

# Chapter 5: Morphology of Flowering Plants

## Comprehensive Study Notes

### Class 11 Biology - NCERT Based

**EXAM SPRINT** - Complete Coverage for NEET and Board Examinations

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## Introduction

Flowering plants (Angiosperms) show remarkable diversity in external structure or morphology despite sharing common features: roots, stems, leaves, flowers, and fruits. Understanding morphological variations and adaptations is crucial for plant classification and identification.

### Basic Plant Organization:

- **Underground part:** Root system
- **Above ground part:** Shoot system (stem, leaves, flowers, fruits)

### Importance of Morphological Study:

- **Classification:** Standard technical terms and definitions
  - **Identification:** Understanding variations and adaptations
  - **Evolution:** Structural modifications for different environments
  - **Taxonomy:** Basis for plant family characteristics
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## 5.1 THE ROOT

### Definition and Origin:

- **Primary root:** Direct elongation of radicle in dicots
- **Function:** Absorption, anchorage, storage, hormone synthesis
- **Growth pattern:** Grows inside soil, bears lateral roots

## **Types of Root Systems:**

### **1. Tap Root System:**

- **Occurrence:** Dicotyledonous plants
- **Structure:** Primary root + secondary, tertiary roots
- **Example:** Mustard plant
- **Characteristics:** Main root prominent, lateral roots smaller

### **2. Fibrous Root System:**

- **Occurrence:** Monocotyledonous plants
- **Structure:** Primary root short-lived, replaced by numerous roots from stem base
- **Example:** Wheat plant
- **Characteristics:** No main root, all roots similar size

### **3. Adventitious Root System:**

- **Origin:** From parts other than radicle
- **Examples:** Grass, Monstera, Banyan tree
- **Special cases:** Prop roots, stilt roots

## **Functions of Root System:**

1. **Absorption:** Water and minerals from soil
2. **Anchorage:** Proper support to plant parts

3. **Storage:** Reserve food materials
4. **Synthesis:** Plant growth regulators (hormones)

### 5.1.1 Regions of Root

#### Root Cap:

- **Structure:** Thimble-like covering at apex
- **Function:** Protects tender root apex during soil penetration
- **Composition:** Dead, thick-walled cells

#### Region of Meristematic Activity:

- **Location:** Few mm above root cap
- **Cells:** Small, thin-walled, dense protoplasm
- **Function:** Repeated cell division for growth

#### Region of Elongation:

- **Location:** Above meristematic region
- **Process:** Rapid cell elongation and enlargement
- **Function:** Responsible for root length increase

#### Region of Maturation:

- **Location:** Above elongation region
- **Features:** Cell differentiation and maturation
- **Root hairs:** Fine, thread-like extensions for absorption
- **Function:** Water and mineral absorption

#### Root Modifications (Additional Information for NEET):

**For Storage:**

- **Fusiform:** Radish (swollen in middle)
- **Napiform:** Turnip (swollen at top)
- **Conical:** Carrot (broad at top, narrow at bottom)
- **Tuberous:** Sweet potato (swollen without definite shape)

**For Support:**

- **Prop roots:** Banyan tree
- **Stilt roots:** Maize, sugarcane
- **Buttress roots:** Large trees

**For Respiration:**

- **Pneumatophores:** Mangrove plants
  - **Function:** Gaseous exchange in waterlogged soils
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## 5.2 THE STEM

**Definition and Characteristics:**

- **Structure:** Ascending axis bearing branches, leaves, flowers, fruits
- **Origin:** Develops from plumule of germinating seed
- **Features:** Bears nodes and internodes
- **Color:** Generally green when young, woody and brown when mature

**Distinguishing Features:****Nodes and Internodes:**

- **Nodes:** Regions where leaves arise
- **Internodes:** Portions between two nodes
- **Significance:** Characteristic feature distinguishing stem from root

#### **Buds:**

- **Terminal bud:** At stem tip
- **Axillary bud:** In leaf axil
- **Function:** Give rise to branches

