Term-I

SEXUAL REPRODUCTION IN FLOWERING PLANTS

Syllabus

➢ *Flower structure; development of male and female gametophyte; pollination-types, agencies and examples; outbreeding devices; pollen-pistil interaction; double fertilization; post fertilization events – development of endosperm and embryo, development of seeds and formation of fruit; special modes-apomixis, parthenocarpy, polyembryony; significance of seed dispersal and fruit formation.*

STAND ALONE MCQs (1 Mark each)

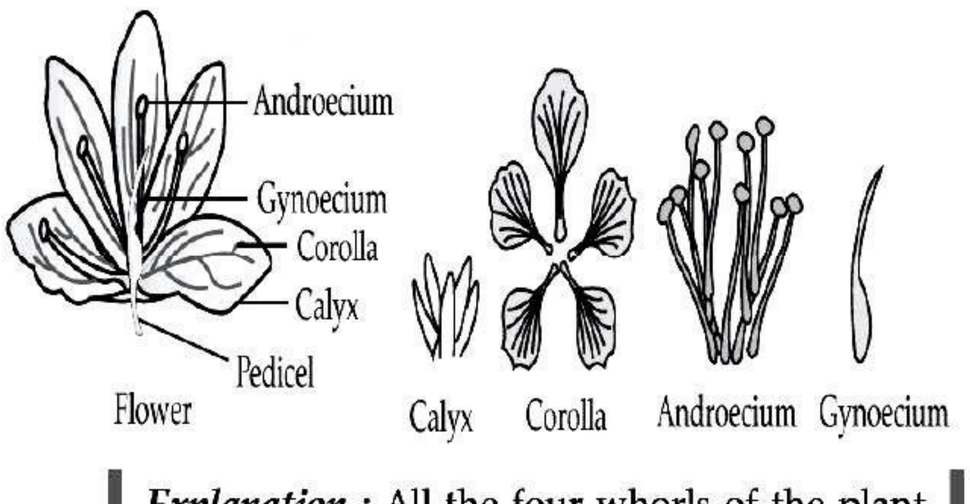
Q. 1. Among the terms listed below, those that of are not technically correct names for a floral whorl are :

(i) Androecium (ii) Carpel (iii) Corolla (iv) Sepal

(A) (i) and (iv) **(B)** (iii) and (iv)

(C) (ii) and (iv) **(D)** (i) and (ii)

Ans. Option (C) is correct.



> ***Explanation :*** All the four whorls of the plant with their relative position in flower can be indicated through following diagram. Sepals collectively form a whorl, called as calyx while technically the carpel is known as gynoecium. The floral whorls formed by petals and stamens are called as corolla and androecium, respectively.

Q. 2. Embryo sac is related to ovule as _____ is related to an anther.

(A) Stamen

(B) Filament

(C) Pollen grain

(D) Androecium

Ans. Option (C) is correct.

> ***Explanation :*** The pollen grains represent the male gametophytes. As the anthers mature and dehydrate, the microspores dissociate from each other and develop into pollen grains. So, embryo sac is to ovule as pollen grain is to an anther.

Q. 3. In a typical 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

Ans. (A)

Explanation : In a typical complete, bisexual and hypogynous flower the arrangement of floral whorls on the thalamus from the outermost to the inner most is as follows :

(i) **Calyx :** It is the outermost whorl of sepals.
(ii) **Corolla :** It is a whorl of petals inside the calyx.
(iii) **Androecium :** It is a whorl of stamens inside the corolla.
(iv) **Gynoecium :** It is a whorl of pistils (in the centre of the flower forming inner most whorls).

Q. 4. A dicotyledonous plant bears flowers but never produces fruits and seeds. The most probable cause for the above situation is:

(A) Plant is dioecious and bears only pistillate flowers

(B) Plant is dioecious and bears both pistillate and staminate flowers

(C) Plant is monoecious

(D) Plant is dioecious and bears only staminate flowers

Ans. Option (D) is correct.

