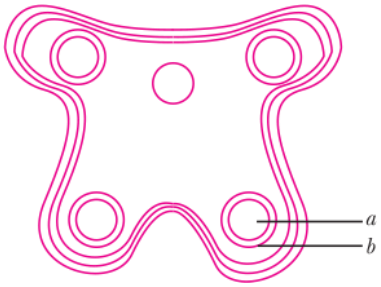
Short Answer Questions-I (PYQ)

[2 Marks]

Q.1. In the T.S. of a mature anther given below, identify "a" and "b" and mention their function.



Ans.

(a) Sporogenous tissue: It forms pollen grains.

(b) Tapetum: It provides nourishment to the developing pollen grains.

Q.2. In a flowering plant a microspore mother cell produce 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 megaspores 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.3. Explain giving two reasons why pollen grains can be best preserved as fossils.

Ans.

(i) Pollens are produced in large numbers.

(ii) The sporopollenin in exine protects the pollen from harsh conditions.

Q.4. Name the organic materials the exine and intine of an angiosperm pollen grains 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.5. Differentiate between the two cells enclosed in a mature male gametophyte of an angiosperm.

Ans.

S.No.	Vegetative cell	Generative cell
1.	It is bigger in size.	It is smaller and floats in the cytoplasm of vegetative cell.
2.	It has food reserves.	It gives rise to two male gametes.

Q.6. "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 sporpollenin is absent.

Q.7. Where is sporopollenin present in plants? State its significance with reference to its chemical nature.

Ans. Sporopollenin is present in the exine of pollen grains. It is the most resistant organic material in nature. It provides protection to the pollen/gamete/gametophyte from unfavourable conditions or chemicals (acids, enzymes and high temperature).

Q.8. 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 Michelia is apocarpous.

Q.9. 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. There are 7 cells in total.

Q.10. Mention the ploidy of the different types of cells present in the female gametophyte of an angiosperm.

Ans.

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

Q.11. Explain any two devices by which autogamy is prevented in flowering plants.

Ans.

(i) Male and female flowers are present on different plants.

(ii) The stamens and stigma of a bisexual flower mature at different times.

(a) Anthers mature earlier than the stigma and release pollens.

(b) The stigma matures earlier than the anther.

(iii) Flowers are self-sterile or self-incompatible.

(iv) Chasmogamous flowers are present with exposed stamens and stigma which facilitate cross-pollination.

Q.12.

(a) Mention the similarity between autogamy and geitonogamy.

(b) How does geitonogamy differ from xenogamy?

Ans.

(a) In both cases pollen grains come from the same plant. So they are genetically similar.

(b) In geitonogamy pollen grains are transferred from the anther to the stigma of another flower, of the same plant whereas in xenogamy pollen grains are transferred from the anther, to the stigma of a different flower.

Q.13. 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.

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

Q.14. 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.15. Geitonogamous flowering plants are genetically autogamous but functionally cross-pollinated. Justify.

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

Q.16. 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.17. 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.18. 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.19. 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.20. 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.21. List the post-fertilisation events in angiosperms.

Ans.

(i) Development of endosperm

(ii) Embryogeny/development of embryo

(iii) Seed formation

(iv) Fruit formation

Q.22. Mention the function of each of the following:

Q. tassels of corn cob.

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

Q. tapetum in the microsporangium.

Ans. Provides nourishment to the developing pollen grains.

Q.23. Describe the development of endosperm after double fertilization in an angiosperm. Why does endosperm development proceeds that of zygote?

Ans.

Endosperm Development

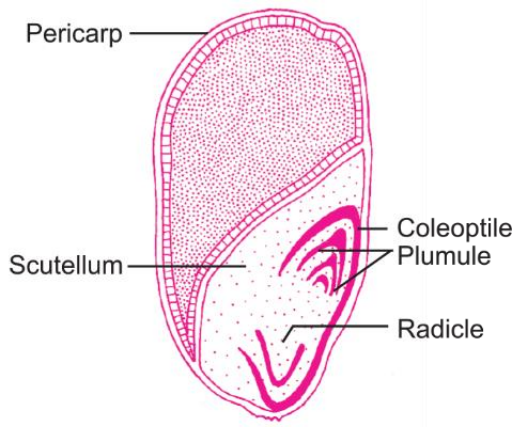
- Endosperm develops first followed by an embryo.
- Endosperm develops from PEN.
- The PEN undergoes successive nuclear divisions to give rise to free nuclei and this stage of endosperm development is called free nuclear endosperm.
- Subsequently, cell wall is formed on the periphery and endosperm becomes cellular.
- This division is followed by cytokinesis and thus endosperm becomes cellular. It is now called cellular endosperm.

