# CHAPTER 2

# **SEXUAL REPRODUCTION IN FLOWERING PLANTS**

# **MULTIPLE-CHOICE QUESTIONS**

- 1. Among the terms listed below, those that of are not technically correct names for a floral whorl are:
  - i. Androecium
  - ii. Carpel
  - iii. Corolla
  - iv. Sepal
    - (a) i and iv, (b) iii and iv (c) ii and iv (d) i and ii.
- 2. Embryo sac is to ovule as \_\_\_\_\_ is to an anther.
  - a. Stamen
  - b. Filament
  - c. Pollen grain
  - d. Androecium
- 3. In a typical complete, bisexual and hypogynous flower the arrangement of floral whorls on the thalamus from the outermost to the innermost is:
  - a. Calyx, corolla, androecium and gynoecium
  - b. Calyx, corolla, gynoecium and androecium
  - c. Gynoecium, androecium, corolla and calyx
  - d. Androecium, gynoecium, corolla and calyx
- 4. A dicotyledonous plant bears flowers but never produces fruits and seeds. The most probable cause for the above situation is:
  - a. Plant is dioecious and bears only pistillate flowers
  - b. Plant is dioecious and bears both pistillate and staminate flowers
  - c. Plant is monoecious
  - d. Plant is dioecious and bears only staminate flowers.

- 5. The outermost and innermost wall layers of microsporangium in an anther are respectively:
  - a. Endothecium and tapetum
  - b. Epidermis and endodermis
  - c. Epidermis and middle layer
  - d. Epidermis and tapetum
- 6. During microsporogenesis, meiosis occurs in:
  - a. Endothecium
  - b. Microspore mother cells
  - c. Microspore tetrads
  - d. Pollen grains.
- 7. From among the sets of terms given below, identify those that are associated with the gynoecium.
  - a. Stigma, ovule, embryo sac, placenta
  - b. Thalamus, pistil, style, ovule
  - c. Ovule, ovary, embryo sac, tapetum
  - d. Ovule, stamen, ovary, embryo sac
- 8. Starting from the innermost part, the correct sequence of parts in an ovule are,
  - a. egg, nucellus, embryo sac, integument
  - b. egg, embryo sac, nucellus, integument
  - c. embryo sac, nucellus, integument, egg
  - d. egg, integument, embryo sac, nucellus.
- 9. From the statements given below choose the option that are true for a typical female gametophyte of a flowering plant:
  - i. It is 8-nucleate and 7-celled at maturity
  - ii. It is free-nuclear during the development
  - iii. It is situated inside the integument but outside the nucellus
  - iv. It has an egg apparatus situated at the chalazal end(a) i and iv,(b) ii and iii(c) i & ii(d) ii & iv
- 10. Autogamy can occur in a chasmogamous flower if:
  - a. Pollen matures before maturity of ovule
  - b. Ovules mature before maturity of pollen
  - c. Both pollen and ovules mature simultaneously
  - d. Both anther and stigma are of equal lengths.

- 11. Choose the correct statement from the following:
  - a. Cleistogamous flowers always exhibit autogamy
  - b. Chasmogamous flowers always exhibit geitonogamy
  - c. Cleistogamous flowers exhibit both autogamy and geitonogamy
  - d. Chasmogamous flowers never exhibit autogamy
- 12. A particular species of plant produces light, non-sticky pollen in large numbers and its stigmas are long and feathery. These modifications facilitate pollination by:
  - a. Insects
  - b. Water
  - c. Wind
  - d. Animals.
- 13. From among the situations given below, choose the one that prevents both autogamy and geitonogamy.
  - a. Monoecious plant bearing unisexual flowers
  - b. Dioecious plant bearing only male or female flowers
  - c. Monoecious plant with bisexual flowers
  - d. Dioecious plant with bisexual flowers
- 14. In a fertilised embryo sac, the haploid, diploid and triploid structures are:
  - a. Synergid, zygote and primary endosperm nucleus
  - b. Synergid, antipodal and polar nuclei
  - c. Antipodal, synergid and primary endosperm nucleus
  - d. Synergid, polar nuclei and zygote.
- 15. In an embryo sac, the cells that degenerate after fertilisation are:
  - a. Synergids and primary endosperm cell
  - b. Synergids and antipodals
  - c. Antipodals and primary endosperm cell
  - d. Egg and antipodals.
- 16. While planning for an artificial hybridization programme involving dioecious plants, which of the following steps would not be relevant:
  - a. Bagging of female flower
  - b. Dusting of pollen on stigma
  - c. Emasculation
  - d. Collection of pollen