Explanation : In dioecious plants, the unisexual male flower is staminate, that is, bearing stamens only,while the female is pistillate or bearing pistils only. For the production of fruits and seeds fertilization must take place, which is possible only in the presence of both male and female flowers. When the plant is dioecious, it will give rise to the following situations :

(i) If the plant is dioecious and bears only pistillate flowers, fertilization can take place with the help of pollinators.
(ii) If the plant is dioecious and bears only staminate flowers, fertilization cannot take place, because female gamete is non-motile which can't reach the male gamete in order to fuse with it. When the plant is monoecious, that is, carrying both stamen and pistil together, it may lead to self-fertilization and production of seed.

Q. 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

Ans. Option (D) is correct.

Explanation : The outermost and innermost wall layers of microsporangium in an anther are respectively, epidermis and tapetum. A typical microsporangium is generally surrounded by four-wall layers, that is, the epidermis, (outermost protective layer), endothecia, (middle fibrous layers) and the tapetum (innermost nutritive layer).

Q. 6. During microsporogenesis, meiosis occurs in:

(A) Endothecium

(B) Microspore mother cells

(C) Microspore tetrads

(D) Pollen grains.

Ans. Option (B) is correct.

Explanation : During microsporogenesis, meiosis occurs in microspore mother cells. As the anther develops, the microspore mother cells of the sporogenous tissue undergo meiotic divisions to form microspore tetrads. The microspore tetrad after dehydration is separated into pollen grains.

Q. 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

Ans. Option (A) is correct.

Explanation : Gynoecium indicates the female reproductive part of the flower which consists of pistil. Each pistil has three parts, that is, stigma,style and ovary. Inside the ovarian cavity, the placenta is located. Arising from the placenta there are the megasporangia, commonly called ovules.

The functional megaspore undergoing the meiotic division develops into the female gametophyte or embryo sac. Thalamus, tapetum and stamen are not a part of gynoecium. Thalamus is the part of flower which form the base on which all the floral whorls rest up on. Tapetum is the inner most nutritive layer or microsporangium and stamens are male reproductive part (androecium) of plant.

Q. 8. From the statements given below choose the option that are 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
(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

Ans. Option (C) is correct.

Explanation : Statement (i) and (ii) are correct regarding female gametophyte of flowering plant. The female gametophyte or embryo sac is located inside the nucellus, enclosed within the integuments. In a majority of flowering plants, one of the megaspore is functional while the other three degenerates. Three repeated mitotic divisions of the functional megaspore results in the formation of seven-celled or eight-nucleate embryo sac. Six of the eight nuclei are organised at the two poles. Three cells grouped at micropylar end forms egg apparatus and 3 at the chalazal end form antipodal cells. The large central cell at the centre has two polar nuclei. The meiotic divisions in the formation of embryo sac are strictly free nuclear, that is nuclear divisions are not followed immediately by cell-wall formation. Gametophyte is situated at micropylar end not at chalazal end.

Q. 9. Autogamy can occur in a chasmogamous flower if:

(A) Pollen matures before maturity of ovule

(B) Ovules mature before maturity of pollen

(C) Both pollen and ovules mature simultaneously

(D) Both anther and stigma are of equal lengths

Ans. Option (C) is correct.

Explanation : Autogamy is a method of self-pollination. It is a process in which the stigma of a flower receives pollens from the anther of same flower. For autogamy both the sex organs of a chasmogamous flower should mature at the same time. As chasmogamous flowers open at maturity, pollen release and stigma receptivity should be synchronised for the process of autogamy. In such flowers, the length of anther and stigma plays secondary role in autogamy, *e.g.*, in case of protandry (in which pollens mature early) and protogyny (in which stigma matures early) leads to cross-pollination.

Q. 10. 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

Ans. Option (A) is correct.

Explanation : The pollination that occurs in opened flowers is called chasmogamy. It is of two types, that is, self-pollination (autogamy) and cross-pollination. Cross-pollination is of two types, that is, geitonogamy and xenogamy. So, we can say that chasmogamous flowers exhibit both autogamy (self-pollination) and allogamy (cross pollination).While, in cleistogamous flower the anthers and stigma lies close to each other within the closed flowers. When anthers dehisce in the flower buds, pollen grains come in contact with the stigma for effective pollination. Thus, these flowers are invariably autogamous as there is no chance of cross-pollen landing on the stigma.

