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.
Solution:
Option (c) is the answer.

2. The embryo sac is to ovule as _____ is to an anther.
a. Stamen
b. Filament
c. Pollen grain
d. Androecium
Solution:
Option (c) is the answer.

3. In a typically 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
Solution:
Option (a) is the answer.

4. A dicotyledonous plant bears flowers but never produces fruits and seeds. The most probable cause for the above situation is:
a. The plant is dioecious and bears only pistillate flowers
b. The plant is dioecious and bears both pistillate and staminate flowers
c. The plant is monoecious
d. The plant is dioecious and bears only staminate flowers.
Solution:
Option (d) is the answer.

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
Solution:
Option (d) is the answer.

6. During microsporogenesis, meiosis occurs in:
a. Endothecium
b. Microspore mother cells
c. Microspore tetrads
d. Pollen grains.
Solution:
Option (b) is the answer.

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
Solution:
Option (a) is the answer.

8. Starting from the innermost part, the correct sequence of parts in an ovule is,
a. egg, nucellus, embryo sac, integument
b. egg, embryo sac, nucellus, integument
c. embryo sac, nucellus, integument, egg
d. egg, integument, embryo sac, nucellus.
Solution:
Option (b) is the answer.

9. From the statements given below choose the option that is 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 of
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 and ii (d) ii and iv
Solution:
Option (c) is the answer

10. Autogamy can occur in a chasmogamous flower if:
a. Pollen matures before the maturity of ovule
b. Ovules mature before the maturity of pollen
c. Both pollen and ovules mature simultaneously
d. Both anther and stigma are of equal lengths.
Solution:
Option (c) is the answer.

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
Solution:
Option (a) is the answer.

12. A particular species of the 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.
Solution:
Option (c) is the answer.

13. From among the situations given below, choose the one that prevents both autogamy and geitonogamy.
a. A monoecious plant bearing unisexual flowers
b. A dioecious plant bearing only male or female flowers
c. Monoecious plant with bisexual flowers
d. Dioecious plant with bisexual flowers
Solution;
Option (b) is the answer.

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.
Solution:
Option (a) is the answer.

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.
Solution:
Option (b) is the answer.

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. A dusting of pollen on stigma
c. Emasculation
d. Collection of pollen
Solution:
Option (c) is the answer.

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.
Solution:
Option (c) is the answer.

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
Solution:
Option (b) is the answer.

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.
Solution:
Option (b) is the answer.

20. The phenomenon wherein, the ovary develops into a fruit without fertilisation is called:
a. Parthenocarpy
b. Apomixis
c. Asexual reproduction
d. Sexual reproduction
solution:
Option (a) is the answer.

VERY SHORT ANSWER TYPE QUESTIONS

1. Name the component cells of the 'egg apparatus' in an embryo sac.

Solution:
Synergids, egg cells and the filiform apparatus are the component cells of the egg apparatus in an embryo.

2. Name the part of gynoecium that determines the compatible nature of pollen grain.
Solution:
The pistil is the part of gynoecium that determines the compatible nature of pollen grain.

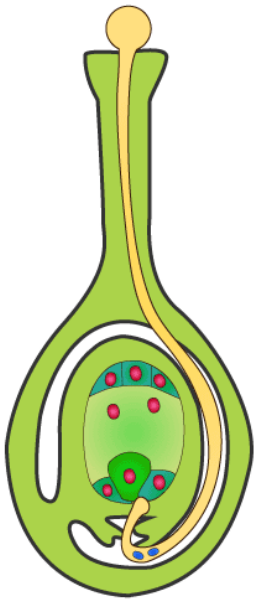
3. Name the common function that cotyledons and nucellus perform.
Solution:
They both have abundant reserve food materials, so they both store reserve food materials.

4. Complete the following flow chart

Pollen mother cell → Pollen tetrad → Pollen grain (a) = vegetative cell (b) = ?
Solution:
B = Generative cell.

5. Indicate the stages where meiosis and mitosis occur (1, 2 or 3) in the flow chart.
Megaspore mother cell →Megaspores → Embryo sac →Egg
Solution:
Megaspores – Meiosis, Embryo sac – Mitosis, Egg – Mitosis

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 the egg apparatus.
Solution:



Solution:
Pollen tube, Antipodal, Polar Nuclei, Egg cell, Synergids

7. Name the parts of the pistil which develop into fruit and seeds.
Solution:
Stigma, style and ovary are the parts of the pistil which develop into fruit and seeds.

