

NCERT Exemplar Solutions of Class 11 Biology – Chapter: 5 – Morphology of Flowering Plants

LONG ANSWER TYPE QUESTIONS

1. Distinguish between families Fabaceae, Solanaceae, Liliaceae based on gynoecium characteristics (with figures). Also, write the economic importance of any one of the above family.

Solution:

Fabaceae	Solanaceae	Liliaceae
Ovary superior, monocarpellary, unilocular with many ovules, style single	Bicarpellary obliquely placed, syncarpous; ovary superior, bilocular, placenta swollen with many ovules, axile	Tricarpellary, syncarpous, ovary superior, trilocular with many ovules; axile placentation

Economic Importance of Fabaceae:

- **Food crops:** Gram, peas, beans, lentils (protein source)
- **Fodder:** Clover, alfalfa
- **Timber:** Rosewood, Dalbergia
- **Dyes:** Indigofera (indigo dye)
- **Nitrogen fixation:** Improve soil fertility
- **Medicine:** Many legumes have medicinal properties

2. Describe various stem modifications associated with food storage, climbing and protection.

Solution:

i) Food storage – Underground stems of potato, ginger, turmeric, Samarkand, Colocasia are modified to store food in them.

ii) Climbing – Stem tendrils which develop from axillary buds, are slender and spirally coiled and help plants to climb such as in gourds (cucumber, pumpkins, watermelon) and grapevines.

iii) Protection – Axillary buds of stems may also get modified into woody, straight and pointed thorns. Thorns are found in many plants such as Citrus, Bougainvillea.

Enhanced Details:

Food Storage Modifications:

- **Rhizome:** Underground stem (ginger, turmeric)
- **Tuber:** Swollen tips of underground stems (potato)
- **Bulb:** Underground bud with fleshy scale leaves (onion)
- **Corm:** Swollen underground stem base (Colocasia)

Climbing Modifications:

- **Tendrils:** Coiled structures for support (grapevine)
- **Thorns:** Sharp, pointed structures (Bougainvillea)

- **Hooks:** Curved structures (Rose)

3. Stolon, offset and rhizome are different forms of stem modifications. How can these modified forms of stem be distinguished from each other?

Solution:

Stolon is underground stems which spread to new niches and when old plants die, new are formed. It is a creeper.

Offset is a lateral branch with short internodes and each node bearing a rosette of leaves and tuft of roots is found in aquatic plants.

The rhizome is an underground stem growing parallel to soil surface which is differentiated from roots in having scale leaves and auxiliary buds and helps in vegetative propagation.

Enhanced Explanation:

Feature	Stolon	Offset	Rhizome
Position	Above/below ground	Water surface	Underground
Growth	Horizontal runner	Short lateral branch	Horizontal underground
Examples	Strawberry, Mint	Water hyacinth, Pistia	Ginger, Iris
Function	Vegetative propagation	Vegetative propagation	Food storage + propagation

4. The mode of arrangements of sepals or petals in a floral bud is known as aestivation. Draw the various types of aestivation possible for a typical pentamerous flower.

Solution:

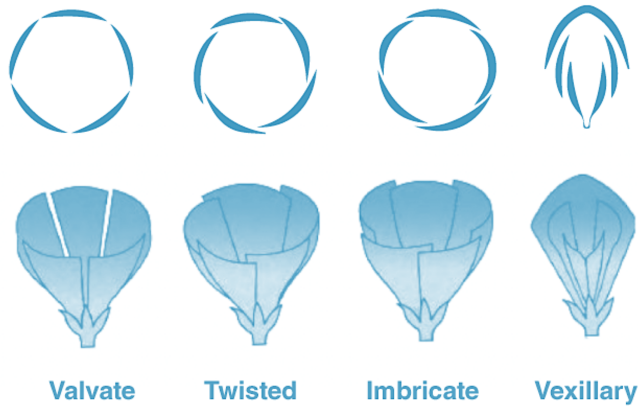
There are 4 types of aestivation:

i. Valvate: When sepals or petals in a whorl just touch one another at the margin, without overlapping, as in Calotropis.

ii. Twisted: If one margin of the appendage overlaps that of the next one and so on as in china rose, lady's finger and cotton.

iii. Imbricate: If the margins of sepals or petals overlap one another but not in any particular direction as in Cassia and Gulmohar.

