinus. The petiole help hold the blade to light. Long thin flexible petioles allow leaf blades to flutter in wind thereby cooling the leaf and bringing fresh air to leaf surface. The lamina or the leaf blade is the green expanded part of the leaf with veins and veinlets. There is, usually, a middle prominent vein, which is known as the midrib. Veins provide rigidity to the leaf blade and act as channels of transport for water, minerals and food materials. The shape, margin, apex, surface and extent of incision of lamina varies in different leaves.

The arrangement of veins and the veinlets in the lamina of leaf is termed as venation. When the veinlets form a network, the venation is termed as reticulate. When the veins run parallel to each other within a lamina, the venation is termed as parallel. Leaves of dicotyledonous plants generally possess reticulate venation, while parallel venation is the characteristic of most monocotyledons.

A leaf is said to be simple, when its lamina is entire or when incised, the incisions do not touch the midrib. When the incisions of the lamina reach up to the midrib breaking it into a number of leaflets, the leaf is called compound. The compound leaves may be of two types. In a pinnately compound leaf a number of leaflets are present on a common axis, the rachis, which represents the midrib of the leaf as in neem. In palmately compound leaves, the leaflets are attached at a common point, i.e., at the tip of petiole, as in silk cotton.

Phyllotaxy is the pattern of arrangement of leaves on the stem or branch. It is of three types – alternate, opposite and whorled. In alternate type of phyllotaxy, a single leaf arises at each node in alternate manner, e.g. China rose, sun flower plants. In opposite type, a pair of leaves arise at each node and lie opposite to each other as in Calotropis and guava plants. If more than two leaves arise at a node and form a whorl, it is called whorled, e.g. Alstonia.

1.) The arrangement of veins and the veinlets in the lamina of leaf is termed as

- a.) Phyllotaxy
- b.) Venation
- c.) Reticulate venation
- d.) Parallel venation

2.) The leaf attached to the stem by the leaf base and may bear two lateral small leaf like structures termed as

- a.) Petiole
- b.) Lamina
- c.) Stipules
- d.) Pulvinus

- 3.) Explain different parts of typical leaf.
- 4.) Explain types of venation with suitable examples.
- 5.) Explain different types of phyllotaxy with suitable examples.

✓ Answer Key-

➤ Multiple Choice Answers:

1. (b) Presence of chlorophyll
2. (b) Adventitious roots.
3. (d) Node
4. (b) Potato
5. (c) Petiole
6. (d) Stolons
7. (c) Banana
8. (d) Stony endocarp
9. (c) Entire seed
10. (a) Lateral
11. (a) Coconut
12. (b) Unisexual but on the same plant
13. (c) Stamens
14. (d) All of these
15. (c) Position of ovary



➤ Fill In the Blanks:

1. Potato family
2. Papilonoideae, Leguminosae
3. mustard plant
4. calyx, perianth, androecium
5. aleurone layer
6. scutellum, Plumule

➤ True or False:

1. True
2. False

3. True
4. True
5. True
6. True

➤ **Very Short Answers:**

1. Answer: Morphology refers to external structures.
2. Answer: Prop roots
3. Answer: Monocotyledonous
4. Answer: Wheat plant
5. Answer: Banyan
6. Answer: The root is covered at the apex by a thimble-like structure called the root cap.
7. Answer: Region of meristematic activity.
8. Answer: To absorb water and minerals from the soil.
9. Answer: Carrot and turnip
10. Answer: Rhizophora.

