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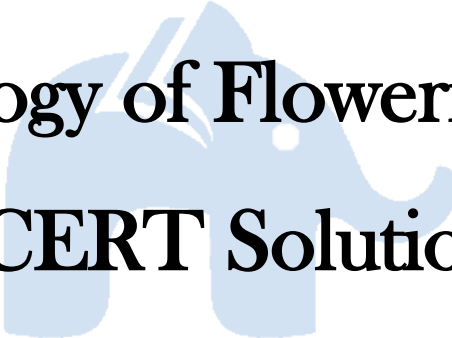
# **Class 11**

# **BIOLOGY**

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# Morphology of Flowering Plants

## NCERT Solutions



**Question 1.**

What is meant by modification of root? What type of modification of root is found in the:

- (a) Banayan tree
- (b) Turnip
- (c) Mangrove trees

**Answer.**

The main function of root is absorption of water and minerals from soil. Roots are modified to produce various functions like storage of food, support to the plant, respiration and absorption of oxygen from the atmosphere.

- (a) Banayan tree – Roots are modified to provide mechanical support. Banayan has prop roots which provide mechanical support to the tree. It arises from branches and enters the soil.
- (b) Turnip – Roots of turnip are modified for storage of food. This is napiform root modification.
- (c) Mangrove trees – Roots of mangroves grow vertically upward from the soil and are modified for absorption of oxygen from the atmosphere. These are called pneumatophores.

**Question 2.**

Justify the following statements on the basis of external features:

- (i) Underground parts of a plant are not always roots.
- (ii) Flower is a modified shoot.

**Answer.**

(i) In some plants, stem is underground and carry out additional functions like storage of food. For example: ginger has an underground stem.

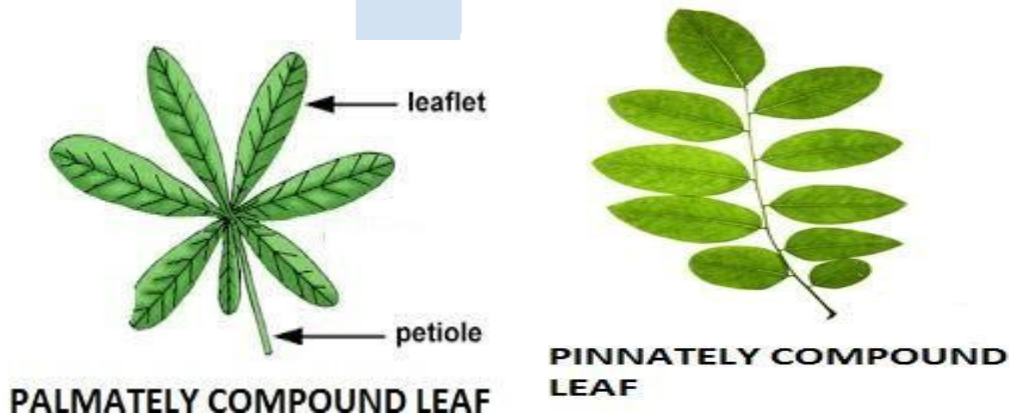
(ii) Sometimes apical meristem gives rise to the floral meristem.

**Question 3.**

How is a pinnately compound leaf different from palmately compound leaf?

**Answer.**

PINNATELY COMPOUND LEAF	PALMATELY COMPOUND LEAF
Leaves are attached to the common axis.	Leaves are attached at a common point.
Example: Neem	Example: Silk cotton



**Question 4.**

Explain with suitable examples the different types of phyllotaxy.

**Answer.**

Phyllotaxy is the pattern of arrangement of leaves on the stem or branch.

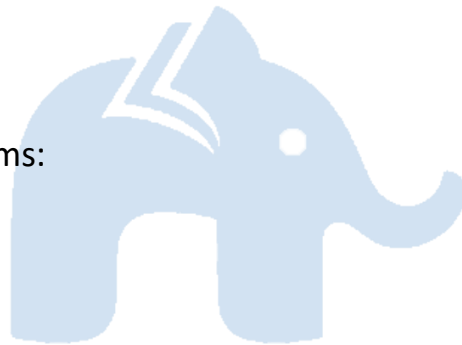
They are of three types:

- 1) **Alternate:** a single leaf arise at each node in alternate manner. E.g. china rose, sunflower.
- 2) **Opposite:** a pair of leaves arise at each node and lie opposite to each other. E.g. guava, jamun.
- 3) **Whorled:** when three or more leaves arise at each node and form a whorl. E.g. Alstonia

**Question 5.**

Define the following terms:

- (a) aestivation
- (b) placentation
- (c) actinomorphic
- (d) zygomorphic
- (e) superior ovary
- (f) perigynous flower
- (g) epipetalous stamen



**Answer.**

- (a) **Aestivation:** It defined as the mode of arrangement of sepals and petals in a floral bud.