#### **Functions of Stem:**

1. **Support:** Spreading branches with leaves, flowers, fruits
2. **Conduction:** Water, minerals, and photosynthates transport
3. **Storage:** Food storage in some stems
4. **Protection:** Thorns and spines
5. **Vegetative propagation:** Runners, stolons, bulbs

#### **Stem Modifications (Important for NEET):**

##### **Underground Modifications:**

- **Rhizome:** Ginger, turmeric (horizontal growth)
- **Tuber:** Potato (swollen tips of stolons)
- **Bulb:** Onion (shortened stem with fleshy leaves)
- **Corm:** Colocasia (swollen stem base)

##### **Aerial Modifications:**

- **Tendrils:** Grape, cucumber (climbing support)

- **Thorn:** Bougainvillea, lemon (protection)
  - **Phylloclade:** Opuntia (flattened, leaf-like)
  - **Cladode:** Asparagus (cylindrical, green branches)
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## 5.3 THE LEAF

### Definition and Origin:

- **Structure:** Lateral, generally flattened organ on stem
- **Origin:** Develops at nodes from shoot apical meristem
- **Arrangement:** Acropetal order (young leaves toward apex)
- **Function:** Primary organ for photosynthesis

### 5.3.1 Parts of a Typical Leaf:

#### 1. Leaf Base:

- **Function:** Attaches leaf to stem
- **Stipules:** Two lateral, small leaf-like structures
- **Monocots:** Expands into sheath covering stem
- **Pulvinus:** Swollen leaf base in leguminous plants

#### 2. Petiole:

- **Structure:** Stalk connecting leaf base to lamina
- **Function:** Positions blade for optimal light exposure
- **Flexibility:** Allows movement in wind for cooling
- **Sessile leaves:** Leaves without petiole

### 3. Lamina (Leaf Blade):

- **Structure:** Green, expanded portion
- **Midrib:** Prominent central vein
- **Veins and veinlets:** Transport channels and support
- **Variations:** Shape, margin, apex, surface texture

### 5.3.1 Venation Patterns:

#### Reticulate Venation:

- **Pattern:** Veinlets form network
- **Occurrence:** Dicotyledonous plants
- **Examples:** Mango, peepal

#### Parallel Venation:

- **Pattern:** Veins run parallel to each other
- **Occurrence:** Monocotyledonous plants
- **Examples:** Grass, banana, maize

### 5.3.2 Types of Leaves:

#### Simple Leaves:

- **Definition:** Lamina entire or incisions don't reach midrib
- **Axillary bud:** Present in axil of petiole
- **Examples:** Mango, peepal

#### Compound Leaves:

- **Definition:** Incisions reach midrib, breaking into leaflets

- **Axillary bud:** Present in axil of petiole, not leaflets
- **Types:** Pinnately and palmately compound

#### **Pinnately Compound:**

- **Structure:** Leaflets on common axis (rachis)
- **Rachis:** Represents midrib of leaf
- **Examples:** Neem, rose, tamarind

#### **Palmately Compound:**

- **Structure:** Leaflets attached at common point (petiole tip)
- **Examples:** Silk cotton, cannabis

### **5.3.3 Phyllotaxy (Leaf Arrangement):**

#### **Alternate Phyllotaxy:**

- **Pattern:** Single leaf at each node alternately
- **Examples:** China rose, mustard, sunflower

#### **Opposite Phyllotaxy:**

- **Pattern:** Pair of leaves at each node, opposite each other
- **Examples:** Calotropis, guava

#### **Whorled Phyllotaxy:**

- **Pattern:** More than two leaves at each node forming whorl
- **Examples:** Alstonia

## **Leaf Modifications (NEET Important):**

### **For Support:**

- **Tendrils:** Pea (leaflet modification)
- **Hooks:** Bougainvillea

### **For Protection:**

- **Spines:** Cactus, Opuntia
- **Scale leaves:** Underground stems

### **For Storage:**

- **Succulent leaves:** Aloe, Agave
- **Bulb scales:** Onion

### **For Insect Capture:**

- **Pitcher:** Nepenthes
  - **Venus flytrap:** Dionaea
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## **5.4 THE INFLORESCENCE**