Q. 11. A particular species of 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

Ans. Option (C) is correct.

Explanation : Plants use two abiotic (wind and water) and one biotic (animals) agent to achieve pollination. Majority of plants use biotic agents for pollination. Pollination by wind is more common amongst abiotic pollination. It requires the light and non-sticky pollen grains so that, they can be transported in wind currents. They often possess well-exposed stamens (so that the pollens are easily dispersed into wind currents) and large often feathery stigma to easily trap air-borne pollengrains. Wind pollination is common in grasses. Pollination by water is called hydrophily which is quite rare in flowering plants but occurs in aquatic plants. Zoophily is pollination through the agency of animals. Entomophily (pollination by insects) is the most common type of zoophily which occurs through the agency of animals.

Q. 12. From among the situations given below, choose the one that prevents both autogamy and geitonogamy.

(A) Monoecious plant bearing unisexual flowers

(B) Dioecious plant bearing only male or female flowers

(C) Monoecious plant with bisexual flowers

(D) Dioecious plant with bisexual flowers

Ans. Option (B) is correct.

Explanation : Dioecious plants (bearing only male or female flowers) prevent both autogamy and geitonogamy. Autogamy is a method of self-pollination in which the transfer of pollen grains from anther to stigma of the same flower takes place. Geitonogamy is the transfer of pollen grains from anther to stigma of another flower of the same plant. It is ecologically cross-pollination which is supposed to be equivalent to self-pollination because all flowers on a plant are genetically identical.

Q. 13. 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) Dusting of pollen on stigma

(C) Emasculation

(D) Collection of pollen

Ans. Option (C) is correct.

> ***Explanation :*** Artificial hybridisation is one of the major methods of crop improvement programme.
> This cross will make sure that only the desired pollen grains are used for pollination and the stigma is protected from contamination (from unwanted pollen). This is achieved by emasculation and bagging techniques. If the female parent produces unisexual flowers;there is no need for emasculation (a process of removal of anther). The female flower buds are bagged before the flowers open. When the stigma becomes receptive, pollination is carried out using the desired pollen and the flower rebagged. This protects them from contamination by unwanted pollen grains. When the female parent bears bisexual flowers,removal of anthers from the flower bud before the anther dehiscence is necessary.

Q. 14. 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.

Ans. Option (B) is correct.

> ***Explanation :*** In some species, the diploid egg cell is formed without reduction division and develops into an embryo without fertilization. It is an a sexual reproduction which occurs in the absence of pollinators or in extreme environments. In some species like citrus plants, nucellar cells surrounding the embryo sac start dividing and develop into embryos. It occurs in the megaspore mother cell without undergoing meiosis and produces diploid embryo sac through mitotic divisions. It helps in the preservation of desirable characters for indefinite period. Thus, it can be concluded that apomictic species produce diploid cells. Haploid cells will be formed during sexual reproduction when cell will undergo meiosis.

Q. 15. Which one of the cell in an embryo-sac produce endosperm after double fertilization?

(A) Synergids cell **(B)** Antipodal cell

(C) Central Cell **(D)** Egg

Ans. Option (C) is correct.

> ***Explanation :*** In female gametophyte,central cell is involved in the double fertilisation that help in the endosperm development While antipodal cells provides nourishment to the egg cell, and synergid cell help in pollen tube growth.

Q. 16. Starting from the innermost part, the correct sequence of parts in an ovule are,

(A) egg, nucellus, embryo sac, integument

(B) egg, embryo sac, nucellus, integument

(C) embryo sac, nucellus, integument, egg

(D) egg, integument, embryo sac, nucellus.

Ans. Option (B) is correct.

> ***Explanation :*** Starting from the innermost part, the correct sequence of parts in an ovule is egg, embryo-sac, nucellus, and integument.

Q. 17. 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.

Ans. Option (A) is correct.

> ***Explanation :*** In a fertilised embryo sac, the haploid,diploid and triploid structures are synergids, zygote and primary endosperm nucleus respectively.