- (b) **Placentation:** It is defined as the arrangement of ovules within the ovary of a flower.
- (c) **Actinomorphic:** When a flower can be divided into two equal radial halves in any radial plane passing through the centre, it is called actinomorphic symmetry.
- (d) **Zygomorphic:** When a flower can be divided into two similar halves only in one particular vertical plane, it is called zygomorphic symmetry.
- (e) **Superior Ovary:** In hypogynous flower, gynoecium occupies the highest position while the other parts are situated below it. This ovary is called superior ovary.
- (f) **Perigynous flower:** If gynoecium is situated in the centre and other parts of the flower are located on the rim of the thalamus almost at the same level. This ovary is called perigynous flower.
- (g) **Epipetalous stamen:** When stamens are attached to the petals, they are called epipetalous stamens.

**Question 6.**

Differentiate between

- (a) Racemose and cymose inflorescence
- (b) Fibrous and adventitious root
- (c) Apocarpous and syncarpous ovary

**Answer.**

	<b>RACEMOSE INFLORESCENCE</b>	<b>CYMOSE INFLORESCENCE</b>
<b>Main axis</b>	Main axis continues to grow and produce flowers laterally.	Main axis terminates in a flower.
<b>Growth</b>	Unlimited	Limited
<b>Arrangement of flowers</b>	Centripetal arrangement of flowers in a group.	Centrifugal arrangement of flowers in a group.
<b>Succession</b>	Flowers are borne in an acropetal succession. Younger flowers at the tip while older flowers are arranged at the base of this inflorescence.	Flowers are borne in a basipetal succession. Younger flowers are present at the base of the inflorescence while older flowers are present at the top.

	<b>FIBROUS ROOT</b>	<b>ADVENTITIOUS ROOT</b>
<b>Occurrence</b>	It occurs in place of tap root system at the base of the stem.	Roots arise from various parts of the plant other than radical.
<b>Functions</b>	Absorption of water and mineral salts.	Clinging, support, storage, reproduction.
<b>Root texture</b>	Thin and fibrous.	Thin, thick or variously modified.

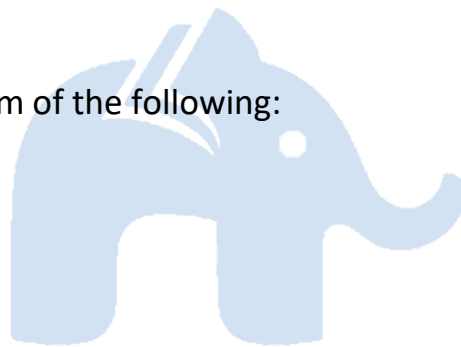
<b>Location</b>	Underground	Above or underground.
<b>Example</b>	Wheat	Banyan

	<b>APOCARPOUS OVARY</b>	<b>SYNCARPOUS OVARY</b>
<b>Number of carpels</b>	The flowers with apocarpous ovary have more than one carpel.	The flowers with syncarpous ovary have more than one carpel.
<b>Types of carpels</b>	Free	Fused
<b>Examples</b>	Lotus	Mustard

**Question 7.**

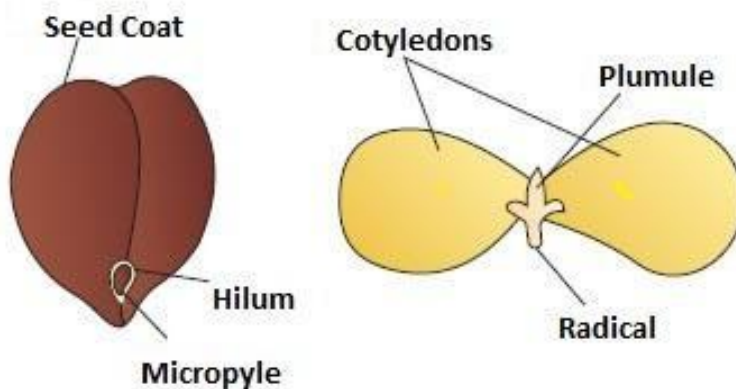
Draw the labeled diagram of the following:

