SEXUAL REPRODUCTION IN FLOWERING PLANTS

Case based question

1. The pollen grains or microspores are the male reproductive bodies of a flower and are contained in the pollen sac or microsporangia. Each pollen grain consists of a single microscopic cell, possessing two coats: the exine and the intine. The exine of a pollen grain is made of chemically stable material. Because of this, pollen grains are often very well preserved for thousands of years in soil and sediments.

(i) One of the most resistant biological material presents in the exine of pollen grain is:

A. Pectocellulosic B. Suberin C. Sporopollenin d. Cellulose.

ANS: I) sporopollenin

(ii) The exine possesses one or more thin places known as

A. Raphe B. Germ pores C. Hilum D. Endothecium.

ANS: ii) Germ pore

(iii) What is the function of germ pore?

A. Emergence of radicle B. Absorption of water for seed germination

C. Initiation of pollen tube D. All of these

ANS:iii) Initiation of pollen tube

(iv) What is the key advantage to the plant for having such strong pollen grain walls?

A. It protects the vital genetic material in the pollen grain.

B. It allows pollen to serve as a valuable fossil record for the study of ancient plants.

C. It prevents the pollen tube from growing out before the pollen grain reaches the stigma of a compatible species.

D. It gives weight to the pollen grain, allowing it to cling better to the body surfaces of insect pollinators.

ANS:iv) it protects the vital genetic material in the pollen grain

(v)The number of germ pores in dicots and monocots respectively are

A. three and two B. two and three C. one and three D. three and one.

ANS:v) One and three

2. Read the following and answer any four questions from (i) to (iv) given below: Double Fertilisation 8 After pollen germination in flowering plants, the pollen tube penetrates through the stigma and the tube grows through the style and reaches the ovary. Once it reaches the ovary, the tube penetrates it and reaches the micropyle of the ovule and enters into the embryo sac. Here, one of the two male nuclei fuse with the nucleus of the egg cell to form a zygote. This fusion of the male and female gametes is known as syngamy. The other male gamete fuses with the two polar nuclei located in the central cell to produce the triploid endosperm nucleus in a primary endosperm cell(PEC). This fusion of three nuclei is termed as triple fusion. Since two types of fusions, syngamy and triple fusion take place in an embryo sac, the phenomenon is termed double fertilization. The zygote develops into an embryo while PEC develops into the endosperm. The cells of endosperm tissue are filled withreserve food materials and are used for the nutrition of the developing embryo.

i. Name the diploid cell of the embryo sac.

a) Egg cell b) Ovary c) Ovule d) Central cellAns. d) Central cell.

ii. Double fertilization is a phenomenon found in

a) Bryophytes b) Pteridophytes c) Angiosperms d) All of the above.Ans. c) Angiosperms.

iii. At least how many pollen grains are required to fertilise 10 ovules in a carpel?

a) 5 b) 10 c) 15 d) 20

Ans. b) 10

iv. The ploidy of a zygote formed as a result of syngamy is
a) Diploid b) Haploid c) Triploid d) None of the above.Ans. a) Diploid.

3. Read the following and answer any four questions from (i) to (iv) given below: Pollinatingagents The pollen-pistil interaction begins with pollination, followed by pollen adhesion to the stigma. After it adheres, it imbibes water and gets hydrated which initiates pollen tube germination. There are different agents of pollination like wind, insects, birds and water.
Anemophilous flowers are pollinated by the agency of wind. These flowers are small andinconspicuous.. The pollen grains are very light, non-sticky and sometimes winged.
Entomophilic flowers are pollinated by insects. These flowers are often attractive to look at with bright petals and are fragrant to attract the insect visitors to them. They often have broadstigmas or anthers to allow the insect to perch on it. Many of the insect-pollinated flowers also secrete nectar which attracts bees, butterflies or other similar insects to the flowers. The pollen grain surface of such flowers produce mucilaginous secretion. Hydrophilic flowers are pollinated by water. It is commonly found in algae, bryophytes, pteridophytes and some angiosperms. The pollen grains may have a mucilaginous covering to protect it from getting wet.

i. The pollinating agent of an inflorescence of small dull coloured flowers with well exposedstamens and large feathery stigma is
a. Water b. Wind c. Insects d. Birds.Ans. b. Wind.

ii. An example of biotic agent for pollination is
a. Air b. Water c. Honey bee d. All of the above.Ans. c. Honey bee.

iii. The pollen grains in the flowers are generally sticky that help them to
a. stick on to the body of the insects b. float on water
c. float in the air d. fall on the ground safely.
Ans. a. stick on to the body of the insects

iv. Which of the following statements seem to describe the water-pollinated submergedplants?
a. The flowers do not produce nectar. b. The flower petals are not brightly coloured.
c. The pollen grains have mucilaginous covering.
d. The female flowers have long stalk to reach the surface.
Ans. d. The female flowers have long stalk to reach the surface.

v. What are the problems with hybrid seeds?
a. Hybrids seeds has to be produced every year.
b. Seeds obtained from hybrid plants when grown, tend to segregate and loose the hybridtraits.
c. Cost factor d. All of the above.
d. Ans. d. All of the above.