Functions

- The cells of endosperm tissue are triploid and filled with reserve food material to nourish the developing embryo.
- The water of tender coconut in the centre is free-nuclear endosperm and white kernel in the outer part is the multicellular endosperm.
- The endosperm may be completely consumed by the developing embryo, e.g., pea, beans, or it may persist in mature seed, e.g., coconut.

Q.24. Draw a vertical section of a maize grain and label (i) pericarp, (ii) scutellum, (iii) coleoptile and (iv) radicle.

Ans.



V.S. of maize grain

Q.25. Explain the function of each of the following:

Q. Coleorhiza

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

Q. Germ pores

Ans. Germ pores allow germination of pollen grain and formation of pollen tubes.

Q.26. 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.27. 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.28. 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 nucellus is the perisperm. For example, in black pepper and beet.

Q.29. 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 post fertilisation 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.30. 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. 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.31. 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.32. Why is an apple called a false fruit and a banana a parthenocarpic fruit? Explain.

Ans. In normal conditions, the fruit develops from the ovary. However, in apple the thalamus also contributes to fruit formation. That is why it is called a false fruit.

Banana is called a parthenocarpic fruit because it develops without fertilisation and is thus seedless.

Q.33. 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.34. If you squeeze a seed of orange you might observe many embryos of different sizes? How is it possible? Explain.

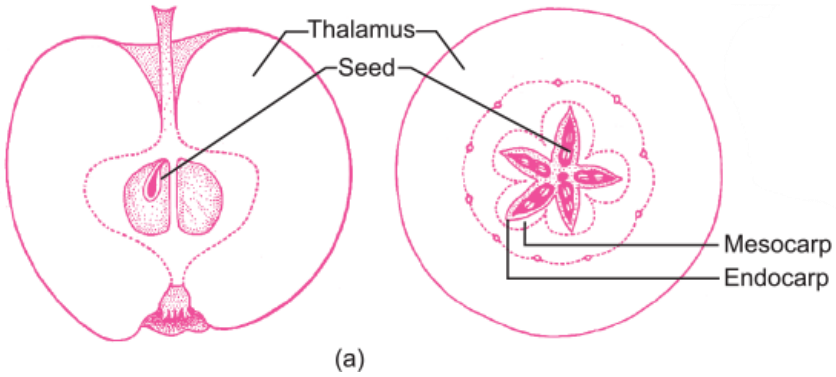
Ans. In orange, the nucellar cells surrounding the embryo sac start dividing, protrude into the embryo sac and develop into a number of embryos of different sizes.

Q.35. 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.36. Draw a sectional view of an apple and label the different parts of an ovary in it. Fruits develop from an ovary. Then why is apple referred to as a false fruit?

Ans.



In apple, the thalamus also contributes to fruit formation. Therefore, it is called a false fruit.

Q.37. 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.38. Answer the following questions -

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

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

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

Ans.

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.39. Answer the following questions -

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

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

Q. When do farmers prefer using apomictic seeds?

Ans. 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.

Short Answer Questions-I (OIQ)

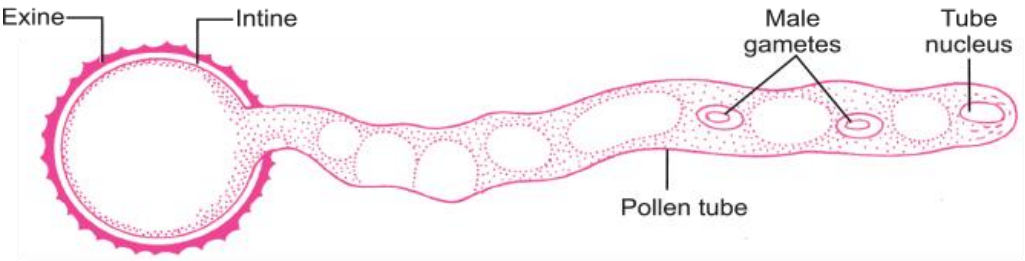
[2 Mark]

Q.1. Write briefly the role of pollination in the growth and development in an angiosperm.

