

For BioResire students



NEET Biology Material

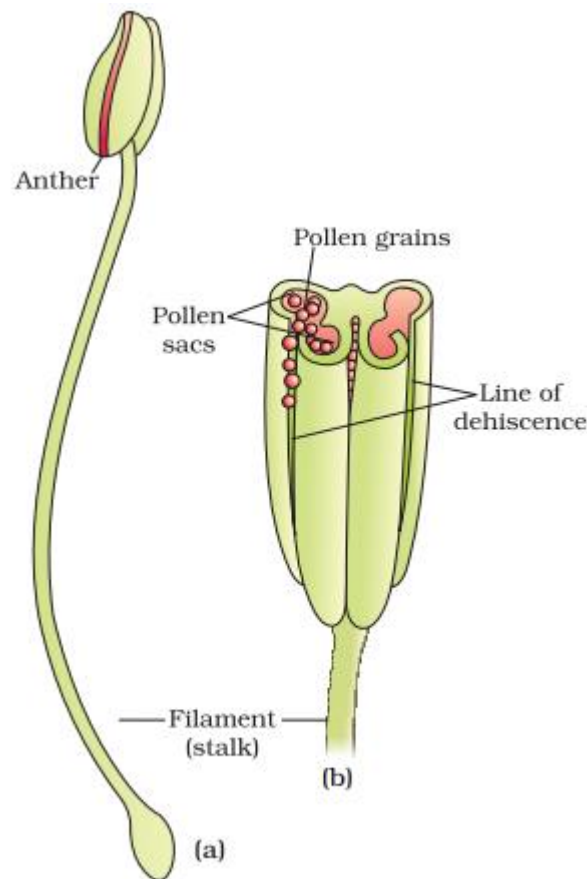
Elite Batch

Website: www.bioresire.in

Contact: +91-6301352398

info@bioresire.in

- Stamen consists of long and slender stalk called filament and generally bilobed anthers. Each lobe contains two theca (dithecious).
- The anther is four-sided structure consisting of four microsporangia, two in each lobes.
- Microsporangia develop further and become pollen sacs which contain pollen grains.
- A typical angiosperm anther is bilobed with each lobe having two theca, i.e., they are dithecous.
- The anther is a four-sided (tetragonal) structure consisting of four microsporangia located at the corners, two in each lobe.
- The microsporangia develop further and become pollen sacs.



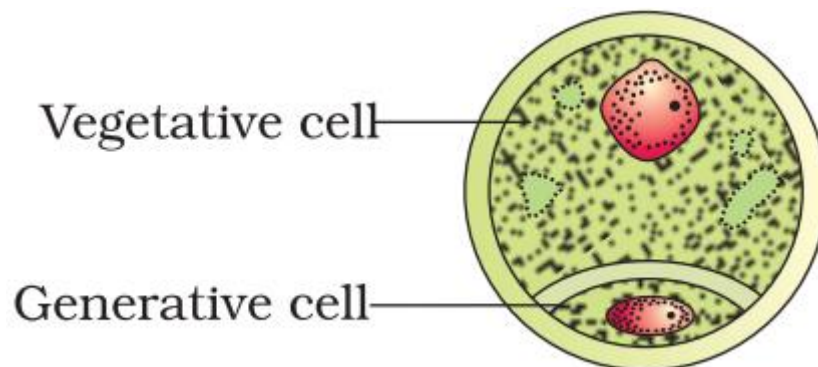
Structure of microsporangium:

A typical microsporangium appears near circular in outline. It is generally surrounded by four wall layers: epidermis, endothecium, middle layers, and the tapetum. The outer three wall layers perform the function of protection and help in dehiscence of the anther to release the pollen. The innermost wall layer is the tapetum. It nourishes the developing pollen grains. When the anther is young, a group of compactly arranged homogeneous cells called the sporogenous tissue occupies the center of each microsporangium.

Microsporogenesis: The process of formation of microspores from a pollen mother cell through meiosis is called microsporogenesis. The microspores, as they are formed, are arranged in a cluster of four cells—the microspore tetrad. As the anthers mature and dehydrate, the microspores dissociate from each other and develop into pollen grains.

Pollen grain: The pollen grains represent the male gametophytes. Pollen grains are generally spherical, measuring about 25-50 micrometers in diameter. It has a prominent two-layered wall. The hard outer layer called the exine is made up of sporopollenin, which is one of the most resistant organic materials known. It can withstand high temperatures and strong acids and alkali. Pollen grain exine has prominent apertures called germ pores. The inner wall of the pollen grain is called the intine. It is a thin and continuous layer made up of cellulose and pectin.

When the pollen grain is mature, it contains two cells, the vegetative cell and generative cell. The generative cell is small and floats in the cytoplasm of the vegetative cell.



The Pistil, Megasporangium (ovule) and Embryo sac:

The gynoecium represents the female reproductive part of the flower.

Monocarpellary or Multicarpellary: The gynoecium may consist of a single pistil (monocarpellary) or may have more than one pistil (multicarpellary).

Syncarpous or Apocarpous: When there are more than one, the pistils may be fused together (syncarpous) or may be free (apocarpous).

Each pistil has three parts: The stigma, style, and ovary.