8. In the case of polyembryony, if an embryo develops from the synergid and another from the nucellus which is haploid and which is diploid?
Solution:
Embryos from Synergids – Haploid, Embryos from nucellus – diploid

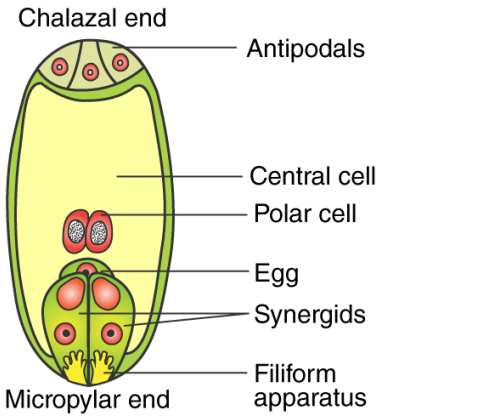
9. Can an unfertilized, apomictic embryo sac give rise to a diploid embryo? If yes, then how?
Solution:
Yes, an unfertilized, apomictic embryo sac can give rise to a diploid embryo. When megaspore develops into embryo sac without meiotic division, the egg developed will be diploid.

10. Which are the three cells found in a pollen grain when it is shed at the three celled stages?
Solution:
One vegetative cell and two male gametes are found in a pollen grain when it is shed at the three celled stages.

11. What is self-incompatibility?
Solution:
Self-incompatibility is a genetic mechanism that prevents self-pollination (i.e., pollination from the same flower or other flowers of the same plant) from fertilizing the ovules by inhibiting pollen germination or pollen tube growth in the pistil.

12. Name the type of pollination in self-incompatible plants.
Solution:
Xenogamy is the type of pollination in self-incompatible plants.

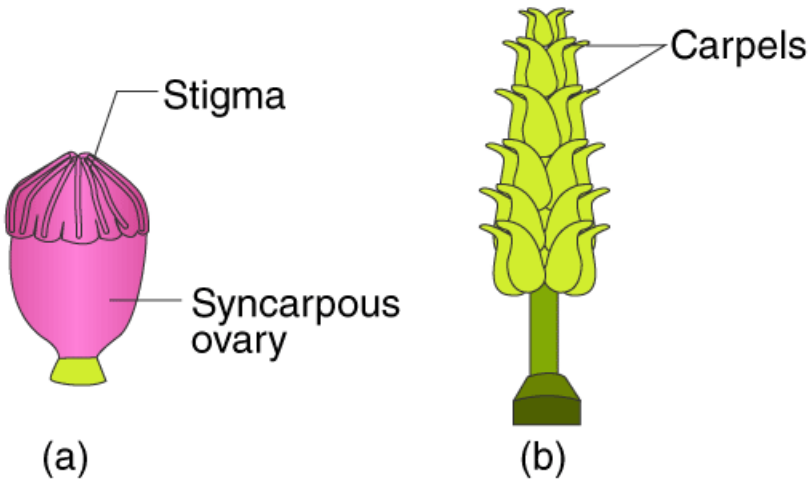
13. Draw the diagram of a mature embryo sac and show its 8-nucleate, 7-celled nature. Show the following parts: antipodals, synergids, egg, central cell, polar nuclei.
Solution:



14. Which is the triploid tissue in a fertilized ovule? How is the triploid condition achieved?
Solution:
The triploid tissue in a fertilized ovule is endosperm which is developed from the Primary Endosperm nucleus. This triploid condition is achieved by fusion of three haploid nuclei called triple fusion.

15. Are pollination and fertilization necessary in apomixes? Give reasons.
Solution:
Apomixes is the development of seeds without prior fertilization. Apomixes avoids the processes of meiosis and fertilization, leading to embryo development.

16. Identify the type of carpel with the help of diagrams given below:



Solution:
(a) is Syncarpous multicarpellary (i.e., have more than one pistil fused).
(b) is Apocarpous multicarpellary (i.e., have more than one pistil but free)

17. How is pollination carried out in water plants?
Solution:
In few species, female flower reaches the surface of the water by the long stalk and pollen grains from male flowers are released on to the surface of the water. In some cases, female flowers remain submerged in water and the pollen grains are released inside the water.

