

**Class: 11**  
**Subject: Biology**  
**Topic: Morphology of flowering plants**  
**No. of Questions: 21**

- Q1. What is meant by modification of root? What types of modification of root is found in the
- A. Banyan tree
  - B. Turnip
  - C. Mangrove trees

Sol. Modification of root is change in the shape, size, structure and normal functioning of root to perform some secondary functions.

- A. Banyan tree – prop roots
- B. Turnip – napiform fleshy tap roots
- C. Mangrove tree – pneumatophores (respiratory roots)

Q2. Define the following terms:

- A. Aestivation
- B. Placentation
- C. Actinomorphic
- D. Zygomorphic
- E. Superior ovary
- F. Perigynous flower
- G. Epipetalous stamen

Sol. (A) Aestivation: The mode of arrangement of sepals or petals in relation to one another in a flower bud is known as aestivation.

(B) Placentation: The manner in which the ovules are attached in an ovary is called placentation.

(C) Actinomorphic: A flower with radial symmetry i.e., the parts of each whorl are similar in size and shape. The flower can be divided into two equal halves along more than one median longitudinal plane.

(D) Zygomorphic: A flower with bilateral symmetry i.e., the parts of one or more whorls are dissimilar. The flower can be divided into two equal halves in only one vertical plane.

(E) Superior ovary : The ovary is called superior when it is borne above the point of attachment of perianth and stamens on the thalamus.

(F) Perigynous flower: If gynoecium of a flower is situated in the centre and other parts such as perianth and stamens are located on the rim of the thalamus, the flower is called perigynous. All the floral parts are at the same level.

(G) Epipetalous stamen: Stamens adhere to the petals by their filaments and hence appearing to arise from them.

Q3. What are false fruits? Give two examples.

Sol. The fruits develop from parts other than ripened ovary are called false fruits. For example, fruits of apple and pear develop from fleshy thalamus.

Q4. Mention the function performed by

- A. Scale leaf of onion
- B. Axillary bud of cucumber
- C. Tap root of beet.

Sol. A. It provides protection and coverage,  
B. It gets modified into tendril and provides anchor (support).  
C. It stores food material.

Q5. What type of ovary is found in family-Solanaceae?

Sol. The ovary of solanaceae is bicarpellary, syncarpous, bilocular, superior, axile placentation with swollen placenta and septum is oblique.

Q6. Write the botanical names of

- A. Tomato-Lycopersicon lycopersicum syn Solanum lycopersicu
- B. Chillies-Capsicum annum
- C. Tobacco-Nicotiana tabacum

Q7. You have heard about several insectivorous plants that feed on insects. Nepenthes or the pitcher plant is one such example, which usually grows in shallow water or in marsh lands. What part of the plant is modified into a 'pitcher'? How does this modification help the plant for good even though it can photosynthesize like any other green plant?

Sol. Leaf lamina is modified into a pitcher to digest the insect's body and help the plant to adapt to nitrogen deficiency of soils.

Q8. What is aestivation? Describe its various types found in petals.

Sol. The mode of arrangement of petals (also sepals) in relation to one another in a flower bud is known as aestivation. It is of the following types:

Q9. Open – Petals of whorl are sufficiently apart from each other.

Sol. A. Valvate – Petals of a whorl (or sepals of a whorl) meet by their edges but do not overlap.

B. Twisted or contorted – Margins of petals are overlapping regularly that is margin of a petal overlaps the next and the other margin is overlapped by a preceding petal.

C. Imbricate – Margins of petals are overlapping irregularly. Out of five petals, one is completely internal, one is completely external and in each of the remaining three petals one margin is internal and the other is external.

D. Quincuncial – It is a modification of imbricate aestivation in which two petals are internal, two are external and the fifth one has one margin external and the other margin internal.

Q10. Why is the leaf of bombax categorized as palmately compound multifoliate leaf?

Sol. In bombax (Red silk cotton), the petiole bears five or more leaflets at the tip like the fingers of the palm. Therefore, it is categorized as palmately compound multifoliate leaf.

Q11. Why are flowers of cucumber referred to as epigynous?

Sol. In cucumber, the ovary is borne below the point of attachment of perianth. The thalamus completely covers the ovary and fuses with it. Therefore, flowers of cucumber are epigynous.

Q12. Differentiate between

- A. Bract and bracteole
- B. Pulvinus and petiole
- C. Pedicel and peduncle
- D. Spike and spadix
- E. Stamen and staminode
- F. Pollen and pollinium

Sol. A. Bract is leaf like structure in the axil of which a flower arise and bracteole is a leaf like structure present on the pedicel.

A. Pulvinus is the swollen leaf base and petiole is the stalk of leaf.

B. Pedicel is the stalk of flower and peduncle is an axis on which flowers arise.

- C. Spile is racemose inflorescence with sterile bisexual flowers and spadix is special racemose inflorescence with sessile male and female flowers on an axis which is surrounded by a spathe.
- D. Stamen is fertile male sex organ and staminode is sterile male sex organ.
- E. Pollen is individual microspore and pollinium is a group of pollen grains held together.