The stigma serves as a landing platform for pollen grains. The style is the elongated slender part beneath the stigma. The basal bulged part of the pistil is the ovary.

Inside the ovary is the ovarian cavity. The placenta is located inside the ovarian cavity. Arising from the placenta are the megasporangia, commonly called ovules.

The Megasporangium:

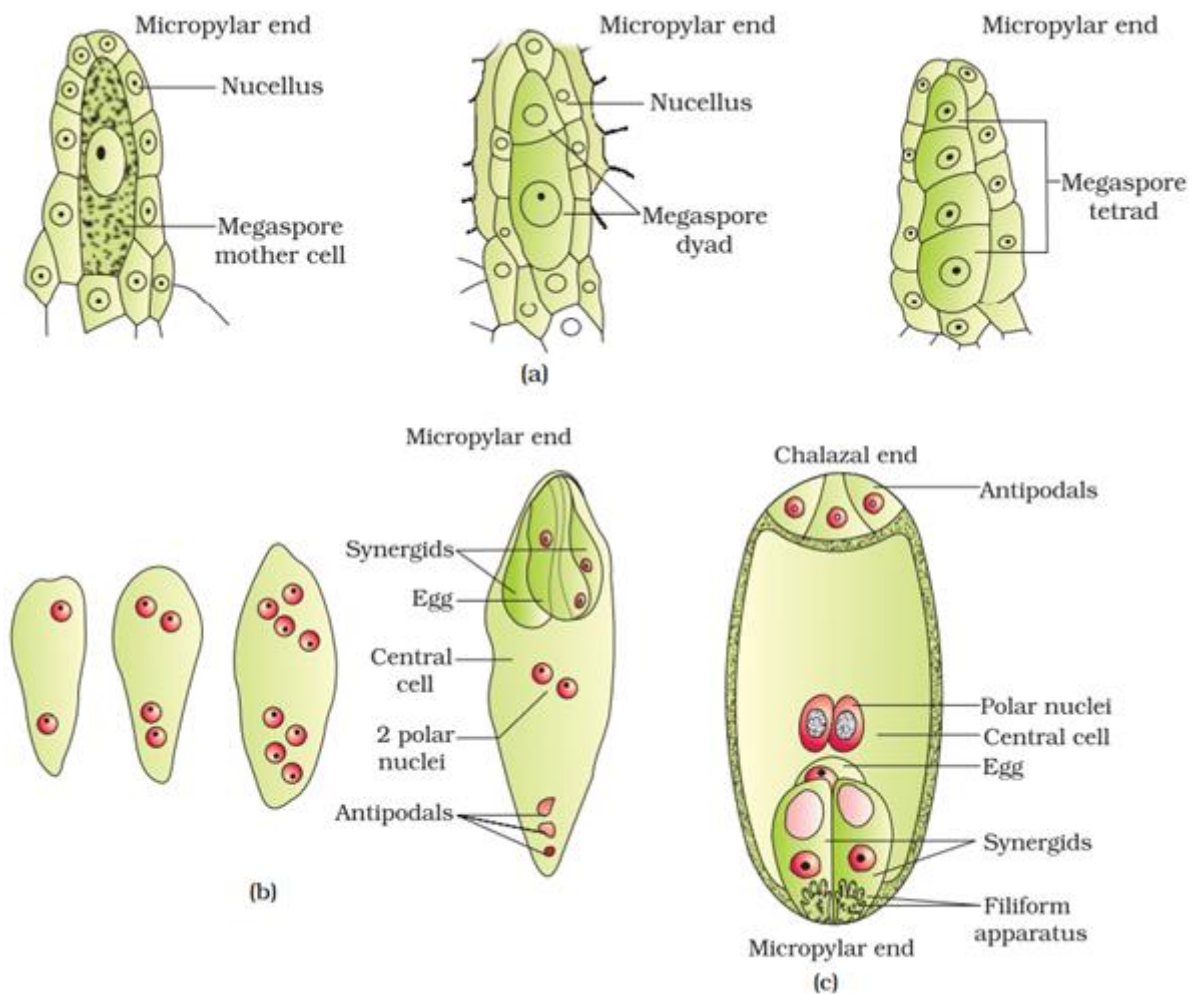
The ovule is a small structure attached to the placenta by means of a stalk called funicle. The body of the ovule fuses with funicle in the region called hilum. Each ovule has one or two protective envelopes called integuments. Integuments encircle the ovule except at the tip where a small opening called the micropyle is organized. Opposite the micropylar end, is the chalazal end. Enclosed within the integuments is a mass of cells called the nucellus. Located in the nucellus is the embryo sac or female gametophyte.

Megasporogenesis:

The process of formation of megaspores from the megaspore mother cell is called megasporogenesis. Ovules generally differentiate a single megaspore mother cell (MMC) in the micropylar region of the nucellus. It is a large cell containing dense cytoplasm and a prominent nucleus. The MMC undergoes meiotic division. Meiosis results in the production of four megaspores.