18. What is the function of the two male gametes produced by each pollen grain in angiosperms?
Solution:
The two male gametes produced by each pollen grain in angiosperms helps in double fertilization. Syngamy is the process results in the formation of a zygote by the movement of male gamete towards the egg cell and fuses with its nucleus. The other male gamete moves towards the two polar nuclei located in the central cell and fuses with them to produce a triploid primary endosperm nucleus.

SHORT ANSWER TYPE QUESTIONS
1. List three strategies that a bisexual chasmogamous flower can evolve to prevent self-pollination (autogamy).
Solution:
i) Avoiding synchronisation of pollen release and stigma reception can prevent autogamy that is avoiding the simultaneous maturing of anther and stigma
ii) Self-incompatibility or self-sterility is a genetic mechanism that prevents self-pollination
iii) The pollen of a flower doesn't come in contact with the stigma of the same flower can prevent autogamy by placing anther and stigma at a different position.

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.
Solution:
(a) Selection of parents is done first.
(b) Emasculation
(c) Bagging
(d) Collection of pollen from the male parent
(e) Dusting the pollen on the stigma
(f) Re-bagging

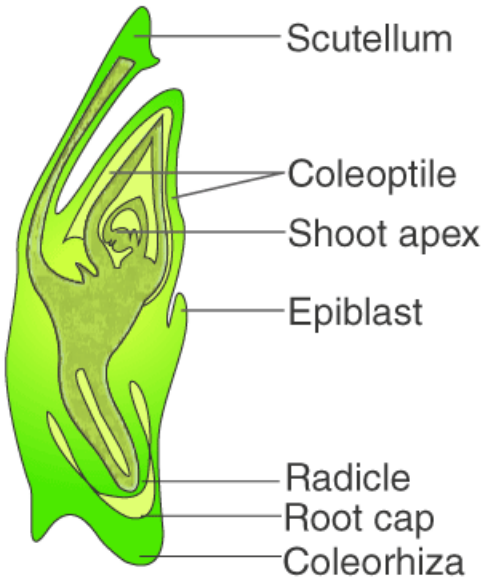
3. Vivipary automatically limits the number of offspring's in a litter. How?
Solution:
A litter is an offspring at one birth of animals from the same mother. A litter usually is 3-8 offspring's together. The vivipary automatically limits the number of offspring's in a litter because during the female reproductive cycle limited number of eggs are produced and fertilized.

4. Does self-incompatibility impose any restrictions on autogamy? Give reasons and suggest the method of pollination in such plants.
Solution:
Yes, Self-incompatibility imposes restrictions on autogamy.
Self-incompatibility is a genetic mechanism that prevents self-pollination (i.e., pollination from the same

flower or other flowers of the same plant) from fertilizing the ovules.
The restrictions are imposed as continued self-pollination leads to inbreeding depression. And to prevent such type of depression self-incompatibility is used.

5. In the given diagram, write the names of parts shown with lines.

Solution:



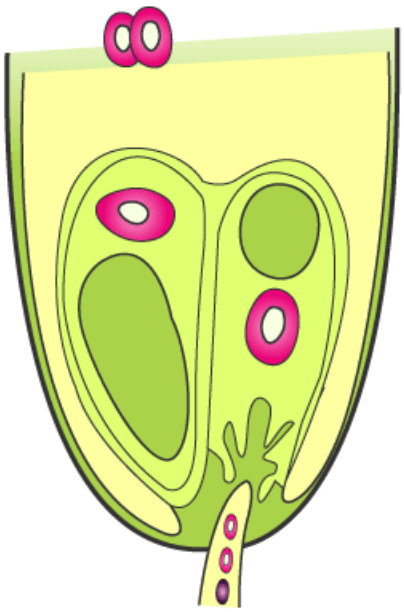
6. What is polyembryony and how can it be commercially exploited?
Solution:
Presence of more than one embryo in a seed is known as polyembryony. It can be commercially exploited in many ways like:
i. It helps in plant breeding
ii. It helps in horticulture

7. Are parthenocarpy and apomixis different phenomena? Discuss their benefits.
Hint: Yes, parthenocarpy and apomixis different phenomena. Parthenocarpy leads to the development of seedless fruits. Apomixis leads to embryo development.
Solution:
Parthenocarpy is the development of fruit without prior fertilization and is seedless. This can be used to produce seedless fruit like grapes, banana etc.
Apomixis is the development of seed without prior fertilization that mimics sexual reproduction.