Q13. How do you distinguish between hypogeal germination and epigeal germination? What is the role of cotyledon (s) and the endosperm in the germination of seeds?

Sol. In hypogeal germination the cotyledons remain under the soil during germination of seed and in epigeal germination cotyledons come out of the soil during seed germination. Cotyledons provide nutrition to embryo during seed germination and helps in the differentiation of embryo to seedling. Endosperm provide food to the zygote during embryogenesis, i.e., for the formation of embryo.

Q14. Differentiate between runner and sucker.

Sol. The tip of sucker directly bends upwards to produce an upright aerial shoot. The tip of stolon, on the other hand, does not come above ground.

Q15. Write an explanatory note on defense mechanisms in plants.

Sol. Most of the plants possess natural defense mechanism to fight against attack of their enemies. These mechanisms involve structural or morphological devices as well as biochemical secretions. The important among them are thorns, spines and hairs. Plants like lemon, duranta and bougainvillea possess stem thorns.

They are deep-seated and have vascular connections. Berberis, Aloe and Argemone Mexicana possess leaf spines. Plants develop spines to protect themselves from grazing animals. Bristles or hairs are hard and stiff due to deposition of silica or calcium carbonate. Prickles are superficial pointed outgrowths of stem and leaves (e.g. Rose and silk cotton tree). Many plants possess sharp stinging hairs with siliceous apices. Plants like jatropha, boerhaavia and tobacco possess glandular hairs which secrete sticky substances.

Other defense mechanisms are presence of biochemical substances like latex, alkaloids tannins, resins, essential oils and steroids. These substances may be irritating or poisonous. Ficus, nerium and Euphorbia secrete latex whereas poppy, Datura and tobacco possess alkaloids. Many ferns and cycads possess phlobaphene and cyanin so that animals do not feed upon them. Neem and karela are bitter in taste. Colocasia and other aroids possess irritating substances. Some plants protect themselves by geophilous habit (e.g. ginger, turmeric, onion, etc.) others by

myrmicophily and mimicry habits.

Q16. A. Name the layer which separates endosperm from embryo in a monocotyledonous seed.

B. Where lies the cotyledon of a maize grain (monocotyledonous seed)? What is it called? Give its functions.

Sol. (A) The layer which separates endosperm from embryo is aleurone layer.

(B) The single cotyledon in maize seed is represented by a shield-shaped structure called scutellum. It helps in the translocation of nutrients from endosperm to the growing embryo at the time of germination.

Q17. Select a plant which grows in swampy areas, giving reasons.

Plant A: Develops haustoria for absorption of food.

Plant B: Develops prop roots for support.

Plant C: Develops pneumatophores to get oxygen for respiration.

Sol. Plant C grows in swampy areas because it develops respiratory roots or pneumatophores. These roots possess lenticels for gaseous exchange. There is a high concentration of salt in swamps where oxygen is not available for roots.

Q18. Identify the family which shows the following diagnostic features. Name two plants of the family which are used as source of food.

Flowers pentamerous, Gynoecium – bicarpellary, syncarpous, ovary placed obliquely, placentation

Sol. These are diagnostic features of family solanaceae. The two plants are – *Solanum tuberosum* (potato) and *Lycopersicon esculentum* (tomato).

Q19. Complete the following table by giving the correct options:

Family	Inflorescence	Flower	Stamens	Gynoecium
Fabaceae	-	-	10	-
Solanaceae	Solitary, axillary or cymose	-	-	-
Liliaceae	-	Actinomorphic	-	Tricarpellary

Sol.

Family	Inflorescence	Flower	Stamens	Gynoecium
Fabaceae	Racemose	Zygomorphic	10	Monocarpellary
Solanaceae	Solitary, axillary or cymose	Actinomorphic	10	Bicarpellary
Liliaceae	Solitary/cymose	Actinomorphic	3+3	Tricarpellary

- Q20. Hemant used to get to vegetable market with his grandfather, a retired biology teacher. Grandfather told Hemant that chillies, brinjal, and tomato belong to the same family of plants and asked him to find out similarity in these plants.

Read the above passage and answer the following questions:

- Identify the family to which the above plants belong.
- What are the characteristic features of the family? Name any three characteristics.
- What value is reflected in grandfather's behavior?

Sol.

- Solanaceae.
- It is characterized by persistent calyx, obliquely placed ovary and swollen placenta.
- Grandfather wanted to arouse interest of his grandson in science.

- Q21. Pointing towards a sunflower plant, father asked Manoj, a biology student, to show him the flower of this plant. Manoj plucked flowering twig and pointed towards the big yellow structure at the tip of the twig. Father laughed and clarified that it is not a single flower but a group of several flowers arranged in a disc like structure.

Read the above passage and answer the following questions:

- What is inflorescence?
- Define racemose and cymose inflorescence.
- What message is delivered by father

Sol.

- a) It is a shoot or an axis bearing a cluster of flowers in a particular manner.
- b) In racemose type of inflorescence, the main axis possesses terminal bud which grows indefinitely giving rise to lateral and axillary flowers. In cymose type, the main axis terminates into a flower and further growth takes place by lateral branches which arise below the terminal flower
- c) Being a student of biology, one should observe things critically.

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