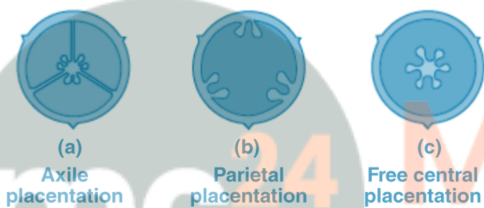
iv. Vexillary: In pea and bean flowers, there are five petals, the largest (standard) overlaps the two lateral petals (wings) which in turn overlap the two smallest anterior petals (keel).



5. The arrangement of ovules within the ovary is known as placentation. What does the term placenta refer to? Name and draw various types of placentations in the flower as seen in T.S. or V.S.

Solution:

The mode of attachment of ovule to the placenta is known as placentation which is of the following types: **Parietal, Marginal, Axile, Free central and Basal.**



Placenta refers to the part of the carpel to which ovules are attached.

Types of Placentation:

1. **Axile placentation**: Placenta is central, ovules attached in multilocular ovary (tomato, lemon)
2. **Parietal placentation**: Ovules attached to the wall of unilocular ovary (mustard, Argemone)
3. **Free central placentation**: Ovules attached to central axis, no septa (Dianthus, Primrose)
4. **Marginal placentation**: Ovules attached along the margin of carpel (pea, beans)
5. **Basal placentation**: Single ovule at the base of ovary (sunflower, marigold)

6. Sunflower is not a flower. Explain.

Solution:

Sunflower is not a flower but a type of inflorescence called **capitulum** in which the receptacle is flattened. The whole cluster of florets gets surrounded by bracts, known as an involucre. Two kinds of florets are recognised in sunflowers:

(i) Ray Florets – Arranged on the rim of a receptacle having distinct yellow and strap-shaped petals. These florets are female, sterile and are always zygomorphic and may be arranged in one or more whorls.

(ii) Disc florets – Grouped in the centre, bisexual and actinomorphic.

Enhanced Explanation:

- **Capitulum:** Head-like inflorescence with many small flowers (florets)
- **Involucre:** Collection of bracts surrounding the flower head
- **Ray florets:** Outer, showy, often sterile flowers for attraction
- **Disc florets:** Inner, fertile flowers for reproduction
- **Examples:** Sunflower, daisy, marigold (all Asteraceae family)

7. How do you distinguish between hypogeal germination and epigeal germination? What is the role of the cotyledon(s) and the endosperm in the germination of seeds?

Solution:

Role of Cotyledons and Endosperm in the germination of seeds: They contain reserved food materials. When seed imbibes water, enzymes get activated, hydrolyze reserve food material and make it available for the germinating seed.

Hypogeal germination is when epicotyl grows first, and only the plumule is pushed out of the soil. The cotyledons remain non-green and non-photosynthetic.

Epigeal germination is when hypocotyl grows first. It pushes cotyledons and other parts of the seed out of the soil. Cotyledons become green and photosynthetic.

Enhanced Comparison:

Hypogeal Germination

Epigeal Germination

Cotyledons remain below soil

Cotyledons emerge above soil

Epicotyl elongates

Hypocotyl elongates

Cotyledons non-photosynthetic

Cotyledons become photosynthetic

Examples: Pea, gram, mango

Examples: Bean, castor, sunflower

8. Seeds of some plants germinate immediately after shedding from the plants, while in other plants they require a period of rest before germination. The latter phenomenon is called dormancy. Give the reasons for seed dormancy and some methods to break it.

Solution:

Reasons for seed dormancy:

- Impermeable and hard seed coat
- Presence of chemical inhibitors like abscisic acid
- Immature embryo
- Physical barriers preventing water/oxygen entry

Methods to break seed dormancy:

- Washing away of inhibitors due to rain

- Maturation of embryo
- Inactivation of growth inhibitors due to heat or cold treatment
- Weakening and decomposition of seed coat by microorganisms
- **Scarification:** Mechanical or chemical treatment of seed coat
- **Stratification:** Cold treatment to break dormancy
- **Light exposure:** Some seeds need light to germinate

Enhanced Explanation: Types of Dormancy:

- **Physical dormancy:** Hard seed coat prevents water absorption
- **Chemical dormancy:** Growth inhibitors prevent germination
- **Morphological dormancy:** Immature embryo needs time to develop
- **Physiological dormancy:** Internal factors prevent germination

Ecological Significance:

- Ensures germination under favorable conditions
- Prevents germination in unsuitable seasons
- Allows seed dispersal over time and space
- Reduces competition among seedlings

