

**Class: 12**  
**Subject: Biology**  
**Topic: Sexual reproduction in flowering plant**  
**No. of Questions: 25**

Q1. Double fertilization process means

- a) Fusion of one male gamete nucleus with egg nucleus while fusion of other male gamete nucleus with secondary nucleus
- b) fusion of male gamete nucleus with secondary nucleus
- c) Fusion of two polar nuclei with each other
- d) fusion of male gamete nucleus with egg nucleus

Sol.. a)

Q2. Identify the most closely related terms in the given sets

- a) megasporangium, megaspore, egg, ovule
- b) microsporangium, microspore, egg, ovary
- c) megasporangium, megaspore, pollen, ovule
- d) microsporangium, microspore, carpel, ovary

Sol.. a)

Q3. Mention some of the spores of asexual reproduction.

Sol.: Aplanospores, Zoospores, Akinetes and Conidia

Q4. What is meant by monosporic development of female gametophyte?

Sol.. In the process of megasporogenesis, one megaspore mother cell divides by mitotic division to produce four megaspores. In many angiosperms one megaspore develops into female gametophyte and rest of the three get degenerate. This is termed monosporic development of female gametophyte.

Q5. Name the parts of an angiosperm flower in which development of male and female gametophyte take place.

Sol. : The male gametophyte or the pollen grain develops inside the pollen chamber of the anther, whereas the female gametophyte (also known as the embryo sac) develops inside the nucellus of the ovule from the functional megaspore.

Q6. Differentiate between microsporogenesis and megasporogenesis. Which type of cell division occurs during these events? Name the structures formed at the end of these two events.

Sol.. (a)

	Microsporogenesis	Megasporogenesis
1	It is the process of the formation of microspore tetrads from a microspore mother cell through meiosis.	It is the process of the formation of the four megaspores from a megaspore mother cell in the region of the nucellus through meiosis
2	It occurs inside the pollen sac of the anther.	It occurs inside the ovule.

(b) Both events (microsporogenesis and megasporogenesis) involve the process of meiosis or reduction division which results in the formation of haploid gametes from the microspore and megaspore mother cells.

(c) Microsporogenesis results in the formation of haploid microspores from a diploid microspore mother cell. On the other hand, megasporogenesis results in the formation of haploid megaspores from a diploid megaspore mother cell.

Q7. What are chasmogamous flowers? Can cross-pollination occur in cleistogamous flowers? Give reasons for your Sol.wer.

Sol.. There are two types of flowers present in plants namely Oxalis and Viola – chasmogamous and cleistogamous flowers. Chasmogamous flowers have exposed anthers and stigmata similar to the flowers of other species. Cross-pollination cannot occur in cleistogamous flowers. This is because cleistogamous flowers never open at all. Also, the anther and the stigma lie close to each other in these flowers. Hence, only self-pollination is possible in these flowers.

Q8. Mention two strategies evolved to prevent self-pollination in flowers.

Sol.. Self-pollination involves the transfer of pollen from the stamen to the pistil of the same flower. Two strategies that have evolved to prevent self-pollination in flowers are as follows: (1) In certain plants, the stigma of the flower has the capability to prevent the germination of pollen grains and hence, prevent the growth of the pollen tube. It is a genetic mechanism to prevent self-pollination called self-incompatibility. Incompatibility may be between individuals of the same species or between individuals of different species. Thus, incompatibility prevents breeding. (2) In some plants, the gynoecium matures before the androecium or vice-versa. This phenomenon is known as protogyny or protandry respectively. This prevents the pollen from coming in contact with the stigma of the same.

Q9. What is self-incompatibility? Why does self-pollination not lead to seed formation in self-incompatible species?

Sol.. Self-incompatibility is a genetic mechanism in angiosperms that prevents self-pollination. It develops genetic incompatibility between individuals of the same species or between individuals of different species. The plants which exhibit this phenomenon have the ability to prevent germination of pollen grains and thus, prevent the growth of the pollen tube on the stigma of the flower. This prevents the fusion of the gametes along with the development of the embryo. As a result, no seed formation takes place.

Q10. What is meant by monosporic development of female gametophyte?

Sol.. The female gametophyte or the embryo sac develops from a single functional megaspore. This is known as monosporic development of the female gametophyte. In most flowering plants, a single megaspore mother cell present at the micropylar pole of the nucellus region of the ovule undergoes meiosis to produce four haploid megaspores. Later, out of these four megaspores, only one functional megaspore develops into the female gametophyte, while the remaining three degenerate.

Q11. What is bagging technique? How is it useful in a plant breeding programme?

Sol.. Various artificial hybridization techniques (under various crop improvement programmes) involve the removal of the anther from bisexual flowers without affecting the female reproductive part (pistil) through the process of emasculation. Then, these emasculated flowers are wrapped in bags to prevent pollination by unwanted pollen grains. This process is called bagging. This technique is an important part of the plant breeding programme as it

ensures that pollen grains of only desirable plants are used for fertilization of the stigma to develop the desired plant variety.

Q12. What is triple fusion? Where and how does it take place? Name the nuclei involved in triple fusion.