➤ **Short Answer:**

1. Answer: The main functions of the root system are as follows:
 - (a) Absorption of water and minerals from the soil.
 - (b) To provide a proper anchorage to the plant parts.
 - (c) To store reserved food material
 - (d) Synthesis of plant growth regulators.
2. Answer: (a) In most of the dicotyledonous plants, the direct elongation of the radicle leads to the formation of primary roots which grows inside the soil. The primary roots and their branches constitute the taproot system. For example-mustard plant.
(b) In monocotyledonous plants the primary root is short-lived and is replaced by a large number of roots. Their roots originate from the base of the stem and constitute the fibrous root system. For example wheat plant.
(c) In some plants, roots arise from parts of the plant other than the radicle. Such roots are called adventitious roots. For example grass, banyan tree etc.
3. Answer: The stem is the ascending part of the axis bearing branches leaves, flowers and fruits. It develops from the plumule of the embryo of a germinating seed. The stem bears nodes and internodes. The region of the stem where leaves are born is called nodes while

the portion between two nodes is called an internode. The stem is generally green when young and later becomes woody and dark brown.

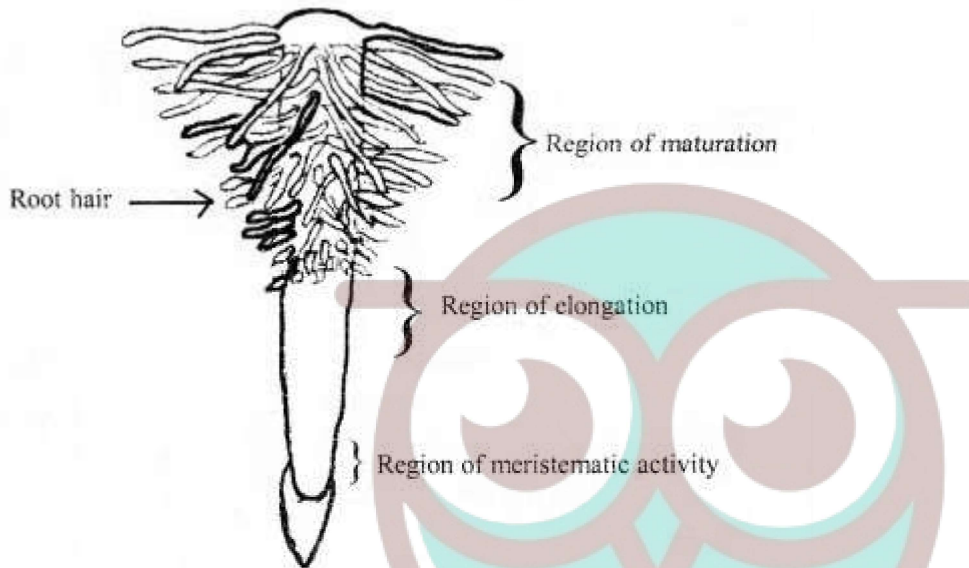
4. Answer: The main functions of stem are as follows:
- (a) Spreading out branches bearing leaves, flowers and fruits.
 - (b) To conduct water, minerals and photosynthates.
 - (c) Some stems perform the function of storage of food, support, protection and vegetative propagation.
5. Answer: The leaf consists of three main parts-leaf base, petiole and lamina.
- (a) Leaf base: The leaf is attached to the stem by the leaf base.
 - (b) Petiole: The petiole help hold the blade to light.
 - (c) Lamina: It is the green expanded part of the leaf with veins and veinlets.
6. Answer: Functions of petiole:
- (a) The petiole helps hold the blade to light.
 - (b) It allows leaf blades to flutter in wind, thereby cooling the leaf and bringing fresh air to the leaf surface.
- Functions of Lamina
- (a) The veins of the lamina provide rigidity to the leaf blade
 - (b) It acts as channels of transport for water, minerals and food materials.
7. Answer: The arrangement of veins and the veinlets in the lamina of the leaf is termed venation. The veinlets in the form of a network are termed reticulate and when the veins run parallel to each other within a lamina, the venation is termed as parallel. Dicotyledonous plants generally possess reticulate venation while monocotyledonous generally possess parallel venation.
8. Answer: The two types of compound leaves are:
- (a) Pinnately compound leaf: In which a number of leaflets are present on a common axis, the rachis, which represents the midrib of the leaf as in neem.
 - (b) Palmately compound leaves: The leaflets are attached at a common point, i.e., at the tip of the petiole, as in silk cotton.