Embryo Sac:

This method of embryo sac formation from a single megaspore is termed monosporic development. The nucleus of the functional megaspore divides mitotically to form two nuclei which move to the opposite poles, forming the 2-nucleate embryo sac, and the formation of the 4-nucleate and later the 8-nucleate stages of the embryo sac. After the 8-nucleate stage, cell walls are laid down leading to the organization of the typical female gametophyte or embryo sac. Six of the eight nuclei are surrounded by cell walls and organized into cells the remaining two nuclei, called polar nuclei are situated below the egg apparatus in the large central cell. Three cells are grouped together at the micropylar end and constitute the egg apparatus, consists of two synergids and one egg cell. Three cells are at the chalazal end and are called the antipodals. a typical angiosperm embryo sac, at maturity, though 8-nucleate is 7-celled.



Pollination

Transfer of pollen grains from anther to stigma.

Autogamy: Transfer of pollen grain from anther to stigma of same flower. Produce two types of flower.

Cleistogamous: Flower which do not open. cleistogamous flowers are autogamous as there is no chance of cross-pollen landing on the stigma. Cleistogamous flowers produce assured seed-set even in the absence of pollinators. e.g., Viola (common pansy), Oxalis, and Commelina.

Chasmogamous: Flowers which are similar to flowers of other species with exposed anthers and stigma

Geitonogamy: Transfer of pollen grains from anther to stigma of different flower of same plant. Geitonogamy is functionally cross-pollination involving a pollinating agent, genetically it is similar to autogamy since the pollen grains come from the same plant.

Xenogamy: Transfer of pollen grain from anther to stigma of different plant's flower of same species.

Agents of pollination: It includes abiotic (water, wind) and biotic (insects, butterfly, honeybee etc. large number of pollen grains are produced by plants using abiotic mode of pollination as most of pollen grains are wasted during transfer.

Adaptations in flowers for Pollination

Wind Pollination:

- **Pollen grains:** Light, non- sticky, winged
- **Anther:** Well exposed
- **Stigma:** Large and feathery
- **Flower:** One ovule, arranged as inflorescence

Example: corn cob, cotton, date palm

Water Pollination:

Bryophytes, Pteridophytes, Algae.

Pollen grains: protected by mucilaginous covering.

Example: Fresh water plants- Vallisneria, Hydrilla Sea grass- Zostera

Main features of wind and water pollinated plants:

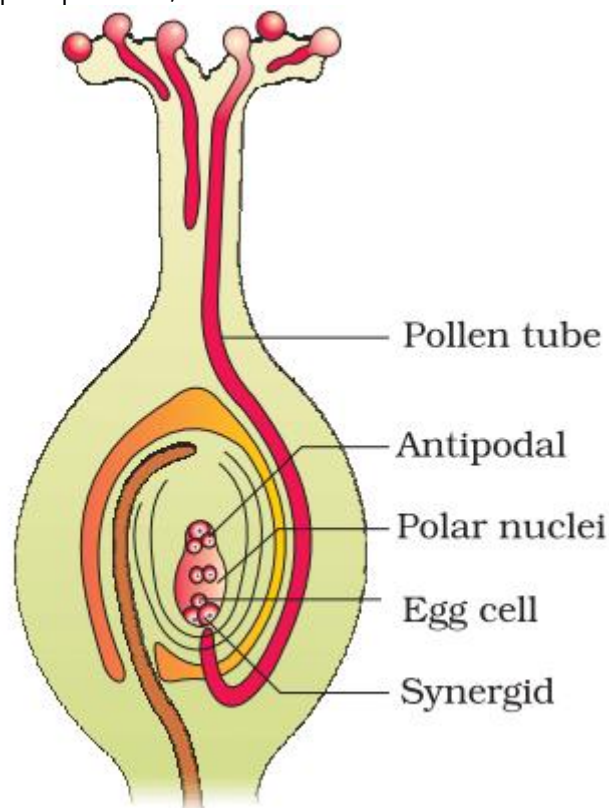
- Produce pollen grains in large no.
- Do not produce nectar.

Insect Pollination:

- **Flowers:** Large, colorful, fragrant, rich in nectar.
- **Pollen grains:** Sticky.
- **Stigma:** Sticky.

Certain rewards to pollinators

- Nectar and (edible) pollen grains as foods.
- Provide safe place for laying eggs.
- **Example:** Amorphophallus, Yucca.



Outbreeding Devices:

The various mechanisms take discourage self-pollination and encourage cross pollination as continued self-pollination leads to inbreeding depression. It includes

- Pollen release and stigma receptivity not synchronized.
- Anther and stigma are placed at different position.
- Inhibiting pollen germination in pistil.
- Production of unisexual flowers.

Pollen pistil interaction:

The pistil has ability to recognize the compatible pollen to initiate post pollination events that leads to fertilization. Pollen grain produce pollen tube through germ pores to facilitate transfer of male gametes to embryo sac.