Ans. Pollination is transfer of pollen grains from anthers to the stigma of a flower. Pollination is prerequisite for fertilisation, events after fertilisation like endosperm development, seed setting and fruit formation. Thus, pollination plays an important role in the growth and development of angiosperms.

Q.2. Draw a diagram of pollen grain with germ tube and two male gametes.

Ans.



Q.3. What is filiform apparatus? What is its function?

Ans. The synergids have special cellular thickenings at the micropylar tip called filiform apparatus. They guide the entry of pollen tubes into the synergids.

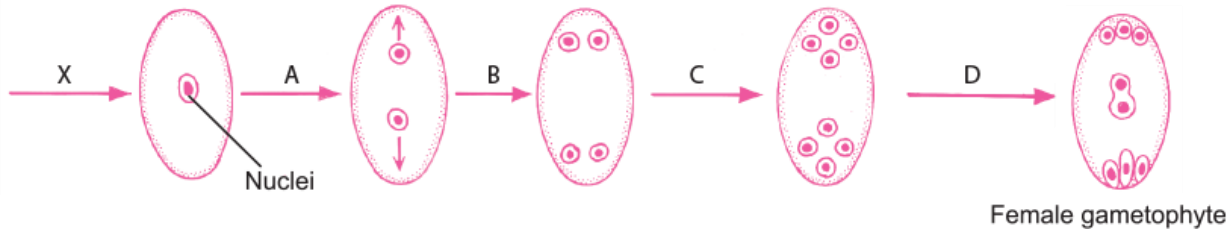
Q.4. Why does the zygote begin to divide only after the division of primary endosperm cell?

Ans. The zygote needs nourishment during its development. As the mature, fertilised embryo sac offers very little nourishment to the zygote, the primary endosperm cell (PEC) divides and generates the endosperm tissue which nourishes the zygote. Hence, the zygote always divides after division of PEC.

Q.5. Which is the triploid tissue in a fertilised ovule? How is the triploid condition achieved?

Ans. The triploid tissue in the ovule is the endosperm. Its triploid condition is achieved by the fusion of two polar nuclei and one nucleus of male gamete, referred to as triple fusion.

Q.6. Fill in the following labels with the type of cell function.



Ans. X—Meiosis (Reduction division); A—Mitosis; B—Mitosis; C—Mitosis; D—Cells reorganised as polar nuclei, antipodals and egg apparatus.

Q.7. What is pericarp? Mention its functions.

Ans. The wall of the ovary that develops into wall of the fruit is called pericarp.

Functions:

(i) Protects the seed till its maturity.

(ii) Helps in dispersal.

Q.8. What is agamospermy? How is agamospermy different from parthenogenesis and parthenocarpy?

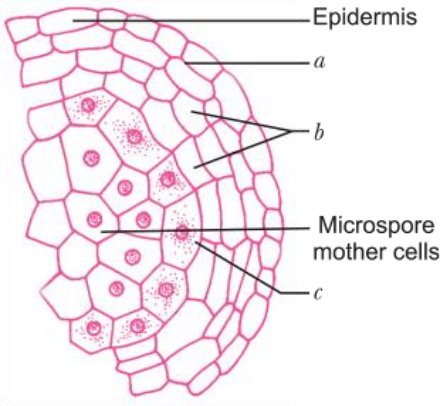
Ans. The phenomenon of asexual reproduction that mimics sexual reproduction as it forms seed without fertilisation is called agamospermy.

Parthenogenesis refers to the development of unfertilised ovule into an adult individual. On the other hand, parthenocarpy is the phenomenon of formation of fruits without fertilisation of an ovary.

Q.9. Given alongside is an enlarged view of one microsporangium of a mature anther.

(i) Name ‘a’, ‘b’ and ‘c’ wall layers.

(ii) Mention the characteristics and function of the cells forming wall layer ‘c’.



Ans.

(i)

= Endothecium,

= Middle layers,

= Tapetum

(ii) Tapetum provides nourishment to the developing pollen grains. The tapetal cells also secrete Ubisch granules that provide sporopollenin and other materials for exine formation.