Chapter

24 Sexual Reproduction in Flowering Plants

TYPE A : MULTIPLE CHOICE QUESTIONS

1. Asexual reproduction is called as *[1997]*
(a) apomixis (b) fragmentation
(c) self fertilization (d) cross fertilization

2. Pollination by snail and slug is called as *[1998]*
(a) entomophilous
(b) malacophilous
(c) ornithophilous
(d) chiropterophilous

3. In angiosperm, the endosperm is *[1998]*
(a) diploid (b) triploid
(c) haploid (d) polyploid

4. Female gametophyte of angiosperm is *[1999]*
(a) 7 celled (b) 8 celled
(c) 11 celled (d) 5 celled

5. Anemophilous flowers have *[1999]*
(a) sessile stigma
(b) small, smooth stigma
(c) coloured and scented flowers
(d) large feathery stigma

6. Growth of pollen tube towards embryo is *[2000]*
(a) geotropism (b) chemotaxis
(c) phototaxis (d) thigmotaxis

7. Which of the following statement is true? *[2000]*
(a) Spores are gametes
(b) Spores and gametes are diploid
(c) Gametes are always haploid
(d) Spores are always diploid

8. Which part of embryo comes out first during seed germination ? *[2001]*
(a) Radicle (b) Plumule
(c) Hypocotyl (d) Epicotyl

9. Xenia refers to *[2002]*
(a) effect of pollen on endosperm
(b) effect of pollen on stems
(c) effect of pollen on taste of fruits
(d) effect of pollen on vascular tissue

10. Ploidy of ovum of angiosperms is *[2002]*
(a) haploid (b) diploid
(c) triploid (d) polyploid

11. Pollen grains are able to withstand extremes of temperature and dessication because their exine is composed of *[2003]*
(a) cutin (b) suberin
(c) sporopollenin (d) callose

12. The pollen tube usually enters the embryo sac
(a) between the egg cell and synergid *[2004]*
(b) by directly penetrating the egg
(c) between one synergid and antipodal cell
(d) by knocking off the antipodal cells

13. Double fertilization involves *[2005]*
(a) fertilization of egg by two male gametes
(b) fertilization of two eggs in the same embryo sac by two sperms brought by one pollen tube
(c) fertilization of the egg and the central cell by two sperms brought by different pollen tubes
(d) fertilization of the egg and the central cell by two sperms brought by the same pollen tube

14. In which one of the following combinations (a - d) the number of chromosomes of the present day hexaploid wheat is correctly represented? *[2006]*

Comb-ination	Mono-somic	Haploid	Nulli-somic	Tri-somic
(a)	21	28	42	43
(b)	7	28	40	42
(c)	21	7	42	43
(d)	41	21	40	43

15. Apomixis is *[2007]*
(a) formation of seeds by fusion of gametes.
(b) formation of seeds without syngamy and meiosis.
(c) formation of seeds with syngamy but no meiosis.
(d) None of the above

16. The plant part which consists of two generations one within the other, is *[2008]*
(a) germinated pollen grain
(b) embryo
(c) unfertilized ovule
(d) seed

17. Chasmogamy refers to the condition where *[2012]*
(a) Flowers remains closed
(b) Flowers are absent
(c) Flowers are open
(d) Flower are gamopetalous

18. What is common between vegetative reproduction and apomixis? *[2013]*
(a) Both are applicable to only dicot plants
(b) Both bypass the flowering phase
(c) Both occur round the year
(d) Both produces progeny identical to the parent

19. Emasculation is not required when flowers are *[2013]*
(a) bisexual (b) intersexual
(c) unisexual (d) either (a) or (b)

20. Geitonogamy involves:
(a) fertilization of a flower by the pollen from another flower of the same plant.
(b) fertilization of a flower by the pollen from the same flower.
(c) fertilization of a flower by the pollen from a flower of another plant in the same population.
(d) fertilization of a flower by the pollen from a flower of another plant belonging to a distant population. *[2014]*

21. Which of the following statement is correct? *[2016]*
(a) Sporopollenin can withstand high temperatures but not strong acids.
(b) Sporopollenin can be degraded by enzymes.
(c) Sporopollenin is made up of inorganic materials.
(d) Sporopollenin can withstand high temperature as well as strong acids and alkalis.

TYPE B : ASSERTION REASON QUESTIONS

Directions for (Qs. 22-24) : These questions consist of two statements, each printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following five responses.

(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect.
(e) If the Assertion is incorrect but the Reason is correct.

22. **Assertion :** If pollen mother cells has 42 chromosomes, the pollen has only 21 chromosomes.
Reason : Pollens are formed after meiosis in pollen mother cell. *[1997]*

23. **Assertion:** The megaspore mother cell divide mitotically to produce four spores.
Reason: Megaspore mother cells are diploid and megaspore is haploid. *[2002]*

24. **Assertion :** Insects visit flower to gather honey.
Reason : Attraction of flowers prevents the insects from damaging other parts of the plant. *[2004]*

Directions for (Qs. 25-28) : Each of these questions contains an Assertion followed by Reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements.

(a) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
(b) If both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.
(c) If Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect.

25. **Assertion :** Pollen mother cells (PMCs) are the first male gametophytic cells. ***[2009]***
Reason : Each PMC gives rise to two pollens.

26. **Assertion :** Chasmogamous flowers require pollinating agents.
Reason : Cleistogamous flowers do not expose their sex organs. ***[2012]***

27. **Assertion :** Double fertilization is characteristic feature of angiospersms.
Reason : Double fertilization involves two fusions. ***[2016]***

28. **Assertion :** Endosperm is a nutritive tissue and it is triploid.
Reason: Endosperm is formed by fusion of secondary nucleus to second male gamete. It is used by developing embryo. ***[1998, 2017]***

HINTS & SOLUTIONS

Type A : Multiple Choice Questions

1. (c) In asexual reproduction, single parent is involved. It usually includes amitosis or mitotic division.