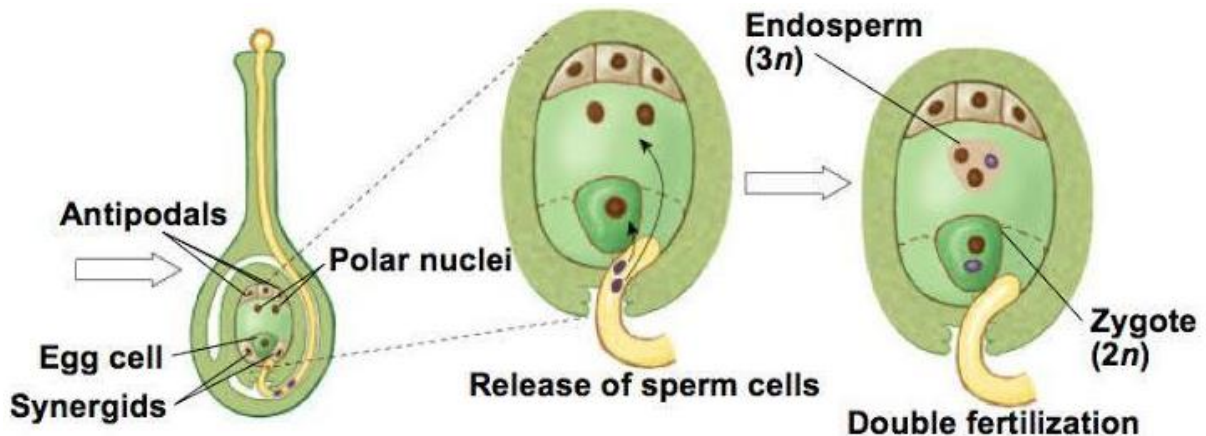
Artificial Hybridization:

- Crossing diff varieties of species- Hybrid individual- with desirable characters of the parent plants
- Desired pollen grains for pollination- stigma protected from contamination
- **Emasculation:** Removal of anther.
- **Bagging:** Flower covered- bag made up of butter-prevent contamination of stigma from unwanted pollen.
- Bagged flower- attains receptivity- mature pollen grains- dusted on the

stigma – rebagged- fruits allowed to develop.

Double Fertilization:

After entering the one of the synergids, each pollen grain releases two male gametes. One male gametes fuse with egg (Syngamy) and other male gametes fuse with two polar nuclei (triple fusion) to produce triploid primary endosperm nucleus (PEN). Since two types of fusion takes place in an embryo sac the phenomenon is called double fertilization. The PEN develops into the endosperm and zygote develops into embryo.



Post fertilization events: Include endosperm and embryo development, maturation of ovules into seeds and ovary into fruits.

Endosperm:

The primary endosperm cell divides many times to forms triploid endosperm tissue having reserve food materials.

Two types of endosperm development:

- Free nuclear type (common method).
- Cellular type.

Non-albuminous: Endosperm completely utilized- before maturation of seeds. e.g pea, groundnut.

Albuminous: A portion of endosperm remain in mature seeds. e.g wheat, maize, castor.

Embryo:

Embryo develops at the micropylar end of the embryo sac where the zygote is located.

Embryogeny: Early stages of embryo development. The zygote gives rise to the proembryo and subsequently to the globular, heart-shaped, and mature embryo.

Embryo consists of:

- Embryonal axis.
- Cotyledons.
- Plumule
- Radicle

Seed:

Fertilized and mature ovule develops into seed.

Monocotyledonous Seed:

- **Scutellum:** Cotyledon
- **Coleorrhiza:** Undifferentiated sheath covering radical & root cap
- **Coleoptile:** Sheath covering plumule

Seed consists of: Cotyledon(s), embryonal axis, Seed coat- double layered- formed by integuments. Testa (outer coat), Tegmen (inner coat).

Micropyle: Small opening on seed coat, it facilitates entry of H₂O & O₂ into seeds (for germination).

Hilum: Scar on seed coat.

Seed: Albuminous/ Non-Albuminous.

Perisperm: Remnants of nucellus that is persistent. e.g., Black pepper.

Dormancy: State of inactivity.

Pericarp: The wall of ovary develops into wall of fruit called pericarp. In true fruits only ovary contributes in fruit formation by in false fruit thalamus also contributes in fruit formation.

Apomixis: Form of asexual reproduction- mimics sexual reproduction- seed formed without fertilization

Formation of apomictic seeds: Diploid cell (formed without meiosis)- develop into embryo without fertilization. Cells of nucellus (2n) surrounding embryo sac- protrude into embryo sac- develop into embryos. e.g., Citrus and Mango.

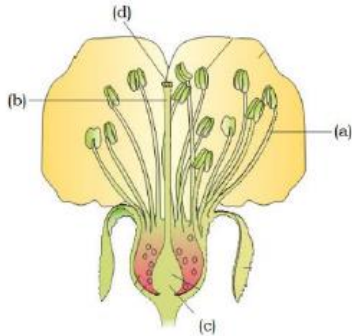
Polyembryony: Occurrence of more than one embryo in a seed, often associated with apomixes. Ex: Citrus, groundnut.

