THE VILLAGE
INTERNATIONAL SCHOOL
"We Nurture Dreams"

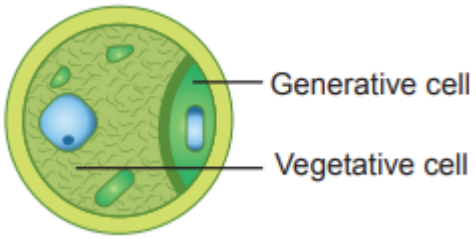
AIM HIGH, TOGETHER WE FLY

Grade 12 Biology

Chapter 2: Sexual Reproduction in flowering plants

Question bank

Q. 1. Draw a diagram of a matured microspore of an angiosperm. Label its cellular components only.



Q. 2. Give an example of a plant which came into India as a contaminant and is a cause of pollen allergy.

Ans. Parthenium or Carrot grass.

Q. 3. State the function of filiform apparatus found in mature embryo sac of an angiosperm.

Ans. The filiform apparatus guides the pollen tube into the synergid.

Q. 4. Why do pollen grains of some flowers trigger 'sneezing' in some people?

Ans. They result in an allergic reaction.

Q. 5. Papaver and Michelia both have multicarpellary ovaries. How do they differ from each other?

Ans. Papaver has syncarpous gynoecium whereas Michelia has apocarpous gynoecium.

Q. 6. An anther with malfunctioning tapetum often fails to produce viable male gametophytes. Give any one reason.

Ans. A malfunctioning tapetum does not provide enough nourishment to the developing male gametophytes and thus fail to produce viable male gametophytes.

Q. 7. How is it possible in Oxalis and Viola plants to produce assured seed-sets even in the absence of pollinators?

Ans. By presence of cleistogamous flowers.

Q. 8. A bilobed, dithecous anther has 100 microspore mother cells per microsporangium. How many male gametophytes this anther can produce? [CBSE Delhi 2010]

Ans. The bilobed anther can produce 1600 male gametophytes.

Q. 9. The diploid number of chromosomes in an angiospermic plant is 16. What will be the number of chromosomes in its endosperm and antipodal cells?

Ans. Endosperm—24 chromosomes, Antipodals—8 chromosomes.

Q. 10. How do flowers of Vallisneria get pollinated?

Ans. In Vallisneria, the female flower stalk is long to reach the water surface to receive the pollen grains carried by water currents and then it gets coiled after pollination.

Q. 11. How many microspore mother cells would be required to produce one hundred pollen grains

in a pollen sac? And why? [CBSE (F) 2013]

Ans. 1 microspore mother cell undergoes meiosis to form 4 pollen grains. In order to produce 100 pollen grains, 25 microspore mother cells must undergo meiosis.

Q. 12. What is pollen–pistil interaction and how is it mediated?

Ans. The ability of the pistil to recognise the pollen followed by its acceptance or rejection is called pollen–pistil interaction. It is mediated by chemical components of pollen interacting with those of pistil.

Q. 13. How many microsporangia are present in a typical anther of an angiosperm?

Ans. Four

Q. 14. Pea flowers produce assured seed sets. Give a reason.

Ans. Pea flowers are cleistogamous, i.e., anther and stigma lie close to each other in closed flowers. So when anthers dehisce in the flower buds, pollen grains come in contact with the stigma to effect pollination. Thus, assured seeds are produced in pea.

Q. 15. Name the part of the flower which the tassels of the corn-cob represent.

Ans. Style and stigma

Q. 16. Write the function of coleoptile.

Ans. It protects the plumule of the monocot embryo.

Q. 17. Write the function of scutellum.

Ans. It provides nourishment and protection to the developing embryo.

Q. 18. In a flowering plant a microspore mother cell produces four male gametophytes while a megaspore mother cell form only one female gametophyte. Explain.