Q. 18. 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.

Ans. Option (B) is correct.

> ***Explanation :*** In unfertilised embryo sac, the antipodal sand synergids are distinctly present at chalazal end and micropylar end respectively while, in fertilised embryo sac, antipodals and synergids gradually degenerate after the formation of zygote.

Q. 19. In the embryos of a typical dicot and a grass, true homologous structures are :

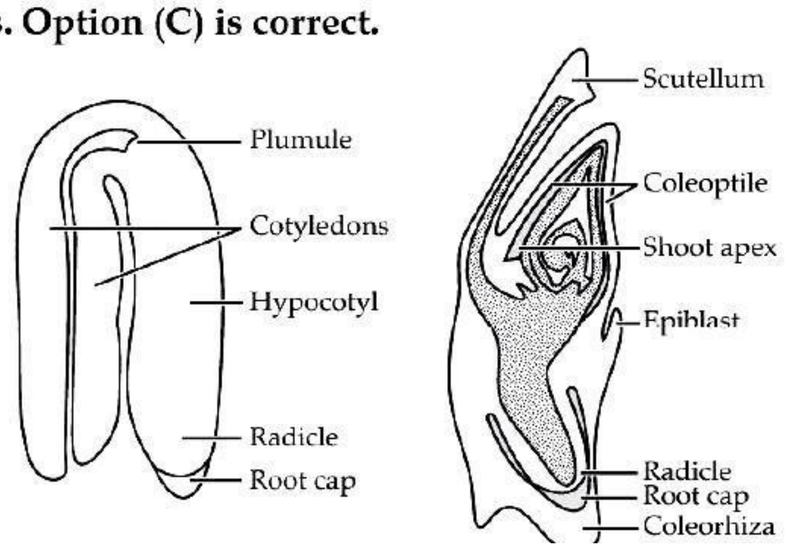
(A) Coleorhiza and coleoptile

(B) Coleoptile and scutellum

(C) Cotyledons and scutellum

(D) Hypocotyl and radicle.

Ans. Option (C) is correct.



Explanation : A typical dicotyledonous embryo consists of two cotyledons. While, embryos of monocotyledons possess only one cotyledon and it is called scutellum (in grass). Cotyledons of dicots, are simple structures generally thick and swollen due to storage of food reserves (as in legumes) and embryo of monocots consists of one large and shield shaped cotyledon known as scutellum situated towards one side (lateral) of the embryonal axis.

Q. 20. 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.

Ans. Option (B) is correct.

Explanation : Apomixis refers to the formation of seeds without fertilization. The embryos are genetically identical to the parental plant.

Q. 21. The phenomenon wherein, the ovary develops into a fruit without fertilisation is called:
(A) Parthenocarpy **(B)** Apomixis
(C) Asexual reproduction
(D) Sexual reproduction

Ans. Option (A) is correct.

Explanation : Parthenocarpy is the formation of seed less fruits without fertilization. The fruits developed from unfertilised ovary are called parthenocarpic fruits.

Q. 22. Fragrant flowers with well developed nectaries are an adaptation for
(A) hydrophily (B) anemophily
(C) entomophily (D) none of these

Ans. Option (C) is correct.

Explanation : **Entomophily is a type of pollination which occur by the insects, e.g.,- butterfly, wasp, ants, beetles and mainly by bees which is most common, the flowers are colourful attract the insect. Nectar is given as reward to insect.**

Q. 23. The total number of nuclei involved in double fertilisation in angiosperm are
(A) two **(B)** three
(C) four **(D)** five

Ans. Option (D) is correct.

Explanation : Double fertilisation is the process in angiosperms. It involves fusion of one male gamete (haploid) with egg (haploid) to form zygote (diploid) that gives rise to embryo accompanied with fusion of other male gamete (haploid) with two polar nuclei (secondary nucleus) to form primary endosperm nucleus (PEN) that gives rise to a nutritive tissue called endosperm.