NCERT LINE BY LINE QUESTIONS

1. The end products of sexual reproduction is/ are – **Page No.-20, Easy**
 A) Fruit B) Seeds C) Flower D) A & B both

2.1 Flower

2. Floriculture deals with – **Page No.-20, Easy**
 A) Flower B) Seed culture C) Fruit D) Both B & C
3. **Page No.-20, Easy**



	(a)	(b)	(c)	(d)
A	Style	Filament	Stigma	Ovary
B	Filament	Style	Ovary	Stigma
C	Filament	Style	Thalamus	Anther
D	Style	Filament	Stigma	Ovule

2.2.2 The pistil, Megasporangium (Ovule) and Embryo sac

4. Choose incorrect statement –
 A) Several hormonal & structural changes are initiated which lead to redifferentiation and further development of the floral primordium.
 B) Inflorescences are formed which bear the floral buds and then the flower
 C) In the flower male and female reproductive structures, the androecium and the gynoecium differentiate and develop
 D) None of these

Page No.-20, Easy

5. Reproductive organ of flower doesnot comprises-
 A) Androecium B) Stamen C) Gynoecium D) Tepals

Page No.-21, Easy

2.2.1 Stamen, Microsporangium & Pollen grains

6. A typical angiosperm anther is _____ with each lobe having _____ theca i.e. they are _____
 A) Bilobed, two, dithecous
 B) Dithecous, two, bilobed
 C) Bilobed , four, dithecous
 D) Dithecous, four, bilobed

Page No.-21, Easy

7. Often theca is separated by
 A) Transverse groove

- B) Longitudinal groove
- C) Diagonal groove
- D) All of these

Page No.-21, Easy

8. The dithecous consist of _____microsporangia located at the corners,_____ in each lobe.
 A) Two, one B) Two, two
 C) Four, two D) Both A & C

Page No.-21, Easy

9. Arrange microsporangial wall in sequence of outside to inside
 A) Epidermis, middle layer, endothecium, tapetum
 B) Epidermis, endothecium, middle layer, tapetum
 C) Epidermis, middle layer, tapetum, endothecium
 D) Endothecium, middle layer, tapetum, epidermis

Page No.-21, Easy

10. How many of microsporangial wall perform function of protection and help in dehiscence of anther to release pollen
 A) 1 B) 2 C) 3 D) 4

Page No.-21, Easy

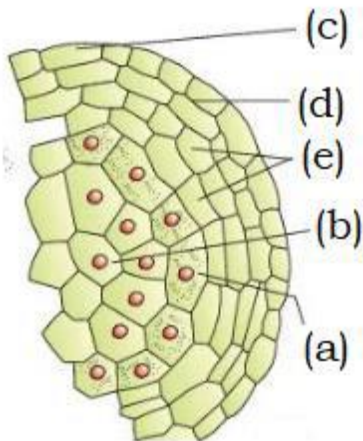
11. _____ is responsible for nourishment of pollen grain.
 A) Tapetum B) Endothecium C) Epidermis D) Middle layer

Page No.-21, Easy

12. Which of the following undergo meiotic division to form microspore tetrad
 A) Sporogenous tissue B) Generative tissue
 C) Microspore D) A & B

Page No.-21, Easy

13.



	a	B	C	d	e
A	Tapetum	Microspore mother cell	endothecium	epidermis	Middle layer
B	Tapetum	Microspore mother cell	epidermis	endothecium	Middle layer
C	Tapetum	Middle layer	Microspore mother cell	endothecium	epidermis
D	epidermis	Middle layer	Microspore mother cell	endothecium	Tapetum

Page No.-22, Medium

14. Microsporogenesis -
 A) Process of formation of microspore
 B) Development of pollen grain from pollen mother cell

- C) It involve meiosis
- D) All of these

Page No.-22, Easy

15. Pollen grain represents –
- A) Male gametophyte
 - B) Male sporophyte
 - C) Female gametophyte
 - D) Female sporophyte

Page No.-22, Easy

16. Choose correct about pollen grain walli)
- i) It has two layered prominent wall
 - ii) Hard outer layered prominent wall
 - iii) Exine is composed of sporopollenin
 - iv) Sporopollenin form continuous exine
- A) i, ii, iii, iv B) i, ii, iii C) i, iii

D) i & iv

Page No.-22, Medium

17. Sporopollenin is absent in –
- A) Intine B) Germ pore C) Exine

D) A & B both

Page No.-23, Medium

18. Pollen grains are well preserved as fossil because of
- A) Presence of intine
 - B) Presence of germ pore
 - C) Presence of sporopollenin
 - D) All of these

Page No.-23, Medium

19. Sporopollenin is degraded by –
- A) Engyme
 - B) High temperature
 - C) Strong acid & alkali
 - D) None of these

Page No.-23, Medium

20. Inner wall of pollen grain is –
- A) Intine, made up of cellulose & lignin
 - B) Thin discontinuous intine
 - C) Both A & B
 - D) None of these

Page No.-23, Medium

21. When pollen grain mature –
- A) It consist of two cell that are two male gamete only.
 - B) It consist of two cell that are generative & vegetative cell
 - C) It consist of two cell that are two male gamete arise from vegetative cell and one generative cell
 - D) It consist of three cell that are two male gamete develop meiotically from generative cell and one vegetative cell

Page No.-23, Easy

22. Choose incorrect statement among following:
- A) In over 60% of angiosperm, pollen grains are shed at 3 – cell stage
 - B) In over 60% of angiosperm, pollen grains are shed at 2 – cell stage
 - C) Both A & B
 - D) None of these

Page No.-23, Easy

23. Pollen allergy is not correlated with-

- A) Cause of parthenium
- B) Cause chronic respiratory disorder
- C) Carrot grass that come into India as a contaminant with imported rice
- D) None of these