Ans. Male gametophytes are formed by meiosis of single microspore mother cell whereas female gametophytes are formed by meiosis of single megaspore mother cell to produce 4 megaspores, out of which 3 degenerate and only one survives. The surviving megaspore undergoes mitotic division to form the female gametophyte.

Q. 19. Name the organic materials the exine and intine of an angiosperm pollen grain are made up of. Explain the role of exine. [

Ans. Exine is made up of sporopollenin and intine is made up of cellulose and pectin. Exine is the most resistant organic material and can withstand high temperature, acidic and alkali environment.

Q. 20. Differentiate between the two cells enclosed in a mature male gametophyte of an angiosperm.

S.No.	Vegetative cell	Generative cell
(*i*)	It is bigger in size.	It is smaller and floats in the cytoplasm of vegetative cell.
(*ii*)	It has food reserves.	It gives rise to two male gametes.

Q. 21. “Pollen grains in wheat are shed at 3-celled stage while in peas they are shed at 2-celled stage.” Explain. Where are germ pores present in a pollen grain?

Ans. At the time of shedding wheat pollen consists of one vegetative and two male gametes, which is the 3-celled stage. While pea pollen consists of one vegetative and one generative cell which is the 2-celled stage. Germ pores are present on the exine where sporopollenin is absent.

Q. 22. Gynoecium of a flower may be apocarpous or syncarpous. Explain with the help of an example each.

Ans. The gynoecium represents the female reproductive part of the flower. When there are more than one pistil, if the pistils are fused together, the flower is said to be syncarpous and if the pistils are free, it is said to be apocarpous. For example, pistil of Papaver is syncarpous and that of Micheliais apocarpous.

Q23. Name all the haploid cells present in an unfertilised mature embryo sac of a flowering plant. Write the total number of cells in it.

Ans. The haploid cells in an unfertilised mature embryo sac are: egg cell, synergids, antipodals and central cell. There are 7 cells in total.

Q. 24. Mention the ploidy of the different types of cells present in the female gametophyte of an angiosperm.

Cells in female gametophyte	Their ploidy
1. Synergids	Haploid
2. Egg	Haploid
3. Polar nuclei	Haploid
4. Antipodals	Haploid
5. Central cell	2 haploid nuclei

Q. 25. What is cleistogamy? Write one advantage and one disadvantage of it, to the plant.

Ans. Pollination occurring in closed flowers is referred to as cleistogamy.

Advantage: It ensures self-pollination and assured seed set formation in absence of pollinators.

Disadvantage: It does not allow cross-pollination. This can cause inbreeding depression as there will be no genetic variation.

Q. 26. (a) List any two characteristic features of wheat flowers that make it a good example of wind

pollination.

(b) It is observed that plant breeders carrying out wheat hybridisation often take pollen grains from the 'pollen banks'. Do you agree ? Give one reason in support of your answer.

Ans. (a) Light pollen grains/Pollen grains more in number/well exposed stamen/feathery and sticky stigma / Numerous flowers are packed into an inflorescence. (Any two)

(b) Yes. Viability of wheat pollen grain is only 30 minutes and so it is stored in pollen bank for a long period of time for later use.

Q. 27. List the two steps that are essential for carrying out artificial hybridisation in crop plants and why.

Ans. (a) Selection of parents: Only those plants should be selected which have desired traits. Emasculation: Removal of anthers from flower before they are mature and dehisce.

(b) Crossing over: Pollen grains from selected male plant is collected and transferred to the female plant after which it is bagged.

Q. 28. Explain the steps that ensure cross pollination in an autogamous flower.

Ans. A bisexual flower is emasculated at unopened stage to prevent self-pollination in the flower and it is bagged after emasculation to prevent contact of unwanted pollen grain with the stigma of the flower. Artificial pollination is then performed when the stigma is ready and the flower is rebagged.

Q. 29. Geitonogamous flowering plants are genetically autogamous but functionally cross-pollinated. Justify. Give similarity of geitonogamy with autogamy and xenogamy.