### **Definition:**

- **Concept:** Arrangement of flowers on floral axis
- **Formation:** Shoot apical meristem → floral meristem
- **Modification:** Internodes don't elongate, axis condenses
- **Solitary flower:** When single shoot tip becomes flower

## **Classification Based on Growth Pattern:**

### **5.4.1 Racemose Inflorescence:**

#### **Characteristics:**

- **Main axis:** Continues to grow (indeterminate)
- **Flower arrangement:** Lateral, in acropetal succession
- **Age pattern:** Older flowers toward base, younger toward apex

#### **Types:**

- **Raceme:** Flowers with stalks on elongated axis (mustard)
- **Spike:** Flowers without stalks on elongated axis (Achyranthes)
- **Catkin:** Spike with unisexual flowers (mulberry)
- **Spadix:** Spike with fleshy axis (palm)
- **Corymb:** Flowers at same level due to different stalk lengths (candytuft)
- **Umbel:** Flowers arise from common point (onion)
- **Head/Capitulum:** Sessile flowers on flat receptacle (sunflower)

### **5.4.2 Cymose Inflorescence:**

#### **Characteristics:**

- **Main axis:** Terminates in flower (determinate)
- **Growth:** Limited
- **Flower arrangement:** Basipetal order (older flowers toward apex)

#### **Types:**

- **Monochasial cyme:** One lateral branch (Heliotropium)

- **Dichasial cyme:** Two lateral branches (jasmine)
- **Polychasial cyme:** Many lateral branches (Callistemon)

### **Special Inflorescences:**

- **Cyathium:** Euphorbia (cup-shaped with unisexual flowers)
  - **Hypanthodium:** Ficus (hollow receptacle with flowers inside)
  - **Verticillaster:** False whorl in mints
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## **5.5 THE FLOWER**

### **Definition and Function:**

- **Structure:** Reproductive unit in angiosperms
- **Purpose:** Sexual reproduction
- **Composition:** Four whorls on swollen stalk end (thalamus/receptacle)

### **Flower Symmetry:**

#### **Actinomorphic (Radial Symmetry):**

- **Definition:** Can be divided into equal halves by any radial plane
- **Examples:** Mustard, datura, chilli
- **Symbol:**  $\oplus$

#### **Zygomorphic (Bilateral Symmetry):**

- **Definition:** Can be divided into equal halves by only one vertical plane
- **Examples:** Pea, gulmohur, bean, Cassia
- **Symbol:** %

**Asymmetric (Irregular):**

- **Definition:** Cannot be divided into equal halves by any plane
- **Examples:** Canna

**Flower Sexuality:****Bisexual (Perfect/Hermaphrodite):**

- **Structure:** Both androecium and gynoecium present
- **Symbol:** ♂
- **Examples:** Hibiscus, mustard

**Unisexual (Imperfect):**

- **Types:** Only stamens (male ♂) or only carpels (female ♀)
- **Plant types:** Monoecious (both sexes on same plant), dioecious (sexes on different plants)

**Floral Parts Number:**

- **Trimerous:** Parts in multiples of 3 (monocots)
- **Tetramerous:** Parts in multiples of 4
- **Pentamerous:** Parts in multiples of 5 (dicots)

**Bract Presence:**

- **Bracteate:** With bracts (reduced leaves at pedicel base)
- **Ebracteate:** Without bracts

**Position of Ovary:****Hypogynous:**

- **Position:** Gynoecium at highest position, other parts below
- **Ovary:** Superior
- **Examples:** Mustard, china rose, brinjal

#### **Perigynous:**

- **Position:** Gynoecium central, other parts on thalamus rim at same level
- **Ovary:** Half inferior
- **Examples:** Plum, rose, peach

#### **Epigynous:**

- **Position:** Thalamus margin grows upward, fusing with ovary
- **Ovary:** Inferior (other parts above ovary)
- **Examples:** Guava, cucumber, sunflower ray florets