Q. 24. Heterostyly as a contrivance for cross-pollination is found in
(A) *Pennisetum* **(B)** *Impatiens*
(C) *Primula vulgaris* **(D)** *Oenothera*

Ans. Option (C) is correct.

Explanation : Heterostyly is the presence of 2–3 types of flower with different heights of styles and stamens are dimorphic heterostyly, there are two types of flower, pin eyed (long style and short stamens) and thrum eyed(short style and long stamens), e.g., *Primula vulgaris* (primrose), jasmine.

ASSERTION AND REASON BASED MCQs (1 Mark each)

Directions : In the following questions a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as :

(A) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

(B) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(C) Assertion (A) is true but reason (R) is false.

(D) Assertion (A) is false but reason (R) is true.

Q. 1. Assertion (A) : Tapetum is a part of anther wall that has 2-3 layers of cells.

Reason (R) : Tapetum layers helps in development and growth of pollen grain.

Ans. Option (B) is correct.

Explanation : In flowering plants, tapetum are the specialized cells that provide nutrition to the pollen grain within the anther.

Q. 2. Assertion (A) : Pollen grains are best preserved as fossils.

Reason (R) : The sporopollenin of exine is highly resistant to the action of strong acids and alkali and can withstand a high temperature.

Ans. Option (A) is correct.

Explanation : Pollen grains are well preserved as fossils because of the presence of sporopollenin which is the most resistant organic material known.

AI **Q. 3. Assertion (A) :** Tapetum is formed during the process of the formation of microsporangium.

Reason (R) : The play an important role in guiding the pollen tubes into the synergid.

Ans. Option (C) is correct.

Explanation : Assertion is true, but the reason is wrong because tapetum plays an important role in nourishing pollen mother cells (PMCs) or microspores.

Q. 4. Assertion (A) : Flowers are structure of sexual reproduction.

Reason (R) : Different type of embryological process occur inside the flower.

Ans. Option (A) is correct.

> *Explanation :* Sexual reproduction involves the transfer fusion of male and female gametes known as pollination. The fertilized ovules produce seeds that continue the next generation.

Q. 5. Assertion (A) : Cleistogamous flowers can produce seeds without pollination.

Reason (R) : Cleistogamous flowers have no chance of cross pollination and they are invariably autogamous.

Ans. Option (A) is correct.

Q. 6. Assertion (A) : Entomophilous flowers are large, colourful, fragrant and rich in nectar.

Reason (R) : If helps in attracting the pollinating agent.

Ans. Option (A) is correct.

> *Explanation :* Entomophily is a type of pollination, which is carried out by insects., Fragrance and colour of the flower's attract insects.

Q. 7. Assertion (A) : In *Ophrys* one petal of the flower bears on an uncanny resemblance to the female bee.

Reason (R) : Two closely related species competing for the same resource can co-exist simultaneously.

Ans. Option (A) is correct.

Q. 8. Assertion (A) : Perisperm is a haploid tissue.

Reason (R) : Perisperm is the remains of nucellus which surround the embryo in certain seeds.

Ans. Option (D) is correct.

> *Explanation :* Perisperm is a nutritive tissue of a seed derived from the nucellus and deposited externally to the embryo sac. It is diploid.

Q. 9. Assertion (A) : Pea, bean, mustard are non-albuminous seeds.

Reason (R) : These seeds retain a part of endosperm as it is not completely used up during embryo development. **1**

Ans. Option (C) is correct.

> *Explanation :* Assertion is true but the reason is wrong, because in non-albuminous seeds, seeds does not retain any endosperm as it is completely used up during embryo development.

Q. 10. Assertion (A) : Geitonogamous flowering plants are cross-pollinated plants.

Reason (R) : In geitonogamous flowering plants the pollen is transferred to the stigma of another flower of another plant.

Ans. Option (C) is correct.

> *Explanation :* A is true but R is wrong because in geitonogamous flower the pollen is transferred to the stigma of another flower of the same plant.

Q. 11. Assertion (A) : Fertilization in flowers, produces fruits and seeds.

Reason (R) : After fertilization the ovary develops into fruits and ovule develops into seed. **1**

Ans. Option (A) is correct.