- 17. In the embryos of a typical dicot and a grass, true homologous structures are:
  - a. Coleorhiza and coleoptile
  - b. Coleoptile and scutellum
  - c. Cotyledons and scutellum
  - d. Hypocotyl and radicle.
- 18. The phenomenon observed in some plants wherein parts of the sexual apparatus is used for forming embryos without fertilisation is called:
  - a. Parthenocarpy
  - b. Apomixis
  - c. Vegetative propagation
  - d. Sexual reproduction.
- 19. In a flower, if the megaspore mother cell forms megaspores without undergoing meiosis and if one of the megaspores develops into an embryo sac, its nuclei would be:
  - a. Haploid
  - b. Diploid
  - c. A few haploid and a few diploid
  - d. With varying ploidy.
- 20. The phenomenon wherein, the ovary develops into a fruit without fertilisation is called:
  - a. Parthenocarpy
  - b. Apomixis
  - c. Asexual reproduction
  - d. Sexual reproduction

#### **VERY SHORT ANSWER TYPE QUESTIONS**

- 1. Name the component cells of the 'egg apparatus' in an embryo sac.
- 2. Name the part of gynoecium that determines the compatible nature of pollen grain.
- 3. Name the common function that cotyledons and nucellus perform.
- 4. Complete the following flow chart

Pollen mother cell  $\rightarrow$  Pollen tetrad  $\rightarrow$  Pollen grain

5. Indicate the stages where meiosis and mitosis occur (1, 2 or 3) in the flow chart.

Megaspore mother cell  $\xrightarrow{1}$  Megaspores  $\xrightarrow{2}$  Embryo sac  $\xrightarrow{3}$  Egg

6. In the diagram given below, show the path of a pollen tube from the pollen on the stigma into the embryo sac. Name the components of egg apparatus.

7. Name the parts of pistil which develop into fruit and seeds.

- 8. In case of polyembryony, if an embryo develops from the synergid and another from the nucellus which is haploid and which is diploid?
- 9. Can an unfertilised, apomictic embryo sac give rise to a diploid embryo? If yes, then how?
- 10. Which are the three cells found in a pollen grain when it is shed at the three celled stage?
- 11. What is self-incompatibility?
- 12. Name the type of pollination in self-incompatible plants.
- 13. Draw the diagram of a mature embryo sac and show its 8-nucleate, 7-celled nature. Show the following parts: antipodals, synergids, egg, central cell, polar nuclei.

- 14. Which is the triploid tissue in a fertilised ovule? How is the triploid condition achieved?
- 15. Are pollination and fertilisation necessary in apomixis? Give reasons.
- 16. Identify the type of carpel with the help of diagrams given below:



- 17. How is pollination carried out in water plants?
- 18. What is the function of the two male gametes produced by each pollen grain in angiosperms.

## **SHORT ANSWER TYPE QUESTIONS**

- 1. List three strategies that a bisexual chasmogamous flower can evolve to prevent self pollination (autogamy).
- 2. Given below are the events that are observed in an artificial hybridization programme. Arrange them in the correct sequential order in which they are followed in the hybridisation programme.

- (a) Re-bagging (b) Selection of parents (c) Bagging (d) Dusting the pollen on stigma (e) Emasculation (f) Collection of pollen from male parent.
- 3. Vivipary automatically limits the number of offsprings in a litter. How?
- 4. Does self incompatibility impose any restrictions on autogamy? Give reasons and suggest the method of pollination in such plants.
- 5. In the given diagram, write the names of parts shown with lines.



- 6. What is polyembryony and how can it be commercially exploited?
- 7. Are parthenocarpy and apomixis different phenomena? Discuss their benefits.
- Hint: Yes, they are different. Parthenocarpy leads to development of seedless fruits. Apomixis leads to embryo development.
  - 8. Why does the zygote begin to divide only after the division of Primary endosperm cell (PEC)?
  - 9. The generative cell of a two-celled pollen divides in the pollen tube but not in a three-celled pollen. Give reasons.

10. In the figure given below label the following parts: male gametes, egg cell, polar nuclei, synergid and pollen tube



### LONG ANSWER QUESTIONS

- 1. Starting with the zygote, draw the diagrams of the different stages of embryo development in a dicot.
- 2. What are the possible types of pollinations in chasmogamous flowers. Give reasons.
- 3. With a neat, labelled diagram, describe the parts of a mature angiosperm embryo sac. Mention the role of synergids.
- 4. Draw the diagram of a microsporangium and label its wall layers. Write briefly on the role of the endothecium.
- 5. Embryo sacs of some apomictic species appear normal but contain diploid cells. Suggest a suitable explanation for the condition.