Ans. Geitonogamous flowers are genetically autogamous because both male and female flowers are borne on the same plant. They are functionally cross-pollinated because the pollen from one flower is transferred to the stigma of a different flower.

Q. 30. How does the Mediterranean orchid Ophrys ensures its pollination by bees?

Ans. The petals of the Ophrys resemble the female of a bee species in size, colour and odour. Male bee mistakes the Ophrys for female bee and tries to copulate. Few pollen grains adhered to the body of the male bee fall over stigma of the flower thereby leading to pollination showing sexual deceit.

Q. 31. Why should a bisexual flower be emasculated and bagged prior to artificial pollination?

Ans. A bisexual flower is emasculated to prevent self-pollination in the flower and it is bagged after emasculation to prevent contact of unwanted pollen grain with the stigma of the flower.

Q. 32. Write the cellular contents carried by the pollen tube. How does the pollen tube gain its entry into the embryo sac?

Ans. Pollen tube carries two male gametes.Pollen tube, after reaching the ovary, enters the ovule through the micropyle and then enters one of the synergids through the filiform apparatus which guides the entry of pollen tube into egg cell.

Q. 33. A pollen grain in angiosperm at the time of dehiscence from an anther could be 2-celled or 3-celled. Explain. How are the cells placed within the pollen grain when shed at a 2-celled stage?

Ans. In 2-celled stage the mature pollen grain contains one generative and vegetative cells, whereas in 3-celled stage one vegetative cell and two male gamete cells are present.The generative cell being small floats in the cytoplasm of the vegetative cell. The pollen grains are shed at this 2-celled stage.

Q. 34. State one advantage and one disadvantage of cleistogamy.

Ans. Advantage: Self-pollination is assured/Seed production is assured.

Disadvantage: Least variations observed/Leads to inbreeding depression.

Q. 35. Name the product of fertilisation that forms the kernel of coconut. How does the kernel differ from coconut water?

Ans. Endosperm forms the kernel of coconut. The coconut water is free-nuclear endosperm whereas kernel is cellular endosperm.

Q. 36. List the post-fertilisation events in angiosperms.

Ans. (i) Development of endosperm

(ii) Embryogeny/development of embryo

(iii) Seed formation

(iv) Fruit formation

Q. 37. Mention the function of each of the following:

(a) Tassels of corn cob.

(b) Tapetum in the microsporangium.

Ans. (a) These are the stigma and style which wave in the wind to trap pollen grains.

(b) Provides nourishment to the developing pollen grains.

Q. 38. Explain the function of each of the following:

(a) Coleorhiza

(b) Germ pores

Ans. (a) Coleorhiza protects the radical of (monocot) embryo.

(b) Germ pores allow germination of pollen grain and formation of pollen tubes.

Q. 39. Differentiate between albuminous and non-albuminous seeds, giving one example of each.

Ans. Albuminous seeds have residual endosperm in them. For example, maize.

Non-albuminous seeds do not have any residual endosperm. For example, pea.

Q. 40. Mention the reasons for difference in ploidy of zygote and primary endosperm nucleus in an angiosperm.

OR

In angiosperms, zygote is diploid while primary endosperm cell is triploid. Explain.

Ans. A zygote is formed by the fusion of haploid male gamete with the haploid egg to form a diploid cell; whereas, primary endosperm nucleus (PEN) is formed by the fusion of haploid male gamete with two haploid polar nuclei, forming a triploid nucleus.

Q. 41. Some angiosperm seeds are said to be 'albuminous', whereas few others are said to have a perisperm. Explain each with the help of an example. [

Ans. Albuminous seeds are those which retain a part of endosperm as it is not completely used up during embryo development. For example, in wheat and maize. In some seeds remnants of nucellus are also persistent. This residual, persistent nucleus is the perisperm. For example, in black pepper and beet.

