Sexual Reproduction in Flowering Plants

Assertion & Reason Type Questions

consists of two statements, one is Assertion (A) and the other is Reason (R). Select the correct answer to these questions from the codes a, b, c and d as given below.

a. Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

b. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

c. Assertion is true but Reason is false.

d. Assertion is false but Reason is true.

Q 1. Assertion (A): Angiospermic flowers perform the function of sexual reproduction.
Reason (R): The male and female reproductive structures are found in the flowers.

Answer : (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion. Angiospermic flowers perform the process of sexual reproduction. This is because they contain the male and female sex organs of the plant.

Q 2. Assertion (A): Nuclear endosperm is formed by subsequent nuclear division without wall formation.
Reason (R): Coconut is an example of such endosperm, where the endosperm remains nuclear throughout the development of the fruit.

Answer : (c) Assertion is true but Reason is false. In free nuclear or nuclear type of endosperm, first and further divisions of primary endosperm nucleus are not followed by cytokinesis or wall formation and thus these free nuclear divisions lead to formation of a large number of free nuclei in embryo sac. This type of endosperm formation is observed in coconut. Here the primary endosperm nucleus undergoes a number of free nuclear divisions. When the fruit is about 50 mm long the embryo sac remains filled with a watery fluid or milk containing free nuclei and fine cytoplasmic particles. At a later stage when the fruit becomes about 100 mm in length the liquid shows in addition to free nuclei, several cells each enclosing variable number of nuclei. Thus coconut has multicellular endosperm (called coconut meat) in the outer part and free nuclear as well as vacuolate endosperm (called coconut milk) in the centre.

Q 3. Assertion (A): Chasmogamous flowers require pollinating agents.
Reason (R): Cleistogamous flowers do not expose their sex organs.

Answer : (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion. Flowers that have open petals such that the reproductive organs are exposed to allow cross- pollination. Therefore, chasmogamous flowers require pollinating agents to facilitate and ensure transfer of pollens. For example, wind, insect, water and animals serve as pollinating agents. The chasmogamous flowers are large, conspicuous colourful flowers with nectar/scent to attract pollinators. This makes Assertion correct. Flowers that remain close to avoid cross pollination and exhibit modifications to facilitate self-pollination are referred to as cleistogamous flowers. They are small, bisexual, colourless flowers and do not secrete nectar; the adaptations to facilitate self-pollination.

Q 4. Assertion (A): The two cotyledons in seed are embryonic leaves.
Reason (R): The embryo contains radicle and plumule.

Answer : (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

Q 5. Assertion (A): Many plants are propagated vegetatively even though they bear seeds.
Reason (R): Potatoes multiply by tubers and apple by cutting.

Answer : (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion. The most common form of asexual reproduction in plants is called vegetative propagation. It is the formation of new plants from vegetative units (propagules) such as buds, tubers, rhizomes, roots, stem, leaf etc. Besides the natural method of vegetative propagation, there are a number of techniques for artificial vegetative propagation of economically and aesthetically important plants. Potatoes are produced by tubers and not by seeds. Stem tubers are found in potato and artichoke. They have buds in the region of nodes or eyes for vegetative multiplication. Root cuttings are used in propagation of lemon, apple, orange, blackberry etc.

Q 6. Assertion (A): Primary endosperm nucleus is diploid.
Reason (R): It is the product of double fertilisation.

Answer : (d) Assertion is false but Reason is true.

Q7. 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.

Q8. Assertion: Insects visit flower to gather honey.
Reason: Attraction of flowers prevents the insects from damaging other parts of the plant.

Q9. Assertion: Pollen mother cells (PMCs) are the first male gametophytic cells.
Reason: Each PMC gives rise to two pollens.

Q10. Assertion: Chasmogamous flowers require pollinating agents.
Reason: Cleistogamous flowers do not expose their sex organs.

Q11. Assertion: Gynoecium consists of pistil.
Reason: It represents the male reproductive part in flowering plants.

Q12. Assertion: Flowers are the structures related to sexual reproduction in flowering plants.
Reason: Various embryological processes of plants occur in a flower.

Q13. Assertion: Geitonogamy is genetically similar to autogamy.
Reason: The pollen grains come from same plant.

Q14. Assertion: Cleistogamous flowers produce assured seed set in the absence of pollinators.
Reason: These flowers do not open at all.

Q15. 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.

Q16. 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.

Q17**. 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.

Q18**. 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 getionogamy, pollen grains from the anthers of one flower are transferred to the stigma of another flower borne on the same plant.

Q19**. 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.

Q20**. 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.

Q21**. 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.