- (i) Gram seed
- (ii) V.S. of maize seed



**Answer.**

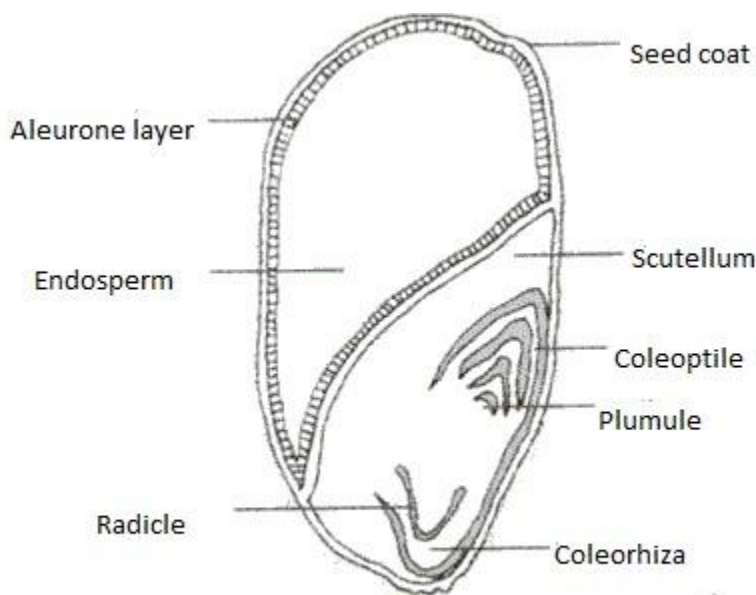
**Gram seed**



**STRUCTURE OF GRAM SEED**



**V. S. of maize seed**



**V.S. OF MAIZE SEED**

**Question 8.**

Describe modifications of stem with suitable examples.

**Answer.**

**Modifications of stem**

- 1) **Modification for food storage** - Underground stems are modified for storage of food like in potato, ginger, turmeric. They act as organs of perennation to tide over conditions unfavourable for growth.
- 2) **Modification for support** – Stem in weak plants have thin, slender and spirally-coiled structures called tendrils which help the plant get attached to nearby structures for support.
- 3) **Photosynthetic stems** – Stem as in *Opuntia* are green which carry out photosynthesis.

- 4) **Protective stems** – Some plants bear thorn which protects them from herbivores as in lemon.

**Question 9.**

Take one flower each of the families Fabaceae and Solanaceae and write its semi-technical description. Also draw their floral diagram after studying them.

**Answer.**

**FAMILY FABACEAE**

Example: Pea

Vegetative Features:

- 1) Tap root system with root nodules.
- 2) Pinnately compound leaf, simple, reticulate venation
- 3) Stem is erect or climber

Floral Formula:



$K(5) C_{1+2+(2)} A_{(9)+1} \underline{G}_1$

Floral Diagram:



**FLORAL DIAGRAM OF FABACEAE**

**FAMILY SOLANACEAE**

Example: *Solanum*

Features: 1) Erect and herbaceous stem  
 2) Reticulate venation, alternate, simple,  
 rarely pinnately

Floral Formula:  $\oplus \text{♀} \overline{\text{K}(5)} \text{C}(5) \text{A}_5 \underline{\text{G}}(2)$

Floral Diagram:



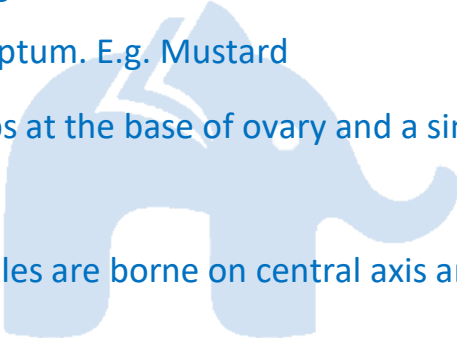
**FLORAL FORMULA OF SOLANACEAE**

**Question 10.**

Describe the various types of placentations found in flowering plants.