### **5.5.1 Parts of Flower:**

#### **5.5.1.1 Calyx:**

##### **Structure and Function:**

- **Position:** Outermost whorl
- **Members:** Sepals
- **Characteristics:** Generally green, leaf-like
- **Function:** Protection during bud stage

##### **Types:**

- **Polysepalous:** Sepals free (china rose)
- **Gamosepalous:** Sepals united (hibiscus)

- **Persistence:** Persistent or caducous (falling off)

### 5.5.1.2 Corolla:

#### Structure and Function:

- **Position:** Second whorl
- **Members:** Petals
- **Characteristics:** Brightly colored
- **Function:** Attract insects for pollination

#### Types:

- **Polypetalous:** Petals free (rose)
- **Gamopetalous:** Petals united (morning glory)

#### Shapes:

- **Tubular:** Tube-like (tobacco)
- **Bell-shaped:** Campanulate (morning glory)
- **Funnel-shaped:** Infundibuliform (Datura)
- **Wheel-shaped:** Rotate (tomato)

#### Aestivation (Arrangement in Bud):

##### Valvate:

- **Pattern:** Sepals/petals just touch at margins without overlapping
- **Examples:** Calotropis, Annona

##### Twisted (Contorted):

- **Pattern:** One margin overlaps the next in regular sequence
- **Examples:** China rose, lady's finger, cotton

#### **Imbricate:**

- **Pattern:** Margins overlap irregularly
- **Examples:** Cassia, gulmohur

#### **Vexillary (Papilionaceous):**

- **Pattern:** Five petals - largest (standard) overlaps two lateral (wings) which overlap two smallest anterior (keel)
- **Examples:** Pea, bean family

### **5.5.1.3 Androecium:**

#### **Structure:**

- **Position:** Third whorl (male reproductive)
- **Members:** Stamens
- **Parts:** Filament (stalk) + anther
- **Anther structure:** Bilobed, each lobe with two pollen sacs
- **Function:** Pollen grain production

#### **Stamen Attachment:**

- **Polyandrous:** Stamens free
- **Epipetalous:** Attached to petals (brinjal)
- **Epiphyllous:** Attached to perianth (lily)

#### **Stamen Union:**

- **Monoadelphous:** United into one bundle (china rose)
- **Diadelphous:** United into two bundles (pea)
- **Polyadelphous:** United into many bundles (citrus)

#### **Stamen Length Variation:**

- **Didynamous:** Four stamens, two long, two short (Salvia)
- **Tetradynamous:** Six stamens, four long, two short (mustard)

#### **Special Terms:**

- **Staminode:** Sterile stamen
- **Anther dehiscence:** Longitudinal, transverse, or poricidal

### **5.5.1.4 Gynoecium:**

#### **Structure:**

- **Position:** Central whorl (female reproductive)
- **Members:** Carpels
- **Parts:** Stigma + style + ovary

#### **Carpel Parts:**

- **Stigma:** Receptive surface for pollen (at style tip)
- **Style:** Elongated tube connecting ovary to stigma
- **Ovary:** Enlarged basal part containing ovules

#### **Carpel Arrangement:**

- **Apocarpous:** Carpels free (lotus, rose)

- **Syncarpous:** Carpels fused (mustard, tomato)

## **Placentation (Ovule Arrangement):**

### **Marginal:**

- **Structure:** Placenta forms ridge along ventral suture
- **Ovules:** In two rows
- **Examples:** Pea, bean

### **Axile:**

- **Structure:** Placenta axial in multilocular ovary
- **Examples:** China rose, tomato, lemon

### **Parietal:**

- **Structure:** Ovules on inner ovary wall
- **Chamber:** One, becomes two due to false septum
- **Examples:** Mustard, Argemone

### **Free Central:**

- **Structure:** Ovules on central axis, no septa
- **Examples:** Dianthus, Primrose

### **Basal:**

- **Structure:** Placenta at ovary base
- **Ovules:** Single ovule attached
- **Examples:** Sunflower, marigold