Page No.-24, Easy

24. Pollen grain of rice is viable upto-

- A) 30 min
- B) Several month
- C) Same as in sonaceae
- D) Both B & C

Page No.-24, Easy

25. Which temperature is correct to store semen for artificial insemination-

- A) 196°C
- B) -196°C
- C) 34°C
- D) 4°C

Page No.-24, Easy

2.2 Pre - fertilization : structure & events:

26. Papaver show

- i) Multicarpellary
- ii) Apocarpous
- iii) Syncarpous
- iv) Monocarpellary

- A) i, ii
- B) i, iii

- C) iv, ii

- D) iv, iii

Page No.-24, Easy

27. Given diagram is of -



- A) Multicarpellary apocarpous gynoecium of michelia
- B) Multicarpellary syncarpous gynoecium of michelia
- C) Multicarpellary syncarpous gynoecium of papaver
- D) Multicarpellary apocarpous gynoecium of papaver

Page No.-25, Easy

28. Which of following serves as a landing platform for pollen grain?

- A) Stigma
- B) Style
- C) Anther
- D) Filament

Page No.-25, Easy

29. Choose correct statement:

- A) Inside the ovary is the ovarian cavity, also known as lodicule
- B) Megasporangia is commonly called ovules
- C) The placenta is located outside ovarian cavity
- D) A & C both

Page No.-25, Easy

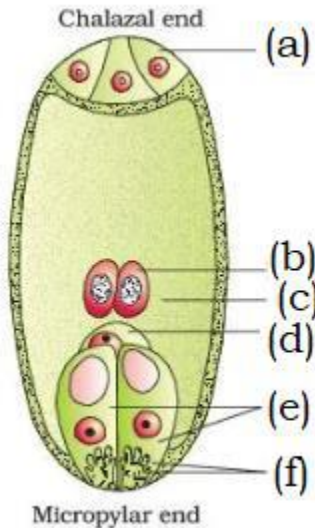
30. Choose incorrect statement -

- A) The number of ovules in an ovary is one in paddy
- B) The number of ovules in an ovary is many in papaya

- C) The number of ovules in an ovary is one in orchid
 D) Wheat mango consist of one ovule **Page No.-25, Easy**
31. Ovule is attached to placenta by - **Page No.-25, Easy**
 A) Funicle B) Integument C) Hilum D) Nucellus
32. Hilum represents the junction between **Page No.-25, Easy**
 A) Ovule & ovary B) Ovule & funicle
 C) Ovule & integument D) None of these
33. Chalaza end represent - **Page No.-25, Easy**
 A) Basal part of ovule
 B) Apical part of ovule
 C) Basal part of ovary
 D) Apical part of ovary
34. Female gametophyte of angiosperm represented by - **Page No.-25, Easy**
 A) Nucellus B) Embryosac C) Integument D) Both A & B
35. An ovule generally has _____ embryo sac formed from a megaspore through _____ division **Page No.-25, Easy**
 A) Single, equational B) Single, reductional
 C) Four, meiotic D) Four, mitotic
36. Megasporogenesis is not related to - **Page No.-25, Easy**
 A) Formation of megaspore from megaspore mother cell
 B) MMC undergoes meiotic division for megaspore
 C) Formation of microspore
 D) Both A & C
37. Ovules generally differentiate a single megaspore mother cell in - **Page No.-25, Easy**
 A) Chalazal end B) Micropylar region
 C) Both A & B D) Integument
38. In a majority of flowering plants **Page No.-26, Easy**
 A) One of the megaspore is functional while other three degenerate
 B) All four megaspore can develops into female gametophyte in almost all angiosperm
 C) Three megaspore is functional while other one degenerated
 D) Both A & B
39. Monosporic embryo development involve - **Page No.-26, Easy**
 A) One functional megaspore
 B) One haploid cell formed in egg apparatus
 C) Four functional megaspore
 D) None of these
40. Choose correct statement - **Page No.-26, Medium**
 A) The nucleus of the functional megaspore divides mitotically to form two nuclei which move to the opposite poles, forming the 2-nucleate embryo sac
 B) Two more sequential mitotic nuclear division in 2-nucleate embryo sac result in formation of 4- nucleate
 C) Mitotic division in embryo sac formation upto 8-celled is strictly free nuclear
 D) All of these
41. How many of eight nuclei of typical embryosac is surrounded by cell wall **Page No.-26, Medium**
 A) 2 B) 4 C) 6 D) 7
42. Central cell of typical embryosac is situated - **Page No.-26, Medium**
 A) Below egg apparatus B) Above egg apparatus
 C) At chalazal end D) None of these

43. Choose the correct about egg apparatus of typical embryo sac
 A) Situated at micropylar end
 B) Consist of three cells
 C) Both A & B
 D) Consist of all cells having special cellular thickening at micropylar tip
44. Typical embryo-sac of angiosperm at maturity is -
 A) 8 celled, 8 nucleate
 B) 7 celled, 8 nucleate
 C) 8 celled, 7 nucleate
 D) 7 celled, 7 nucleate

45.



	a	b	c	d	e	f
A	Antipodal	Polas nuclei	Central cell	Egg	Synergid	Filiform apparatus
B	Antipodal	Polas nuclei	Embryo sac	Egg	Synergid	Filiform apparatus
C	Antipodal	Polas nuclei	Egg	Embryo sac	Filiform apparatus	Synergid
D	Antipodal	Central cell	Polas nuclei	Egg	Filiform apparatus	Synergid