2. (b) Pollination by insects is entomophily, pollination by birds is ornithophily, pollination by bats is chiropterophily and pollination by molluscs (snow, slugs) is malacophily.

3. (b) Endosperm is formed as a result of triple fusion male gamete (n) + seconday nucleus (2n) = Primary endosperm nucleus (3n)
Secondary nucleus is formed by the fusion of 2 polar nuclei.

4. (a) The female gametophyte of angiosperms is eight nucleated and seven celled. The organized embryo sac comprises a 3 celled egg apparatus, three antipodal cells and a bipolar central cell. The embryo sac although eight nucleated has only seven cells.

5. (d) Anemophilous flowers have feathery stigma. It is the characteristic feature of Gramineae family (grass). In grasses, the stigma, that is plumose, works as an efficient pollen catcher. Hence, anemophilous flowers have feathery or plumose stigma.

6. (b) Growth of pollen tube towards embryo is chemotaxis due to the stimulus being chemical in nature. The chemical stimulus is supplied in the form of Ca^{++} ions.

7. (c) Gametes are always haploid in order to preserve the species genetically, anatomically and morphologically also. The embryo or zygote is formed due to the union of male and female gametes. (n + n = 2n). Hence, any species which is 2n is diploid in nature.

8. (a) The radicle comes out first since it grows towards the earth. During seed germination the radicle comes out first due to gravitational force and further more it results in a differential growth.

9. (a) Xenia is the effect of pollen genes on the development of the fruit or seed.

10. (a) Ovum is a female gamete and is always haploid.

11. (c) Sporopollenin, which is the hardest substance, helps the pollen grains to withstand extremes of temperatures. It avoids transpiration or water loss. This hard proteinaceous substance present in the exine makes it also spinous in nature.

12. (a) The synergids direct the growth of pollen tube by secreting some chemical substances. The tip of pollen tube enters into one synergid.

13. (d) Double fertilization involves fertilization of the egg/oosphere (2n) and that of secondary nucleus (3N) by two different sperms produced in the same pollen tube.

14. (d) 1n = 21; monosomic (2n – 1) = 42 – 1 = 41; nullisomic (2n – 2) = 42 – 2 = 40. Trisomic (2n + 1) = 42 +1 = 43

15. (b) In plants, normal sexual reproduction includes meiosis and fertilization . It is called amphimixis. But in some plants abnormal sexual reproduction called apomixis has been observed. Apomixis includes abnormal sexual reproduction in which egg or other cells like synergids and antipodals develop into embryo without fertilization and meiosis. The term apomixis was given be Winkler (1908) *eg. Citrus, Rannunculus.*

16. (b) The plant which consists of two generations one within the other is embryo. In botany, a seed plant *embryo* is part of a seed, consisting of precursor tissues for the leaves, stem and root as well as one or more cotyledons. Once the embryo begins to germinate, grow out from the seed, it is called a seedling. Plants that do not produce seeds, but do produce an embryo, include the bryophytes and ferns. In these plants, the embryo is a young plant that grows attached to a parental gametophyte.

17. (c) Chasmogamous flowers are always open. In same bisexual plants like *Commelina* & *Viola*. Chasmogamous and cleistogamous flowers (which never opens throughout the life) are found.

18. (d) Vegetative reproduction and apomixis both are asexual methods of reproduction, which gives the progeny genetically similar to parent.

19. (c) In unisexual flowers, the female flower buds are bagged before the flowers open. When the stigma become receptive, pollination is carried out using the desired pollen and the flower rebagged. Hence, there is no need of emasculation in these flowers.

20. (a) Geitonogamy is the transfer of pollen grains in different flowers of same plant.

21. (d) Pollen grains are generally spherical and prominent two-layered wall. The hard outer layer (called the exine) is made up of sporopollenin which is one of the most resistant organic material known. It can withstand high temperatures and strong acids and alkali.

Type B : Assertion Reason Questions

22. (a) Pollen mother cells undergo meiosis and produce pollen grains. The pollen grains have haploid number of chromosomes.

23. (e) Megaspore mother cell is a prominent cell in the nucellus. It divides by meiosis and forms a row of four haploid megaspores.

24. (d) Honey bee visit flowers to gather nectar and turn it into honey. Visiting of insects for nectar helps in pollination.

25. (d) Primary sporogenous cell gives rise to microspore mother cells or pollen mother cells (PMCs). They are sporophytic in nature *i.e.*, diploid. These cells undergo meiosis (reduction division) which gives rise to 4 microspores or pollens and this formation of microspores or pollens is called microsporo-genesis. Microspores represent the beginning of the gametophytic phase and they are haploid in nature.

26. (b) The majority of angiosperms bear chasmogamous flowers, which means the flowers expose their mature anthers and stigma to the pollinating agents. There is another group of plants which set seeds without exposing their sex organs. Such flowers are called cleistogamous and the phenomenon is cleistogamy.

27. (b) Double fertilization is a characteristic feature of angiosperms. It involves two fusions in which one female gametes fuse with egg cell to form zygote and other male gamete fuses with the diploid secondary nucleus to produce triploid primary endosperm nucleus.

28. (a) Male gamete (n) + secondary nucleus (2n) = primary endosperm nucleus which develops into endosperm (3n)

Endosperm is the reserve food used by developing embryo.