**Central:**

- **Structure:** Ovules attached to central column
  - **Examples:** Members of Caryophyllaceae
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## 5.6 THE FRUIT

**Definition and Formation:**

- **Origin:** Mature or ripened ovary after fertilization
- **Parthenocarpic fruit:** Formed without fertilization
- **Structure:** Pericarp (fruit wall) + seeds

**Pericarp Structure:****Layers:**

- **Epicarp:** Outer layer (skin)
- **Mesocarp:** Middle layer (flesh)
- **Endocarp:** Inner layer (around seed)

**Fruit Types (Important for NEET):****Simple Fruits:**

- **Drupe:** Fleshy fruit with stony endocarp (mango, coconut)
- **Berry:** Fleshy with soft endocarp (tomato, grapes)
- **Pome:** Fleshy with cartilaginous endocarp (apple, pear)
- **Capsule:** Dry, dehiscent (cotton, poppy)
- **Nut:** Dry, indehiscent, hard (groundnut)

### **Aggregate Fruits:**

- **Formation:** Multiple carpels of single flower
- **Examples:** Raspberry, strawberry

### **Composite Fruits:**

- **Formation:** Multiple flowers of inflorescence
- **Examples:** Pineapple, fig, mulberry

### **Special Cases:**

- **Mango:** Well-differentiated drupe (thin epicarp, fleshy mesocarp, stony endocarp)
  - **Coconut:** Fibrous mesocarp drupe
  - **False fruits:** Apple, strawberry (developed from thalamus)
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## **5.7 THE SEED**

### **Formation and Structure:**

- **Origin:** Ovules after fertilization
- **Basic structure:** Seed coat + embryo
- **Embryo components:** Radicle + embryonal axis + cotyledons

#### **5.7.1 Dicotyledonous Seed Structure:**

##### **Seed Coat:**

- **Layers:** Testa (outer) + tegmen (inner)
- **Hilum:** Scar of attachment to fruit

- **Micropyle:** Small pore above hilum

#### **Embryo:**

- **Cotyledons:** Two, fleshy, food storage
- **Radicle:** Future root (at one end of embryonal axis)
- **Plumule:** Future shoot (at other end of embryonal axis)

#### **Endosperm:**

- **Endospermic seeds:** Endosperm present (castor)
- **Non-endospermic seeds:** Endosperm absent (bean, gram, pea)

### **5.7.2 Monocotyledonous Seed Structure:**

#### **Maize Seed:**

- **Seed coat:** Fused with fruit wall (pericarp)
- **Endosperm:** Bulky, food storage
- **Aleurone layer:** Proteinous layer separating endosperm and embryo

#### **Embryo Structure:**

- **Scutellum:** Single, large, shield-shaped cotyledon
- **Axis:** Short with plumule and radicle
- **Coleoptile:** Sheath covering plumule
- **Coleorhiza:** Sheath covering radicle

#### **Seed Types Based on Endosperm:**

- **Endospermic:** Food stored in endosperm (castor, coconut, maize)
- **Non-endospermic:** Food stored in cotyledons (bean, pea, gram)

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## 5.8 SEMI-TECHNICAL DESCRIPTION

### Components of Description:

1. **Habit:** Herb, shrub, tree
2. **Vegetative characters:** Root, stem, leaves
3. **Floral characters:** Inflorescence, flower parts
4. **Floral diagram:** Visual representation
5. **Floral formula:** Symbolic representation

### Floral Formula Symbols:

#### Basic Symbols:

- **Br:** Bracteate
- **K:** Calyx (sepals)
- **C:** Corolla (petals)
- **P:** Perianth (when calyx and corolla similar)
- **A:** Androecium (stamens)
- **G:** Gynoecium (carpels)

#### Additional Symbols:

- $\bar{\mathbf{G}}$ : Superior ovary
- $\mathbf{G}$ : Inferior ovary
- $\mathbf{\sigma}$ : Male flower
- $\mathbf{\rho}$ : Female flower