Q. 12. Assertion (A) : Seed is the final product of sexual reproduction in angiosperms.

Reason (R) : A seed typically bears seed coat, cotyledons and an embryo axis.

Ans. Option (B) is correct.

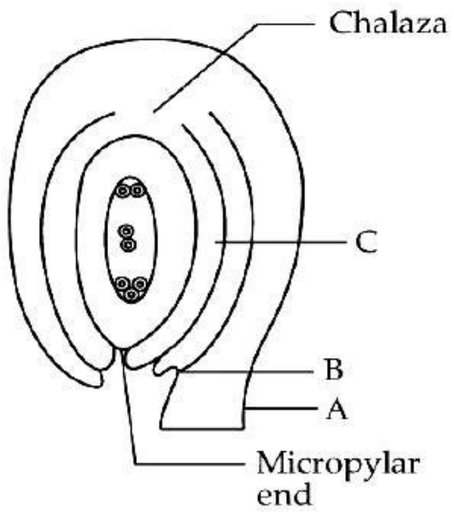
> *Explanation :* After fertilization, the ovary wall develop in fruits embryo captured in the seed as final product of sexual reproduction in plants. The seed bear protective seed coat, cotyledons and embryo axis.

CASE-BASED MCQs

Attempt any 4 sub-parts from each question. Each sub-part carries 1 mark.

I. Read the following text and answer the following questions on the basis of the same:

Study the given diagram and answer any of the four questions given below:



Q.1. This diagram represent which type of ovule

(A) Atropous **(B)** Orthotropous

(C) Anatropous **(D)** Amphitropous

Ans. Option (C) is correct.

> *Explanation :* Anatropous ovule is a completely inverted ovule turned back 180 degrees on its stalk. Ovule - a small body that contains the female germ cell of a plant; develops into a seed after fertilization.

Q.2. A is the stalk of the ovule is called

(A) Hilum **(B)** Pedicle

(C) Chalazal pole **(D)** Funicle

Ans. Option (D) is correct.

Explanation : Funicle is the stalk that attaches an ovule to the placenta in the ovary of a flowering plant. It contains a strand of conducting tissue leading from the placenta into the chalaza.

Q.3. The junction of attachment of funicle with the body of ovule at B is

(A) Funicle **(B)** Hilum

(C) Nucellus **(D)** Chalazal pole

Ans. Option (B) is correct.

Explanation : A scar on a seed (as a bean) marking the point of attachment of the ovule is called hilum. There is small pore, called micropyle, which represent the micropyle of ovule.

Q.4. Tegmen develops from the part labelled C in the figure is called

(A) Inner integument **(B)** Outer Integument

(C) Funicle **(D)** Chalazal pole

Ans. Option (A) is correct.

Explanation : The seed has two layers one is outer called the testa which is develops from the outer integument and another is inner layer called the tegmen which is develops from the inner integument of the ovule.

Direction : In the following questions a statement of Assertion (A) is followed by a statement of Reason (R). Mark the correct choice as :

(A) Both assertion (A) and reason (R) are true and (R) is correct explanation of assertion (A).

(B) Both assertion (A) and reason (R) are true, but reason (R) is not the correct explanation of assertion (A).

(C) Assertion (A) is true, but reason (R) is false.

(D) Assertion (A) is false, but reason (R) is true.

Q. 5. Assertion (A) : Most common type of ovule is anatrous.

Reason (R) : Anatropous ovule is horse-shoe shaped.

Ans. Option (C) is correct.

Explanation : Funiculus lies at the micropylar end and due to the unilateral growth of the ovule is called anatropous ovule. In angiosperms, when the curvature of the ovule affects the nucellus and later it becomes horse shoe-shaped. Such ovule is called amphitropous.

II. Read the following text and answer the following questions on the basis of the same:

Gynoecium, is the female reproductive part of the flower. It may consist of a single or more than one pistil. These pistil may be free or fuse. Each pistils has three parts, stigma, style and ovary. Ovary has an ovarian cavity, which has one or many chambers or locules. The placenta is located inside the ovarian cavity. Megasporangia or ovules arise from the placenta.