➤ Long Answer:

1. Answer: At the apex, the root is covered by a thimble-like structure called the root cap. The root cap protects the tender apex of the root as it penetrates the soil. A few millimetres above the root cap is the region of meristematic activity. The cells present in this region are very small, thin-walled and with dense protoplasm.

The cells proximal to this region undergo rapid elongation and enlargement and are also

responsible for the growth of the root in length. This region is called the region of elongation. The cells of this region gradually differentiate and mature. This zone proximal to the region of elongation is called the region of maturation. Some epidermal cells, from this region, form very fine and delicate, thread-like structures called root hairs. The functions of these root hairs are to absorb water and minerals from the soil.



The regions of the root-tip

2. Answer: When the lamina of the leaf is entire or incised and the incisions do not touch the midrib, the leaf is said to be simple. A leaf is said to be compound when the incisions of the lamina reach up to the midrib breaking it into a number of leaflets. In both simple and compound leaves a bud is present in the axil of the petiole. However, a bud is not present in the axil of leaflets of the compound leaf.

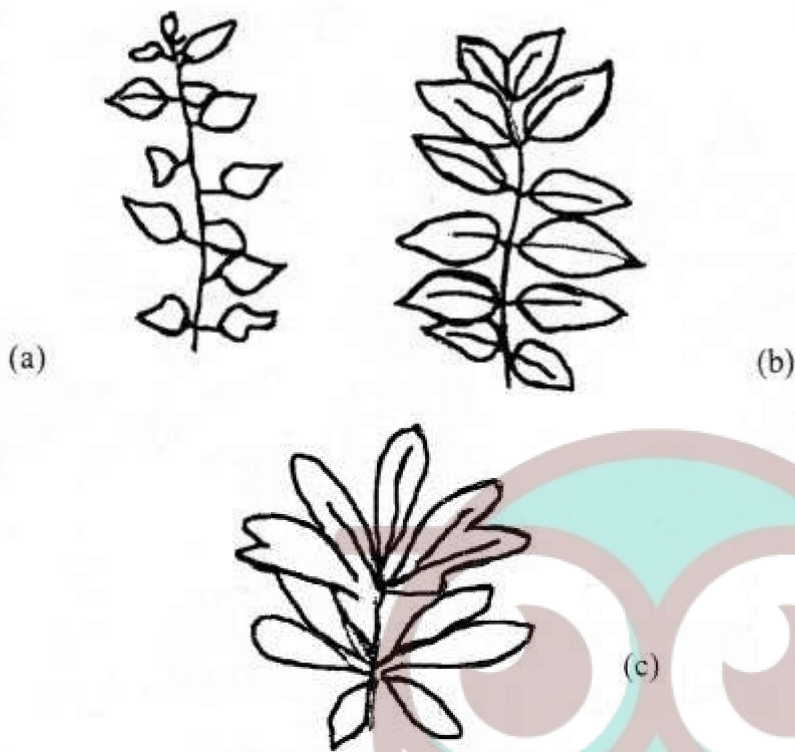
There are two types of compound leaves:

- (a) Pinnately compound leaf
- (b) Palmately compound leaf

In a pinnately compound leaf, a number of leaflets are present on a common axis, the rachis, which represents the midrib of the leaf. However in palmately compound leaves, the leaflets are attached at a common point,

i. e, the tip of the petiole.

Phyllotaxy refers to the pattern of arrangement of leaves on the stem or branch. Phyllotaxy is of three types alternate, opposite and whorled. A single leaf that arises at each node in an alternate manner is called alternate phyllotaxy, for example, as in china rose. When a pair of leaves arise at each node and lie opposite to each other it is called opposite phyllotaxy, for example in calotropis. If more than two leaves arise at a node and form a whorl it is called whorled phyllotaxy, as in Alstonia.