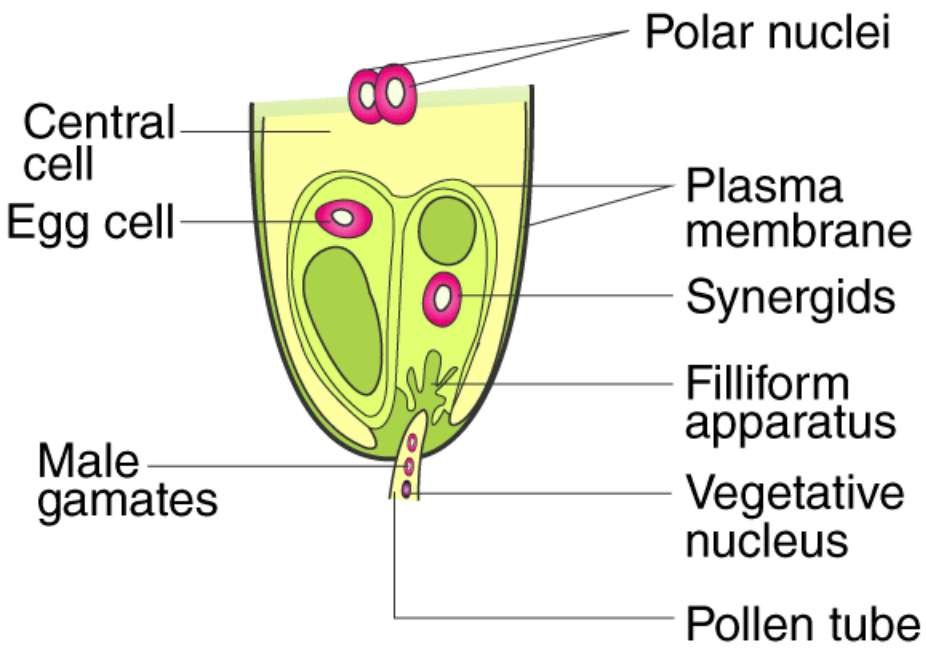
8. Why does the zygote begin to divide only after the division of Primary endosperm cell (PEC)?
Solution:
The zygote begins to divide only after the division of Primary endosperm cell (PEC) because it needs nourishment during its development. The PEC forms the endosperm where food materials are stored for the developing embryo. So the zygote begins to divide only after the division of Primary endosperm cell. PEC is an adaptation to provide assured nutrition to the developing embryo.

9. The generative cell of two-celled pollen divides in the pollen tube but not in three-celled pollen. Give reasons.
Solution:
The generative cell in pollen grain divides mitotically to give rise to the two male gametes before pollen grains are shed. This is a 3-celled stage i.e., one vegetative cell and two male gametes. Pollen grains in the 2-celled stage just have 2 cells namely vegetative cell and a generative cell. As here division of generative cell did not take place, hence the generative cell of two-celled pollen divides in the pollen tube.