Q. 1. In which of the following plants the number of ovules in an ovary is one ?

(A) Mango **(B)** Orchids

(C) Water melon **(D)** Papaya

Ans. Option (A) is correct.

Explanation : Mango possess a single ovule in each ovary and orchids, watermelon, and papaya have multiple ovules present in each ovary.

Q. 2. A multicarpellary, syncarpous gynoecium is found in :

(A) Papaver **(B)** Brinjal

(C) Tomato **(D)** All

Ans. Option (D) is correct.

Explanation : Papaver, brinjal, and tomato all have multicarpellary, syncarpous gynoecium. In this condition carpels are more than one and fused.

Q. 3. 82% of ovules found in angiosperms are ..... .

(A) Anatropous **(B)** Amphitropous

(C) Orthotropous **(D)** Circinotropous

Ans. Option (A) is correct.

Explanation : anatropous ovule is found in 82% angiosperm and it completely inverted ovule turned back 180 degrees on its stalk.

Q. 4. Which among the following cell is binucleate in an embryo sac ?

(A) Antipodal cell **(B)** Central cell

(C) Synergid **(D)** Female gamete

Ans. Option (B) is correct.

Explanation : Central cell form binucleate endosperm mother cell upon fertilization with one of the two sperm cells, forms triploid endosperm to nourish embryo development.

Q. 5. Flowers with both androecium and gynoecium are called :

(A) Bisexual flowers **(B)** Anther

(C) Unisexual flowers **(D)** Androgynous

Ans. Option (B) is correct.

Explanation : Androecium is the male part and gynoecium is the female part, and in those flower have both of these they are called bisexual flower.

III. Read the following text and answer the following questions on the basis of the same:

A typical anther is bilobed. It is a tetragonal structure consisting of four microsporangia. These microsporangia form pollen sac which on maturity

gets filled with a pollen grains. Pollen grains represent the male gametophytes, their cell wall is very hard. Pollen grains of many species cause severe allergies which cause various diseases in human beings.

Q. 1. Which among the following is a major cause of pollen allergy in India?

(A) *Mirabilis* **(B)** *Myosotis*

(C) *Parthenium* **(D)** *Pistia*

Ans. Option (C) is correct.

> ***Explanation :*** Parthenium is a invasive species in India, and its is also known as carrot grass or congress grass which is the major cause of allergy in India, the parthenium weed produces as much as 3,000 million pollen grains per square meter during the flowering season.

Q. 2. Select the odd one out with respect to wall layers of microsporangium in flowering plants.

(A) Integument **(B)** Tapetum

(C) Endothecium **(D)** Middle layers

Ans. Option (A) is correct.

> ***Explanation :*** The integuments are the outer layer(s) of the ovule and develop into a seed coat as the ovule matures following fertilization.

Q. 3. Study of pollen grains is called ..... .

(A) Bryology **(B)** Mycology

(C) Algology **(D)** Polynology

Ans. Option (D) is correct.

> ***Explanation :*** Study of pollen grains is called polynology.

Q. 4. The prominent pollen grain aperture called germ pore is present in :

(A) Exine **(B)** Intine

(C) Vegetative cell **(D)** Generative cell

Ans. Option (A) is correct.

> ***Explanation :*** The prominent pollen grain aperture called germ pore is present in exine, it is decay-resistant outer coating of a pollen grain or spore.

Direction : In the following questions a statement of Assertion (A) is followed by a statement of Reason (R). Mark the correct choice as :

(A) Both assertion (A) and reason (R) are true and (R) is correct explanation of assertion (A).

(B) Both assertion (A) and reason (R) are true, but reason (R) is not the correct explanation of assertion (A).

(C) Assertion (A) is true, but reason (R) is false.

(D) Assertion (A) is false, but reason (R) is true.

Q. 5. Assertion (A) : The innermost layer of microsporangium is called tapetum.

Reason (R) : Tapetum nourishes the develop into pollen grains.

Ans. Option (B) is correct.

> ***Explanation :*** Cells of tapetum have dense cytoplasm and more than one nuclei, which help in nourishing the developing pollen grains.