Sol.. Triple fusion is the fusion of the male gamete with two polar nuclei inside the embryo sac of the angiosperm. This process of fusion takes place inside the embryo sac. When pollen grains fall on the stigma, they germinate and give rise to the pollen tube that passes through the style and enters into the ovule. After this, the pollen tube enters one of synergids and releases two male gametes there. Out of the two male gametes, one gamete fuses with the nucleus of the egg cell and forms the zygote (syngamy). The other male gamete fuses with the two polar nuclei present in the central cell to form a triploid primary endosperm nucleus. Since this process involves the fusion of three haploid nuclei, it is known as triple fusion. It results in the formation of the endosperm. One male gamete nucleus and two polar nuclei are involved in this process.

Q13. Why do you think the zygote is dormant for some time in a fertilized ovule?

Sol.. The zygote is formed by the fusion of the male gamete with the nucleus of the egg cell. The zygote remains dormant for some time and waits for the endosperm to form, which develops from the primary endosperm cell resulting from triple fusion. The endosperm provides food for the growing embryo and after the formation of the endosperm, further development of the embryo from the zygote starts.

Q14. Why is apple called a false fruit? Which part(s) of the flower forms the fruit?

Sol.. Fruits derived from the ovary and other accessory floral parts are called false fruits. On the contrary, true fruits are those fruits which develop from the ovary, but do not consist of the thalamus or any other floral part. In an apple, the fleshy receptacle forms the main edible part. Hence, it is a false.

Q15. Explain the role of tapetum in the formation pollen-grain wall.

Sol.. Tapetum is the innermost layer of the microsporangium. It provides nourishment to the developing pollen grains. During microsporogenesis, the cells of tapetum produce various enzymes, hormones, amino acids, and other nutritious material required for the development of pollen grains. It also produces the exine layer of the pollen grains, which is

composed of the sporopollenin.

Q16. If one can induce parthenocarpy through the application of growth substances, which fruits would you select to induce parthenocarpy and why?

Sol.. Parthenocarpy is the process of developing fruits without involving the process of fertilization or seed formation. Therefore, the seedless varieties of economically important fruits such as orange, lemon, water melon etc. are produced using this technique. This technique involves inducing fruit formation by the application of plant growth hormones such as auxins.

Q17. What is apomixis and what is its importance?

Sol.. Apomixis is the mechanism of seed production without involving the process of meiosis and syngamy. It plays an important role in hybrid seed production. The method of producing hybrid seeds by cultivation is very expensive for farmers. Also, by sowing hybrid seeds, it is difficult to maintain hybrid characters as characters segregate during meiosis. Apomixis prevents the loss of specific characters in the hybrid. Also, it is a cost-effective method for producing seeds.

Q18. Explain oviparous and viviparous animals.

Sol.. Oviparous animals lay eggs outside the female body. Eggs can be fertilized/ unfertilized. Fertilized eggs covered with hard calcareous shell, laid in safe place in the environment. Unfertilised eggs laid in water. Example-fishes, frogs, reptiles, birds  
Viviparous animals bear and rear the embryo inside female body, give birth to youngones.

Advantage-proper embryonic care, protection, survival chances of young-ones greater.  
Examples- cows, whales, humanbeings

Q19. Name any one animal in which self fertilization occurs

Sol.: Taenia (tapeworm)

Q20. Make a note on artificial hybridization.

Sol.. Types of cross-pollination performed by man for crop improvement. Achieved by

i) Emasculation i.e. removal of anthers from the flower bud of a bisexual flower before the anther dehisces using a pair of forceps and  
ii) Bagging i.e. covering the emasculated flowers with a bag of suitable size to protect them from contamination with unwanted pollen. If flower is unisexual, emasculation is not needed. Flower bud bagged & when the stigma becomes receptive, pollination is done using desired pollen & the flower is rebagged

Q21. In a mature ovule, if helium is close to micropyle, then the ovule is called:

- a) Orthotropous
- b) Anatropous**
- c) Hemitropous
- d) Campylotropous

Sol. (b)

Q22. Tapetum layer around the pollen sac is meant for :

- a) Dehiscence
- b) Protection
- c) Fusion
- d) Nutrition

Sol. (d)

Q23. Formation of gametophyte directly from sporophyte without meiosis is

- a) apospory
- b) apogamy
- c) parthenogenesis
- d) amphimixis.

Sol.. (a)

Formation of gametophyte directly from sporophyte without meiosis and spore formation is apospory. The gametophyte has diploid number of chromosomes such gametophyte may form viable gametes which fuse to form tetraploid sporophyte. Apogamy is development of sporophyte directly from gametophytic tissue without fusion of gametes. Amphimixis is normal sexual reproduction. Parthenogenesis is development of embryo from egg without fertilization.

Q24. Male gametophyte of angiosperms/monocots is

- (a) microsporangium
- (b) nucellus
- (c) microspore
- (d) stamen.

Sol.. (c)

Male gametophyte of angiosperms is microspore. Microspore is haploid, uninucleate, minute spores produced in large numbers as a result of meiosis in microspore mother cell inside the microsporangia. These are the first cell of gametophytic generations in angiosperms.

Q25. Double fertilization is characteristic of which category of plants?

Sol.. Double fertilization is the characteristic feature of angiosperms. This phenomenon first observed by Nawaschin, 1898 in *Lilium* and *FriUllaria*. In angiosperms one male gamete fuses with the two polar nuclei to form triploid primary endosperm nucleus. The process is called triple fusion. These two acts together are known as double fertilization.

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