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

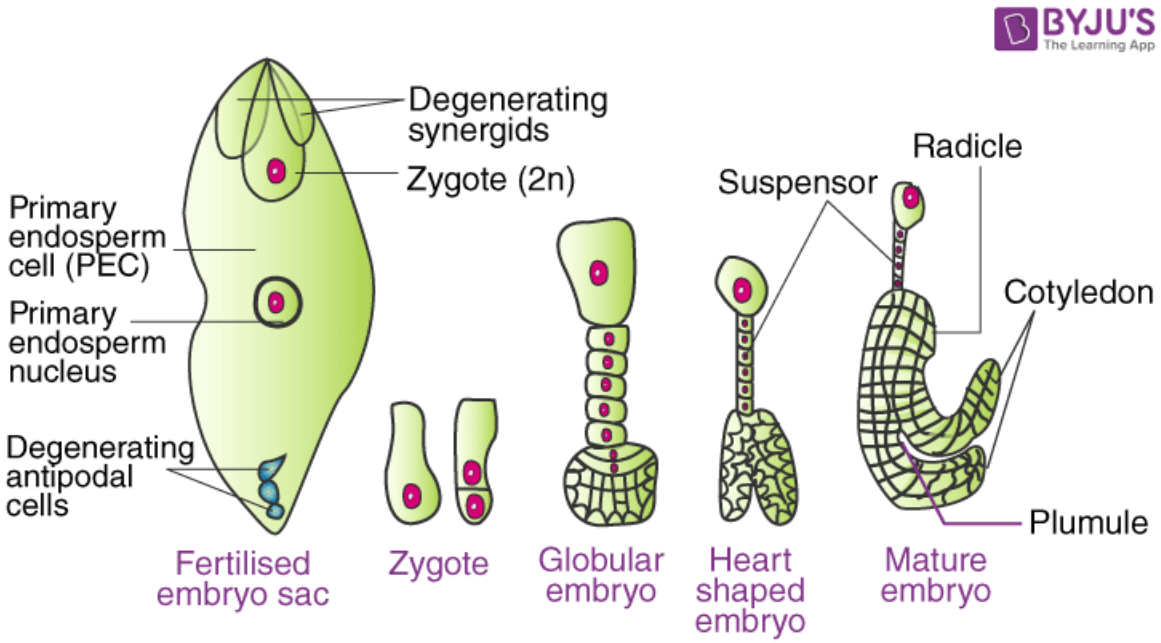


Solution:


Polar nuclei
Central cell
Egg cell
Plasma membrane
Synergids
Filliform apparatus
Male gamates
Vegetative nucleus
Pollen tube

LONG ANSWER TYPE QUESTIONS

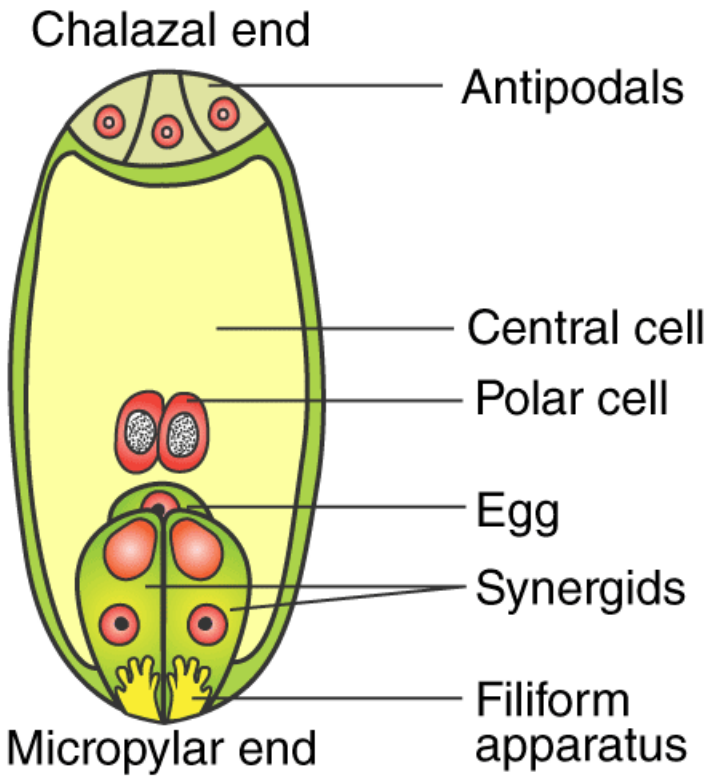
1. Starting with the zygote, draw the diagrams of the different stages of embryo development in a dicot.