- ♂: Bisexual flower
- $\oplus$ : Actinomorphic
- $\%$ : Zygomorphic
- $()$ : Fusion (gamosepalous/gamopetalous)
- **Line above**: Adhesion

### Example - Mustard (Brassicaceae):

**Floral Formula:**  $\oplus \ \text{♂} \ K_{2+2} \ C_4 \ A_{2+4} \ \bar{G}_{(2)}$

#### Interpretation:

- Actinomorphic, bisexual flower
- Calyx: 4 sepals (2+2 arrangement)
- Corolla: 4 free petals
- Androecium: 6 stamens (2 short + 4 long)
- Gynoecium: 2 fused carpels, superior ovary

## 5.9 FAMILY SOLANACEAE (Potato Family)

### Distribution:

- **Range:** Tropics, subtropics, temperate zones
- **Size:** Large family
- **Common name:** Nightshade family

### Vegetative Characters:

#### Habit:

- **Plants:** Mostly herbs, shrubs, rarely small trees

#### **Stem:**

- **Type:** Herbaceous, rarely woody
- **Nature:** Aerial, erect, cylindrical, branched
- **Structure:** Solid or hollow
- **Surface:** Hairy or glabrous
- **Special:** Underground stem in potato

#### **Leaves:**

- **Arrangement:** Alternate
- **Type:** Simple, rarely pinnately compound
- **Stipules:** Exstipulate
- **Venation:** Reticulate

#### **Floral Characters:**

##### **Inflorescence:**

- **Types:** Solitary, axillary, or cymose

##### **Flower:**

- **Sexuality:** Bisexual
- **Symmetry:** Actinomorphic

##### **Calyx:**

- **Number:** 5 sepals
- **Union:** United (gamosepalous)

- **Persistence:** Persistent
- **Aestivation:** Valvate

#### **Corolla:**

- **Number:** 5 petals
- **Union:** United (gamopetalous)
- **Aestivation:** Valvate

#### **Androecium:**

- **Number:** 5 stamens
- **Attachment:** Epipetalous

#### **Gynoecium:**

- **Carpels:** 2 (bicarpellary)
- **Position:** Obliquely placed
- **Union:** Syncarpous
- **Ovary:** Superior, bilocular
- **Placentation:** Axile
- **Ovules:** Many on swollen placenta

#### **Fruit:**

- **Types:** Berry or capsule

#### **Seeds:**

- **Number:** Many
- **Endosperm:** Present (endospermic)

### Floral Formula:

$$\oplus \text{ } \overline{\text{K}}_{(5)} \text{ } \text{C}_{(5)} \text{ } \text{A}_5 \text{ } \overline{\text{G}}_{(2)}$$

### Economic Importance:

#### Food Plants:

- **Tomato:** *Lycopersicon esculentum*
- **Brinjal/Eggplant:** *Solanum melongena*
- **Potato:** *Solanum tuberosum*

#### Spices:

- **Chilli:** *Capsicum annum*

#### Medicinal:

- **Belladonna:** *Atropa belladonna*
- **Ashwagandha:** *Withania somnifera*

#### Other Uses:

- **Tobacco:** *Nicotiana tabacum* (fumigatory)
- **Petunia:** Ornamental

### Important Members:

- ***Solanum nigrum*:** Makoi (black nightshade)
  - ***Datura*:** Thorn apple
  - ***Physalis*:** Ground cherry
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# **NEET-Specific Important Points**

## **High-Yield Topics for NEET:**

### **1. Root System Types:**

- Tap root vs fibrous root
- Root modifications and functions
- Root regions and their characteristics

### **2. Leaf Morphology:**

- Simple vs compound leaves
- Venation patterns (diagnostic for monocot/dicot)
- Phyllotaxy types
- Leaf modifications

### **3. Flower Structure:**

- Parts of flower and their functions
- Placentation types (very important)
- Floral formula interpretation
- Ovary position (superior/inferior)

