Chapter.2
Sexual Reproduction in Flowering Plants
Class – XII
Subject –Biology

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

Answer 1.

Pollen grains represent the male gametophyte in an angiosperm which develops inside the microsporangia. On the other hand, female gametophytes of angiosperms are formed from the megaspore through the process of reduction division which lies inside the nucellus of ovule.

2. 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.

Answer 2.

Microsporogenesis	Megasporogenesis
1. Formation of microspore from mother cells.	Formation of megaspore from megaspore mother cell.
2. This process forms thousands of microspores and pollen grains.	Only one functional megaspore is formed.

3. It occurs inside the anther.	It occurs inside the nucellus of developing ovule.

In both the processes, meiosis takes place.

Pollen grains formed at the end of microsporogenesis and female gametophytes formed at the end of megasporogenesis.

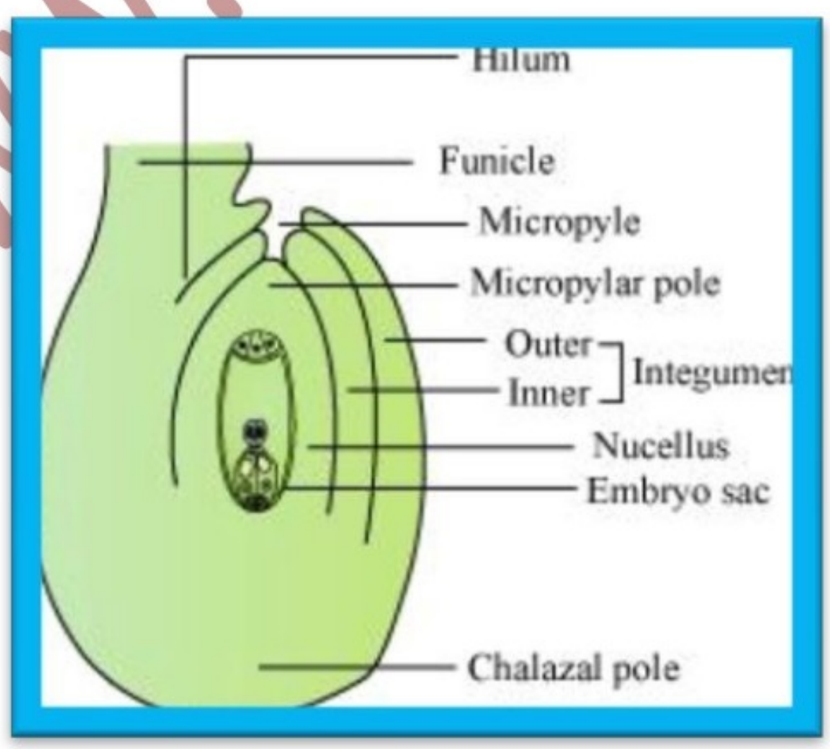
3. **Arrange the following terms in a correct developmental sequence: Pollen small piece, sporogenous tissue, microspore tetrad, pollen mother cell, male gametes.**

Answer 3.

Sporogenous tissue, microspore tetrad, pollen mother cell, pollen grain, male gametophyte.

4. **With a neat labelled diagram, describe the parts of a typical angiosperm ovule.**

Answer 4.



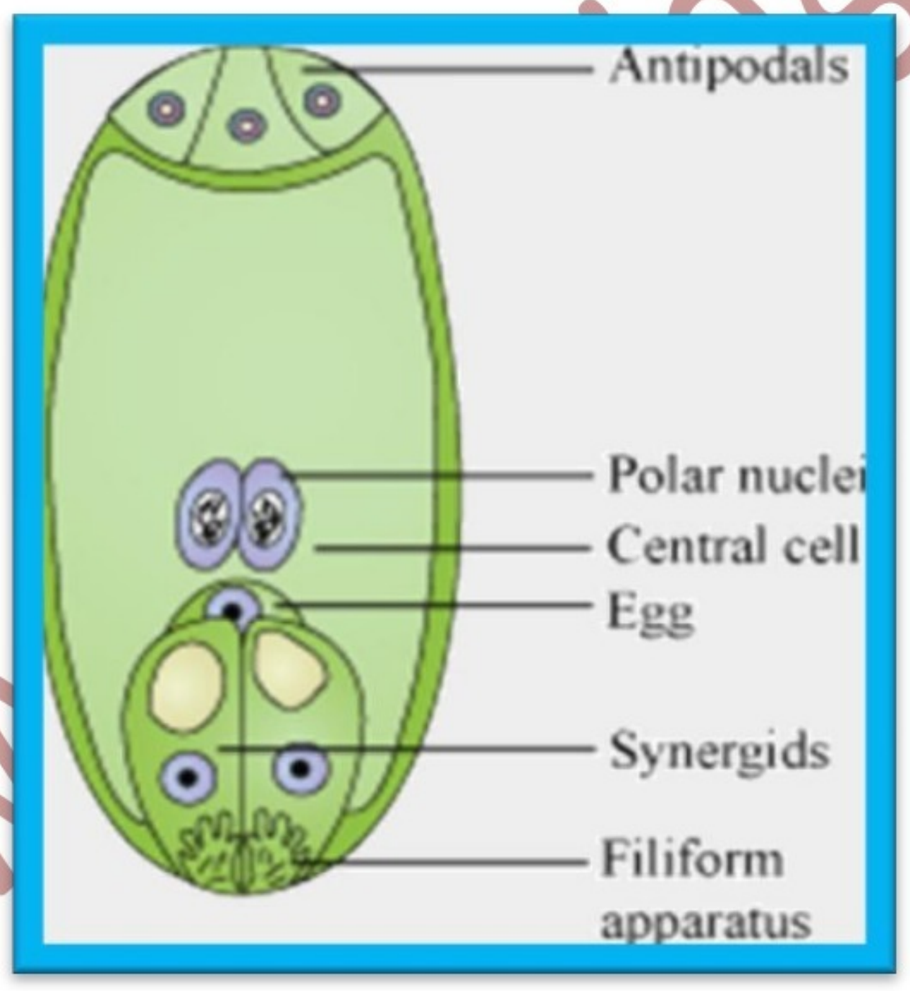
5. What is meant by monosporic development of female gametophyte?