2.2.3 Pollination

46. Pollination is-
 A) transfer of motile pollen to stigma
 B) transfer of non-motile anther to stigma
 C) transfer of motile anther to stigma
 D) transfer of non-motile pollen to stigma
47. Transfer of pollen from anther to stigma of same flower is called-
 A) Autogamy B) Geitonogamy C) Xenogamy D) None of these
48. Read the given statements-
 (i) Autogamy cannot occur in open flower.
 (ii) Geitonogamy cannot occur in closed flower.
 Choose the appropriate answer-
 A) (i) is correct but (ii) is wrong

- B) (i) is wrong but (ii) is correct
 C) (i) and (ii) are both correct
 D) (i) and (ii) are both wrong **Page No.-28, Easy**
49. Complete autogamy is rare in-
 A) Closed flower B) Open flower
 C) Both open and closed flower D) Neither open nor closed flower
Page No.-28, Easy
50. Flowers that do not open at all are called
 A) Chasmogamous B) Polygamous
 C) Cleistogamous D) Xenogamous **Page No.-28, Easy**
51. Oxalis produce-
 A) Cleistogamous flowers B) Chasmogamous flowers
 C) Both (A) and (B) D) Can't say **Page No.-28, Easy**
52. How many of the given characters are necessarily present in cleistogamous flower.
 (i) Anthex and stigma lie close to each other.
 (ii) There is synchrony in pollen release and stigma receptivity.
 (iii) Lengths of anther and stigma are very different.
 (iv) Flower is necessarily dioecious.
 (v) Assured seed-set even without pollinators.
 A) 1 B) 2 C) 3 D) 4
Page No.-28, Easy
53. Geitonogamy is-
 A) Functionally self-pollination and genetically cross-pollination
 B) Genetically self-pollination and functionally cross-pollination
 C) Cross-pollination both genetically and functionally
 D) Self-pollination both genetically and functionally
Page No.-28, Easy
54. Xenogamy is-
 A) Functionally self-pollination and genetically cross-pollination
 B) Genetically self-pollination and functionally cross-pollination
 C) Cross-pollination both genetically and functionally
 D) Self-pollination both genetically and functionally
Page No.-28, Easy
55. Autogamy is-
 A) Functionally self-pollination and genetically cross-pollination
 B) Genetically self-pollination and functionally cross-pollination
 C) Cross-pollination both genetically and functionally
 D) Self-pollination both genetically and functionally
Page No.-27, Easy
56. Genetically different type of pollen is brought to stigma by-
 A) Autogamy only
 B) Geitonogamy only
 C) Xenogamy only
 D) More than one options **Page No.-28, Easy**
57. (a) Pollination by abiotic agents is a chance factor.
 (b) Pollen is produced in enormous amount as compared to number of ovules.
 Choose the best answer.
 A) a and b are correct and b is the reason for a
 B) a and b are correct and a is the reason for b
 C) a is incorrect and b is correct

- D) b is incorrect and a is correct Page No.-28, Easy
58. Which is more common abiotic agent for pollination-
 A) Wind B) Insect C) Water D) Animal
Page No.-28, Easy
59. The pollen grains in wind pollinated plants should be-
 A) Heavy and sticky
 B) Heavy and non-sticky
 C) Light and sticky
 D) Light and non-sticky Page No.-28, Easy
60. Wind pollinated flowers often have ____ in each ovary and flowers are after ____.
(i) **(ii)**
 A) Single Single
 B) Multiple Single
 C) Single packed in inflorescence
 D) multiple packed in inflorescence Page No.-28, Easy
61. The tassels in corn cob are-
 A) Filaments of anthers B) Stigma and style
 C) Reduced leaf D) Stalk of ovule Page No.-28, Easy
62. Match the columns.
Column-I **Column-II**
 (i) Wind pollination (a) Maize
 (ii) Water pollination (b) Hydrilla
 (iii) Biotic pollination (c) Monocots
 (iv) Freshwater pollination (d) Amorphophallus
 A) (i)-d, (ii)-b, (iii)-d, (iv)-c
 B) (i)-c, (ii)-d, (iii)-a, (iv)-b
 C) (i)-a, (ii)-c, (iii)-d, (iv)-b
 D) (i)-b, (ii)-a, (iii)-c, (iv)-d Page No.-28, Easy
63. (a) Distribution of some bryophytes & pteridophytes is limited.
 (r) Transport of male gamete in bryophytes & pteridophyte is dependent on water.
 Choose the correct options.
 A) a and r are correct but r is correct explanation for a
 B) a and r are correct but r is not correct explanation for a
 C) Both a and r are incorrect
 D) a is correct but r is incorrect Page No.-29, Easy
64. Aquatic plants pollinated by water are given, except-
 A) Zostera B) Hydrilla
 C) Water hyacinth D) More than one option Page No.-29, Easy
65. Pollination in water lily occurs by-
 A) Water B) Wind C) Insects D) Both B and C Page No.-29, Easy
66. Choose the correct statements for pollination in sea grasses-
 (i) Female flower reach surface of water.
 (ii) Female flower remain submerged.
 (iii) Pollen released on water surface.
 (iv) Pollen release inside water.
 (v) Pollen grains are carried passively by water.
 (vi) Pollen grains are carried actively in water.
 (vii) Most of the pollen reach stigma.
 (viii) Some of the pollen reach stigma.