Solution:

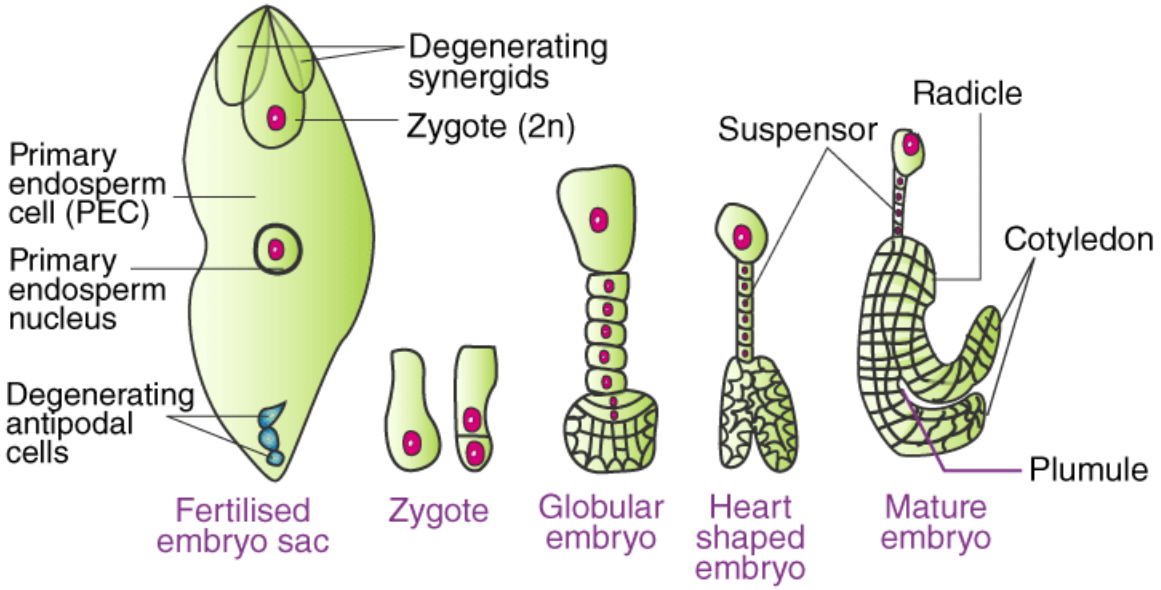
2. What are the possible types of pollinations in chasmogamous flowers? Give reasons.
Solution:
Chasmogamous flower flowers with exposed anthers and stigma. The possible pollinations are
1. Autogamy or self-pollination: Pollen and ovules should mature simultaneously.
2. Dichogamy - For this type of pollination synchronisation of pollen release and stigma reception should be avoided that is by avoiding the simultaneous maturing of anther and stigma
3. Self-incompatibility or self-sterility is a genetic mechanism that prevents self-pollination (i.e., pollination from the same flower or other flowers of the same plant)
4. In chasmogamous flower, length of anther and stigma plays a secondary role in autogamy.
5. Geitonogamy – The pollen and pistil mature at different times but are self – compatible.
6. Xenogamy - This pollination brings genetically different types of pollen grains.

3. With a neat, labelled diagram, describe the parts of a mature angiosperm embryo sac. Mention the role of synergids.
Solution:



i. Antipodal: They are 3-celled at the chalazal end of the ovule.
ii. Polar Nuclei: One nucleus from each end of the chalazal end and micropylar end are called Polar Nuclei.
iii. Central cell: It is the largest cell, formed by the fusion of two polar nuclei.
iv. Egg Apparatus: It includes one large egg cell, 2 synergids and filiform apparatus.
Role of synergids are:
1. For angiosperm production
2. Helps in growth of pollen tubes towards the egg
3. Helps in the nutrition of embryo sac by absorption and transport of food from the nucleus through their filiform apparatus.

4. Draw the diagram of a microsporangium and label its wall layers. Write briefly on the role of the endothelium.
Solution:



Endothecium helps in dehiscence of the anther. It is a fibrous layer of cells lying below the wall of the anther in the epidermis. They lose water at the maturity and contract and help in dehiscence of pollen sac.

5. Embryo sacs of some apomictic species appear normal but contain diploid cells. Suggest a suitable explanation for the condition.
Solution:
Development of seeing without prior fertilization is known as apomixis and it is observed in few flowering.
It is a form that mimics sexual reproduction. It avoids the processes of meiosis and fertilization, leading to embryo development. The offsprings produced will be identical genetically. Embryo sacs of some apomictic species appear normal but contain diploid cells due to absence of meiotic division at the megaspore mother cell stage. Megaspore mother has a diploid nucleus so that t undergoes mitosis to all the resulting nuclei and cells will be diploid.