Answer 5.

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.

6. With a neat diagram explain the 7-celled, 8-nucleate mature female gametophyte.

Answer 6.



7. What are chasmogamous flowers? Can cross-pollination occur in cleistogamous flowers? Give reasons for your answer.

Answer 7.

Those flowers which have exposed anthers and stigma are called chasmogamous flowers.

No, cross-pollination can occur in cleistogamous flowers because cleistogamous flowers are bisexual flowers and do not open at all for complete self-pollination.

8. Mention two strategies evolved to prevent self-pollination flowers.

Answer 8.

Two strategies evolved to prevent self-pollination are:-

a) **Dichogamy** – In this, pollen and stigma of flowers get mature at different periods or times. Dichogamy is of two types, Protogyny- If gynoecium matures earlier than androcium. e.g.; bajra.
Protandry- If androecium matures earlier than gynoecium. e.g.; maize.

b) **Self-incompatibility** – It is the genetic inability of certain pollen grains to fertilize the ovules of same flower or plant.

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

Answer 9.

Self incompatibility is also called self sterility. It is the natural inability to prevent self pollination in which pollen grains from the same flower is unable to fertilize ovules of same flower or plant.

It happens due to several complex mechanisms. These could be saprophytic or gametophytic incompatibility. Prevent of pollen germination, retardation of growth, reorientation of pollen tube, failure of nuclear fusion could be one of the reason.

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

Answer 10.

Bagging is a technique used to prevent the fertilization of stigma from unwanted pollen by covering the emasculated flower with butter-paper. It is useful in a plant breeding programme because it prevents from unwanted cross pollination.

11. What is triple fusion?

Answer 11.

It is fusion of three haploid nuclei during double fertilization. It takes place in the central cell between one male gamete and two polar nuclei and it forms triploid primary endosperm nucleus.

12. Why do you think the zygote is dormant for sometime in a fertilized ovule?

Answer 12.

It is so because development of endosperm precedes development of embryo and nutrition to developing embryo is provided by endosperm tissue

13.Differentiate between:

a) **Hypocotyl and epicotyl**
b) **Coleoptile and coleorrhiza**
c) **Integument and Testa**
d) **Perisperm and pericarp**

Answer 13.

a) Hypocotyl and epicotyl.

Hypocotyl	Epicotyl
It is a cylindrical portion below the level of cotyledons.	The portion of embryonal axis above the level of cotyledons.
It terminates as its lower end in radical or root tip.	It terminates with the plumule or stem tip.

b) Coleoptile and coleorrhiza

Coleoptile	Coleorrhiza

Epicotyl has a shoot apex and a few leaf primordial enclosed in hollow foliar structure called Coleoptile.	At the lower end of embyonal axis, it has the radical and root cap enclosed in undifferentiated sheath called coleorrhiza.

c) Integument and Testa

Integument	Testa
They are the protective covering of ovules.	It is the outer seed coat.
Except micropylar end it encircles the complex ovule.	It protects the young embryo because of its hardness.

d) Perisperm and pericarp

Perisperm	Pericarp
Residual persistent nucellus is called perisperm.	It is fruit's wall which developed from wall of ovary.
It is single layered.	It may have three layers i.e.; exocarp, mesocarp and endocarp.

14. Why apple is called a false fruit? Which parts of the flower forms the fruit?

Answer 14.

Apple is called a false fruit because the thalamus also contributes in the formation of fruit.

Fruits are mainly matured ovary together with structures close to ovary but after the formation of fruit, structures other than ovary degenerates and fall off.

15. What is meant by emasculation? When and why does a plant breeder employ this technique?

Answer 15.

It is a technique done manually in which anthers from flower bud are removed before the pollen dehisces. It is done by plant breeders to produce species of plants having desirable characters by cross-pollination of own choice.

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

Answer 16.

It is a process in which fruits are produced by the use of growth hormones like auxins and gibberellines. It is either done natural or induced. No fertilization takes place in parthenocarpic fruits.

Fruits like oranges, lemons can be easily produced by the process of parthenocarpy.

17. Explain the role of tapetum in the formation of pollen grain wall.

Answer 17.

Innermost wall of microsporangium is called tapetum. Tapetal cells may have uni, bi or multi nucleate and have dense cytoplasm.

Role played by tapetum are as following:-

a) It secretes hormones and various enzymes.
b) During meiosis in spore mother cells, tapetum supports nutrition to anther locule.
c) It produces ubisch bodies which are coated with sporopollenin to cause thickening of exine.
d) It secretes protein for pollen to be compatible during recognition.

18. What is apomixes and what is its important?

Answer 18.

In apomixes process, seeds are produced without fertilization. It is a form of asexual reproduction which is somewhat similar to sexual reproduction.

For hybrid seed industry, apomixes is very important because year after year seeds needs to be produced, which makes these seeds very costly. There won't be any segregation of characters in hybrids, if the hybrids are

made apomicts. Thus, making these seeds to be used year after and that makes hybrid seeds very economical.