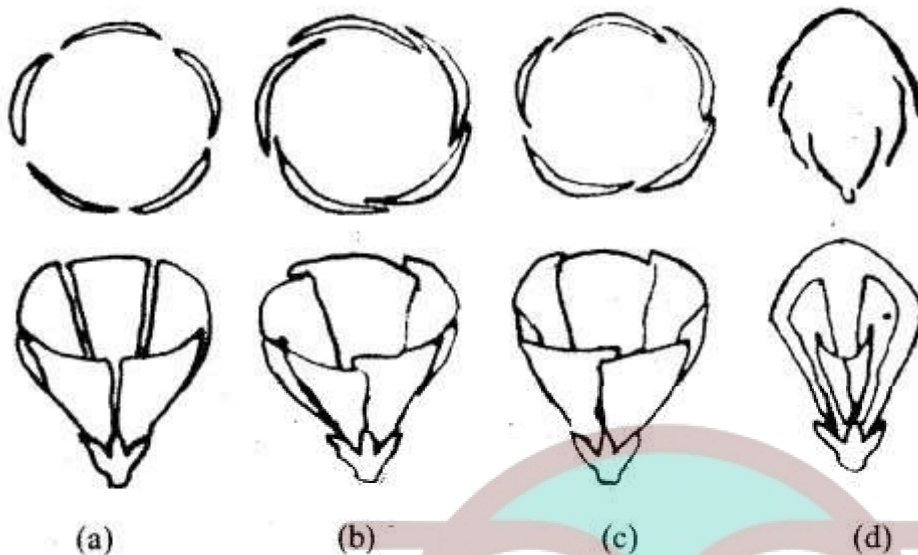
Different types of phyllotaxy: (a) Alternate (b) Opposite (c) Whorled

3. Answer: A flower is a reproductive unit in the angiosperms. It is meant for sexual reproduction. Four different kinds of whorls are found in a flower. These are arranged successively on the swollen end of the stalk or pedicel, called the thalamus or receptacle. These are calyx, corolla, androecium and gynoecium.

(a) Calyx: It is the outermost whorl of the flower and its members are called sepals. Mostly the sepals are green in colour, leaf-like and protect the flower in the bud stage. The calyx may be gamosepalous (in which sepals are united) or polysepalous (in which sepals are free).

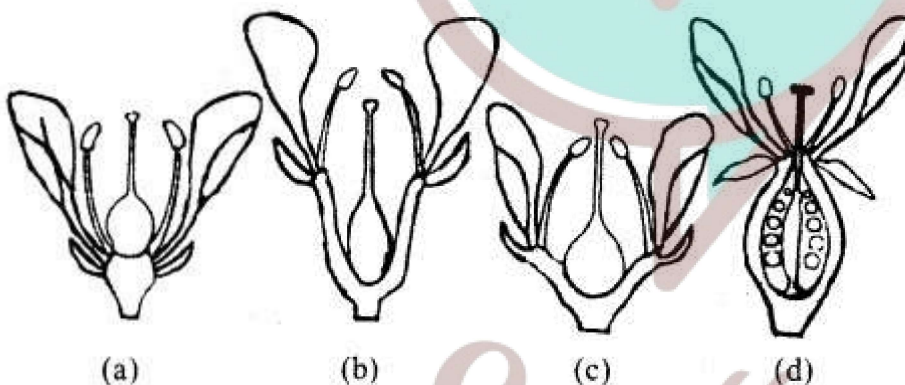
(b) Corolla: It is composed of petals that are usually brightly coloured to attract insects for pollination. The shape of the corolla may be tubular, bell-shaped, funnel-shaped or wheel-shaped.

(c) Aestivation: The pattern of arrangement of sepals or petals in the floral bud with respect to the other members of the same whorl is known as aestivation. The main types of aestivation are valvate, twisted, imbricate and vexillary.