### **4. Inflorescence Types:**

- Racemose vs cymose
- Economic importance of different types

### **5. Seed Structure:**

- Monocot vs dicot seed differences

- Endospermic vs non-endospermic

## **Common NEET Question Patterns:**

### **1. Identification Questions:**

- Identify plant parts from diagrams
- Recognize placentation types
- Distinguish inflorescence types

### **2. Comparison Questions:**

- Monocot vs dicot characteristics
- Simple vs compound leaves
- Root system types

### **3. Functional Questions:**

- Functions of different plant parts
  - Adaptive significance of modifications
  - Economic importance
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## **Memory Aids and Mnemonics**

### **Root Regions (Base to Tip):**

#### **"My Enthusiastic Elephants Make"**

- **M**aturation
- **E**longation

- **Meristematic**
- **Make** (Root cap)

### **Placentation Types:**

**"Many Ants Prefer Big Fresh Carrots"**

- **Marginal**
- **Axile**
- **Parietal**
- **Basal**
- **Free central**
- **Central**

### **Aestivation Types:**

**"Very Intelligent Tigers Visit"**

- **Vexillary**
- **Imbricate**
- **Twisted**
- **Valvate**

### **Floral Parts (Outside to Inside):**

**"Can Cows Always Give"**

- **Calyx**
- **Corolla**
- **Androecium**

- Gynoecium
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## Practice Questions for NEET

### Multiple Choice Questions:

1. Which type of root system is found in monocotyledonous plants? a) Tap root b) Fibrous root c) Adventitious root d) Both b and c
2. In which type of placentation are ovules borne on the central axis with no septa? a) Axile b) Parietal c) Free central d) Basal
3. The flower of mustard plant has: a) 4 sepals and 4 petals b) 6 stamens (4 long + 2 short) c) Superior ovary d) All of the above
4. Scutellum is found in: a) Dicotyledonous seed b) Monocotyledonous seed c) Both d) None
5. Which family is known as potato family? a) Brassicaceae b) Solanaceae c) Fabaceae d) Malvaceae

### Short Answer Questions:

1. Differentiate between simple and compound leaves with examples.
2. What is placentation? Describe different types with examples.
3. Define phyllotaxy. Explain its types with suitable examples.
4. Describe the structure of a dicotyledonous seed.
5. What are the distinguishing features of family Solanaceae?

### Long Answer Questions:

1. Describe the different types of inflorescence with examples.
2. Explain the structure and functions of different parts of a flower.

3. Compare the morphological features of monocotyledonous and dicotyledonous plants.
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## Important Diagrams for NEET

### Must-know Diagrams:

1. **Root regions:** Showing root cap, meristematic, elongation, and maturation zones
  2. **Types of roots:** Tap, fibrous, adventitious
  3. **Leaf types:** Simple, pinnately compound, palmately compound
  4. **Venation:** Reticulate vs parallel
  5. **Placentation types:** All six types with cross-sections
  6. **Flower structure:** Complete flower with all parts labeled
  7. **Seed structure:** Both monocot and dicot seeds
  8. **Floral diagram:** Standard representation method
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## Economic Importance Summary

### Food Plants:

- **Cereals:** Wheat, rice, maize (monocots)
- **Pulses:** Pea, bean, gram (legumes)
- **Vegetables:** Tomato, brinjal, potato (Solanaceae)
- **Fruits:** Mango, apple, orange

### Medicinal Plants:

- **Solanaceae:** Belladonna, ashwagandha

- **Others:** Neem, tulsi, aloe

### **Commercial Plants:**

- **Fiber:** Cotton (Malvaceae)
- **Oil:** Mustard, sunflower
- **Spices:** Chilli, turmeric

### **Ornamental Plants:**

- **Flowers:** Rose, jasmine, marigold
- **Foliage:** Ferns, palms

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**EXAM SPRINT** - Master morphology of flowering plants through systematic study of plant parts, their modifications, family characteristics, and practical applications. Focus on diagrams, comparisons, and economic importance for comprehensive NEET preparation.

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*Source: NCERT Biology Class 11, Chapter 5 - Complete coverage for NEET and Board examination success*