Q. 42. Double fertilisation is reported in plants of both, castor and groundnut. However, the mature seeds of groundnut are non-albuminous and castor are albuminous. Explain the postfertilisation events that are responsible for it.

Ans. The development of endosperm (preceding the embryo) takes place from primary endosperm nucleus (PEN) in both, castor and groundnut. The developing embryo derives nutrition from endosperm. PEN undergoes repeated division to give free nuclei. Subsequently cell wall is formed and endosperm becomes cellular. At this stage endosperm is retained in castor or is not fully consumed but in groundnut endosperm is consumed by growing embryo.

Q. 43. (a) You are given castor and bean seeds. Which one of the two would you select to observe the endosperm?

(b) The development of endosperm precedes that of embryo in plants. Justify.

Ans. (a) Castor

(b) Endosperm stores reserve food materials. It provides nutrition to the developing embryo, therefore its development precedes that of embryo.

Q. 44. (a) Mature seeds of legumes are non-albuminous. Then, can it be assumed that double fertilisation does not occur in legumes? Explain your answer.

(b) List the differences between the embryos of dicot (pea) and monocot (grass family).

Ans. (a) No it cannot be assumed so because fertilisation does takes place but the endosperm is consumed during embryo development.

S. No.	Dicot embryo	Monocot embryo
(*i*)	It has two cotyledons.	It has one cotyledon.
(*ii*)	Radicle and plumule are not covered with sheath.	Radicle is covered with coleorhiza and plumule is covered by coleoptile.

Q. 45. A non-biology person is quite shocked to know that apple is a false fruit, mango is a true fruit and banana is a seedless fruit. As a biology student how would you satisfy this person?

Ans. In apple only the thalamus (along with ovary) portion contributes to fruit formation. Therefore, it is a false fruit. Mango develops only from the ovary, therefore it is a true fruit.Banana develops from ovary but without fertilisation. The method is known as parthenocarpy. Since there is no fertilisation, no seeds are formed in banana.

Q. 46. Why are some seeds referred to as apomictic seeds? Mention one advantage and one disadvantage to a farmer who uses them.

Ans. Seeds that are produced without fertilisation are referred to as apomictic. Advantage: Desired characters are retained in offspring (progeny) as there is no segregation of characters in offspring (progeny). Seed production is assured even in absence of pollinators. Apomictic seeds are economical as they can be used to grow crops year after year.

Disadvantage: Cannot control accumulation of deleterious genetic mutation. These are usually restricted to narrow ecological niches and lack ability to adapt to changing environment.

Q. 47. Explain any two ways by which apomictic seeds get developed.

Ans. Ways by which apomictic seeds develop are:

(i) A diploid egg is formed without reduction division which develops into embryo without fertilisation.

(ii) Some cells of the nucellus, which are diploid in nature, start dividing and without fertilisation develop into embryo.

Q. 48. If you squeeze a seed of orange you might observe many embryos of different sizes? How is it possible? Explain.

Ans. In orange, the nucellar cells surrounding the embryo sac start dividing, protrude into the embryo sac and develop into a number of embryos of different sizes.

Q. 49. Banana is a parthenocarpic fruit whereas oranges show polyembryony. How are they different from each other with respect to seeds?

Ans. Banana develops from an ovary without fertilisation having non-viable seeds so it is called parthenocarpic fruit. An orange contain seeds with more than one embryo thus, it shows polyembryony.

Q. 50. (a) How are parthenocarpic fruits produced by some plants and apomictic seeds by some others? Explain.

(b) When do farmers prefer using apomictic seeds?

Ans. (a) Parthenocarpic fruits are formed when ovary develops into fruit without fertilisation. Apomictic seeds are formed when formation of seeds take place without fertilisation.

(b) To maintain hybrid characters (year after year in a desired plant) and to avoid buying hybrid seeds every year (expensive seeds) farmers prefer using apomictic seeds.