Types of aestivation in corolla: (a) Valvate (b) Twisted (c) Imbricate (d) Vexillary

(d) Androecium: It is composed of stamens which are male reproductive organs of a flower. Each stamen consists of a stalk or a filament and an anther. Each anther is usually bilobed. There are two chambers (pollen sacs) in each lobe. The pollen grains are produced in pollen sacs.



Position of floral parts on thalamus : (a) Hypogynous (b) and (c) Perigynous (d) Epigynous

(e) Gynoecium: It is the female reproductive part of the flower. It is made up of one or more carpels. A carpel consists of three parts ovary, stigma and style. The stigma is at the tip of the style and is the receptive surface for pollen grains. The ovary is an enlarged basal part. The style connects the ovary to the stigma. Each ovary bears one or more ovules attached to a flattened, cushion-like placenta.

A flower may be trimerous tetramerous or pentamerous when the floral appendages are in multiples of 3, 4 and 5 respectively.

The flowers are described as hypogynous perigynous and epigynous based on the position of calyx, corolla and androecium in respect of the ovary on the thalamus.

Assertion Reason Answer-

1. (a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

Explanation: Root cap is the terminal part of root.

2. (c) If Assertion is true but Reason is false.

Explanation: A number of thin, thread-like branched roots develop from the base of the stem in fibrous root system. The roots are of nearly equal size. They form a bunch which helps in holding the soil firmly. It provides good anchorage to the plant, helps in proper absorption of water and minerals. This root system is found in many monocots. Examples of plants having fibrous root system are wheat and barley.

Case Study Answer-

1. Answer:

1.) d

2.) d

3.) Roots perform the following functions:

- Roots absorb water and nutrients from the soil.
- They anchor the plant firmly.
- They help in storing food and nutrients.
- Roots transport water and minerals to the plant.

4.) The roots developed from different parts of the plant other than radicle are called as the adventitious roots.

5.) Root modification – Roots in some plants change their shape and structure and become modified to perform functions other than absorption and conduction of water and minerals. They are modified for support, storage of food and respiration.

Examples,

- Tap roots of carrot.
- Adventitious roots of sweet potato, get swollen and store food.

6.) Pneumatophores – In some plants many roots come out of the ground and grow vertically upwards. Such roots, called pneumatophores, help to get oxygen for respiration.

2. Answer:

1.) b

2.) c

3.) A typical leaf consists of three main parts: leaf base, petiole and lamina.

- Leaf base – The leaf is attached to the stem by the leaf base and may bear two lateral small leaf like structures called stipules. In monocot, the leaf base expands into a

sheath covering the stem partially or wholly. In some leguminous plants the leaf base may become swollen, which is called the pulvinus.

- Petiole – The petiole help hold the blade to light. Long thin flexible petioles allow leaf blades to flutter in wind, thereby cooling the leaf and bringing fresh air to leaf surface.
- Lamina – The lamina or the leaf blade is the green expanded part of the leaf with veins and veinlets. There is, usually, a middle prominent vein, which is known as the midrib. Veins provide rigidity to the leaf blade and act as channels of transport for water, minerals and food materials.

4.) Venation is the arrangement of veins and the veinlets in the lamina of leaf is termed as venation.

- Reticulate venation – When the veinlets form a network, the venation is termed as reticulate. Leaves of dicotyledonous plants generally possess reticulate venation.
- Parallel venation – When the veins run parallel to each other within a lamina, the venation is termed as parallel, while parallel venation is the characteristic of most monocotyledons.

5.) The pattern in which the leaves are arranged on the stem is known as phyllotaxy. These are of three types:

- Alternate Phyllotaxy- The leaf arises from each node in an alternate manner. For eg. China rose, sunflower.
- Opposite Phyllotaxy- The leaves arising at each node lie opposite to each other. For eg., Calotropis
- Whorled Phyllotaxy– More than two leaves arise at each node and form a whorl. For eg., Alstonia

Swotters