**Answer.**

**Placentation** is the arrangement of ovules within the ovary. They are of five types:

- 1) **Marginal** – Placenta forms a ridge along the ventral suture of the ovary and ovules are borne on this ridge forming two rows. E.g. pea
  - 2) **Axile** – When placenta is axial and ovules are attached to it. E.g. tomato
  - 3) **Parietal** – Ovules develop on the inner wall of the ovary or on the peripheral part. Ovary is usually single chambered but becomes two chambered due to the formation of false septum. E.g. Mustard
  - 4) **Basal** – Placenta develops at the base of ovary and a single ovule is attached to it. E.g. sunflower
  - 5) **Free central** – When ovules are borne on central axis and septa is absent. E.g. Primrose
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**Question 11.**

What is a flower? Describe the parts of a typical angiosperm flower.

**Answer.**

Flower is a reproductive unit in angiosperms which is meant for sexual reproduction. A typical flower has four kinds of whorls arranged on thalamus, namely calyx, corolla, androecium and gynoecium.

**Calyx:** It is the outermost whorl of the flower, also called as sepals. They can be free or united. They are green in color and protect flower in bud stage.

**Corolla:** Also called as petals are the bright colored structures which attract insects for pollination. They can be free or united.

**Androecium:** Also called as stamens, are the male reproductive parts of the flowers. They consist of filament and anther. Anther contains male gametes called pollen grains.

**Gynoecium:** Also called as carpels or pistil are the female reproductive parts of the flower. They consist of style, style and ovary. Ovary contains female gametes called ovules.

**Question 12.**

How do the various leaf modifications help plants?

**Answer.**

**Modification of leaves:**

- 1) Support – Leaves are converted into tendrils for climbing. E.g. pea
- 2) Defense – Leaves are converted into spines. E.g. cactus
- 3) Insectivores – Leaves are converted into insect trapping structures. E.g. Pitcher plant
- 4) Food storage – Leaves are modified to store food. E.g. Onion
- 5) Photosynthesis – Leaves of some plants are short-lived and replaced by phyllode that arise from the petiole of the leaves which synthesize food. E.g. Australian acacia

**Question13**

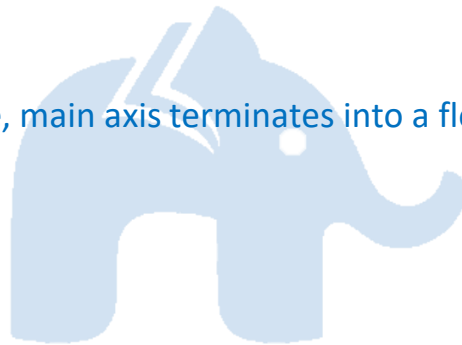
Define the term inflorescence. Explain the basis for the different types of inflorescence in flowering plants.

**Answer.**

Inflorescence is defined as the arrangement of flowers on the flowering axis. Vegetative apex of the stem gets converted into a floral meristem during flowering season.

On the basis of the floral axis growth or termination in a flower, inflorescence is categorized into two racemose and cymose.

- In **racemose inflorescence**, floral axis continues to grow and produce flowers laterally.
- In **cymose inflorescence**, main axis terminates into a flower and growth is limited.



**Question 14.**

Write the floral formula of an actinomorphic, bisexual, hypogynous flower with five united sepals, five free petals, five free stamens and two united carpels with superior ovary and axile placentation.

**Answer.**

The floral formula of the above described flower is represented as



$\oplus \text{♀} \text{♂}$  represents actinomorphic and bisexual flower.

K stands for calyx with five united sepals.

C stands for corolla which are five in number and free.

A stands for androecium which have five free stamens.

G stands for gynoecium which are two in number and line Under G shows that ovary is superior.

**Question 15.**

Describe the arrangement of floral members in relation to their insertion on thalamus.

**Answer.**

In a typical flower, floral parts like calyx, corolla, androecium and gynoecium are arranged over thalamus. Based in their position with respect to thalamus, they are divided into three types: hypogynous, perigynous and epigynous.

Hypogynous flowers are those in which ovary occupies highest position and other parts are situated below it. E.g. in china rose.

Perigynous flowers are those in which ovary is situated in the centre and other floral parts are arranged around it. E.g. Rose

Epigynous flowers are those in which thalamus grows high covering ovary completely and gets fused with it and other parts arise above the ovary. E.g. sunflower.

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