ASSERTION – REASON BASED QUESTIONS

Directions: In the following questions, statement of assertion is followed by a statement of reason. Mark the correct choice as:
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false.
d) If both assertion and reason are false.
1. Assertion: An angiospermous flower represents the modified condensed shoot.
Reason: The fertile leaves of the shoot become modified into microsporophylls which bear ovules.
Ans: c)
2. Assertion: A typical microsporangium of angiosperms is generally surrounded by four wall layers-

epidermis, endothecium, middle layers and tapetum.
Reason: The outer three wall layers perform the function of protection and help in dehiscence of anther.
Ans: b)
3. Assertion: In a microsporangium, the tapetal cells posses little cytoplasm and generally have a single prominent nucleus.
Reason: During microsporogenesis, the microspore mother cells (MMCs) undergo meiosis divisions to produce haploid microspore tetrads.
Ans: d)
4. Assertion: In most angiosperms, microspore of a tetrad grow and separate from one another shortly after meiosis.
Reason: In the members of family Asclepiadaceae, all the pollen grains of a sporangium remain united to form a compact structure called pollinium.
Ans: b)
5. Assertion: Exine of a pollen grain is made up of sporopollenin which is resistant to high temperature, strong acid or alkali as wel as enzymatic degradation.
Reason: Sporopollenin is absent in the region of germpore.
Ans: b)
6. Assertion: The development of embryo sac from a single functional megaspore is termed as monosporic development.
Reason: In monosporic (Polygonum) type of embryo sac development, usually the megaspore which is situated towards micropylar end remains functional.
Ans: c)
7. Assertion: Although geitonogamy is a functionally cross pollination involving a pollinating agent, genetically it is similar to autogamy.
Reason: In geitonogamy, pollen grains from the anthers of one flower are transferred to the stigma of another flower.
Ans: a)
8. Assertion: Hydrophilly constitute a major mode of pollination in most of the aquatic angiospermous plants.
Reason: *Vallisneria* and *Zostera* are examples of water pollinated plants.
Ans: b)
9. Assertion: Only pre-pollination growth of male gametophyte occurs inside the microsporangium whereas the remaining growth occurs over the female reproductive organs.
Reason: Whole of the growth of female gametophyte occurs inside the megasporangium.
Ans: b)
10. Assertion: Self-incompatibility is a genetic mechanism which prevents self pollination by inhibiting either pollen germination or pollen tube growth in the pistil.
Reason: In gametophytic self- incompatibility, the incompatibility reaction is determined by the genotype of the sporophytic tissue.
Ans: c)
11. Assertion: In angiosperms, endosperm development precedes embryo development.
Reason: Double fertilization ensures that the nutritive tissue is formed before the zygote starts cleaving.
Ans: a)
12. Assertion: In *Cocos nucefera,* coconut water represents the cellular endosperm and the surrounding water kernel represents the free – nuclear endosperm.
Reason: Endosperm persists in some mature seeds.
Ans: d)
13. Assertion: During development of embryo in dicots, suspensor serves as the main nutritive tissue for the embryo.
Reason: The last cell of the suspensor at the end adjacent to the embryo is known as hypophysis.
Ans: d)
14. Assertion: Ex-albuminous seed do not possess any residual endosperm as it is completely

consumed during embryo development.
Reason: Wheat, castor, pea and groundnut all are examples of ex-albuminous seed.
Ans: c)
15. Assertion: In plants, apomixes is a form of asexual reproduction that mimics sexual reproduction.
Reason: Apomixis involves the production of seeds without the fusion of gametes.
Ans: a)
16. Assertion: Autogamy is a transfer of pollen grains from an anther to the stigma of the same flower on the same plant.
Reason: Xenogamy is pollination between two flowers on different plants.
Ans: b)
17. Assertion: Insects visit flower to gather honey.
Reason: Attraction of flowers prevents the insects from damaging other parts of the plant.
Ans: d)
18. Assertion: Pollen mother cells (PMCs) are the first male gametophytic cells.
Reason: Each PMC gives rise to two pollens.
Ans: d)
19. Assertion : Chasmogamous flowers require pollinating agents.
Reason: Cleistogamous flowers do not expose their sex organs.
Ans: b)
20. Assertion: Gynoecium consists of pistil.
Reason: It represents the male reproductive part in flowering plants.
Ans: c)
21. Assertion: Flowers are the structures related to sexual reproduction in flowering plants.
Reason: Various embryological processes of plants occur in a flower.
Ans: a)
22. Assertion: Geitonogamy is genetically similar to autogamy.
Reason: The pollen grains come from same plant.
Ans: a)
23. Assertion: Cleistogamous flowers produce assured seed set in the absence of pollinators.
Reason: These flowers do not open at all.
Ans: a)
24. Assertion: A typical microsporangium of angiosperms is generally surrounded by four wall layers.
Reason: The outer three wall layers perform the function of protection and help in dehiscence of anther to release the pollen.
Ans: b)
25. Assertion: Exine of a pollen grain is made up of sporopollenins which are resistant to high temperatures, strong acids or alkali as well as enzymatic degradation.
Reason: Sporopollenins are absent in the region of germ pores.
Ans: b)
26. Assertion: An angiospermous flower represents the modified condensed shoot which performs the function of sexual reproduction.
Reason: The fertile leaves of the shoot become modified into microsporophylls and magasporophylls which bear ovules and anthers respectively.
Ans: c)
27. Assertion: Although geitonogamy is functionally cross-pollination involving a pollinating agent, genetically it is similar to autogamy since the pollen grains come from the same parent.
Reason: In geitonogamy, pollen grains from the anthers of one flower are transferred to the stigma of another flower borne on the same plant.
Ans: a)
28. Assertion: The pre-pollination growth of male gametophyte occurs inside the microsporangium whereas the rest of the growth occurs over the female reproductive organs.
Reason: Growth of the entire female gametophyte occurs inside the megasporangium.
Ans: b)
29. Assertion: Hydrophily is a major mode of pollination in most of the aquatic plants in angiosperms.

Reason: Almost all the aquatic dicot and monocot plants require water for the transport of male gametes and for fertilisation.
Ans: d)
30. Assertion: Pollen grains from male parent are mostly transferred to the stigma in the female parent by some external agency.
Reason: This is because the male flowers or male organs have no internal device to reach the female organs in another flower.
Ans: a)