ANSWER KEY 7 to 21

Q7 **:** (c) Based on the destination of pollen grains, two types of pollination are recognised. When pollen grains are transferred from an anther to the stigma of the same flower the process is called self-pollination or autogamy. Cross-pollination is further classified depending on whether the pollination has occurred between two flowers on the same plant (geitonogamy) or between two flowers on different plants (xenogamy).

Q8 **:** (d) Honey bee visit flowers to gather nectar and turn it into honey. Visiting of insects for nectar helps in pollination.

Q9 : (d) Primary sporogenous cell gives rise to microspore mother cells or pollen mother cells (PMCs). They are sporophytic in nature i.e., diploid. These cells undergo meiosis (reduction division) which gives rise to 4 microspores or pollens and this formation of microspores or pollens is called microsporogenesis. Microspores represent the beginning of the gametophytic phase and they are haploid in nature.

Q10 : (b) The majority of angiosperms bear chasmogamous flowers, which means the flowers expose their mature anthers and stigma to the pollinating agents. There is another group of plants which set seeds without exposing their sex organs. Such flowers are called cleistogamous and the phenomenon is cleistogamy.

Q11 **:** (c) The gynoecium represents the female reproductive part of the flower consisting of pistil.

Q12 **:** (a) Embryological processes occur in ovary, which is a part of flower.

Q13 **:** (a) Geitonogamy is functionally crosspollination involving pollinating agent, genetically it is similar to autogamy since the pollen grains come from the same plant.

Q14 **:** (a) Cleistogamous flowers do not open at all thus ensuring fertilisation and hence produce assured seed-set even in the absence of pollinators.

Q15 **:** (b) A typical microsporangium consists of two parts, outer wall and central homogeneous sporogenous tissue. Microsporangial wall has four types of layers– epidermis, endothecium, 1–3 middle layers and tapetum. The outer three wall layers perform the function of protection in the young anther and mechanism of dehiscence in the ripe anther.

Q16 **:** (b) Wall of a pollen grain consists of two layers– outer exine and inner intine. Exine is the hard outer layer which is made up of sporopollenin. Sporopollenin is one of the most resistant organic material known. It can withstand high temperature, strong acids or alkali and is not degraded by enzymes. Because of the presence of sporopollenin, pollen grains are well preserved as fossils. At certain places, the exine is thin or absent, these areas may have thickened intine or deposition of callose. They are called germ pores (if rounded) or germinal furrows (if elongated). Sporopollenin is absent in the region of germ pores or germinal furrows.

Q17: (c) A flower is a modified condensed shoot specialised to carry out the function of sexual reproduction in angiosperms. Like a branch, it arises in the axil of a small leaf like structure called bract. The receptalce (thalamus or torus) of a flower supports all the floral appendages (i.e., sepals, petals, stamens and carpels). The receptalce consists of several crowded nodes which are separated by condensed internodes. The fertile leaves of the shoot become microsporophylls (stamens) and megasporo phylls (carpels) which bear anthers and ovules respectively. The anthers produce pollen grains and the ovules possess eggs.

Q18 : (a) Geitonogamy is a type of pollination in which pollen grains of one flower are transferred to the stigma of another flower belonging to either the same plant or genetically similar plant. It usually occurs in plants which show monoecious condition (unisexual male and female flowers borne on the same plant. Thus, geitonogamy is functionally cross pollination as it involves pollinating agent to carry out pollination, but genetically it is similar to autogamy (self-pollination) since the pollen grains come from the genetically same plant.

Q19 **:** (b) Pollen grain or microspore is the first cell of male gametophyte generation and represents immature male gametophyte generation and represents immature male gametophyte. Development of male gametophyte is precocious, that is, it begins inside the microsporangium or pollen sac. The pollen grain is shed at 2 or 3 celled stage. The liberated pollen grains are transferred to the receptive surface of the carpel (i.e., stigma) through pollination. Growth of the pollen grain further occurs over the female reproductive organs. Female gametophyte or embryo sac is an oval multicellular haploid structure which is embedded in the nucellus towards micropylar end of the ovule (or integumented megasporangium). Whole of the development of female gametophyte occurs inside the megasporangium.

Q20 **:** (d) Hydrophily is the mode of pollination which is accomplished through the agency of water. Pollination by water is quite rare in flowering plants and is limited to only about 30 genera, mostly monocotyledons e.g., Vallisneria, Zostera, Ceratophyllum, etc. In many aquatic plants with emergent flowers, pollination occurs by wind or insects, e.g., Lotus, Water Lily, Water Hyacinth, etc.

Q21 **:** (a) Internal copulatory organs are absent in plants and thus the aid of an external agency is required for the transfer of pollen grains from the anther to the stigma.