- Page No.-30, Easy**
75. Floral rewards are-
 A) Nectar B) Pollen grains
 C) Both B and A D) None of these
- Page No.-30, Easy**
76. Floral reward in Amorphophallus is-
 A) Nectar B) Safe place to lay-eggs
 C) Colourful petals D) Fragrance to attract insects
- Page No.-31, Easy**
77. Which of the statements is true about
 (a) Pronuba moth and
 (b) Yucca plant?
 A) (a) is dependent on (b) for life cycle but the opposite is not true
 B) (b) is dependent on a for life cycle but the opposite is not true
 C) Both (a) and (b) are interdependent on each other for their life cycle
 D) Both (a) and (b) are independent of each other for life cycle
- Page No.-30, Easy**
78. Outbreeding devices are used to prevent-
 A) Self-fertilization B) Cross-pollination
 C) Both self and cross pollination D) Xenogamy
- Page No.-31, Easy**
79. Inbreeding depression is a result of-
 A) Self-fertilization followed by cross fertilization
 B) Cross-fertilization followed by self fertilization
 C) Continued cross-fertilization
 D) Continued self-fertilization
- Page No.-31, Easy**
80. Self-pollination can be prevented by separation of anther and stigma in-
 A) time (maturity) B) place (position)
 C) none of these D) both of these
- Page No.-31, Easy**
81. Self-incompatibility is not-
 A) Genetic mechanism
 B) Positional separation of anther and stigma
 C) Prevention for geitonogamy
 D) More than one option
- Page No.-31, Easy**
82. Production of unisexual flowers on a plant assures prevention of-
 A) Autogamy only
 B) Autogamy and geitonogamy
 C) Geitonogamy only
 D) Autogamy and Xenogamy
- Page No.-31, Easy**
83. Monoecious plants assures-
 A) no autogamy
 B) no autogamy and geitonogamy
 C) no autogamy and xenogamy
 D) no geitonogamy and xenogamy
- Page No.-31, Easy**
84. Dioecious plants assures-
 A) no autogamy B) no autogamy and geitonogamy
 C) no autogamy and xenogamy D) no geitonogamy and xenogamy
- Page No.-31, Easy**
85. If a wrong pollen (from other species or self-incompatible) lands on stigma-
 A) Pollen germinates but pollen tube cannot grow in style
 B) Pollen germinates, grows in style but cannot enter ovary
 C) Does not germinate at all

C) Fusion of second male gamete with egg cell

D) Fusion of three haploid nuclei

Page No.-34, Easy

95. Which of these is correct?

A) Syngamy = Triple fusion + Double fertilization

B) Double fertilization = Syngamy + Triple fusion

C) Triple fusion = Double fertilization - Syngamy

D) More than one option is correct

Page No.-34, Easy

96. Central cell after double fertilization becomes-

A) Zygote

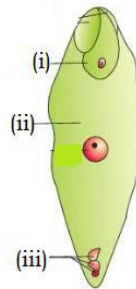
B) PEN

C) PEC

D) Embryo

Page No.-34, Easy

97. Identify the correct labels.



(i) (ii) (iii)

A) Zygote PEN Degenerating antipodals

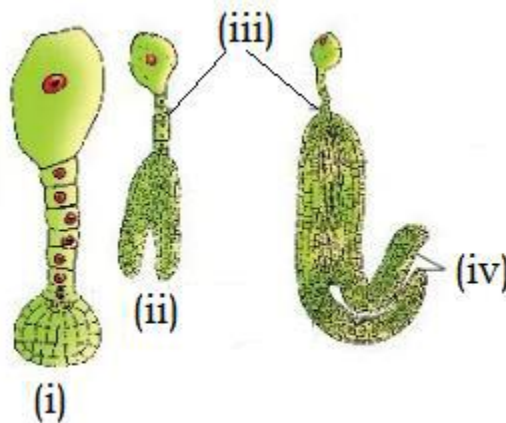
B) Zygote PEC Degenerating antipodals

C) Zygote PEN Degenerating synergids

D) Zygote PEC Degenerating synergids

Page No.-34, Easy

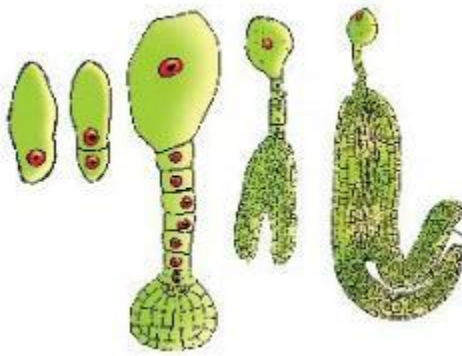
98. Identify the correct labels.



	i	ii	iii	iv
A	Globular embryo	Heart shaped embryo	Suspensor	Cotyledon
B	Heart shaped embryo	Globular embryo	Cotyledon	Suspensor
C	Globular embryo	Heart shaped embryo	Cotyledon	Suspensor
D	Heart shaped embryo	Globular embryo	Suspensor	Cotyledon

Page No.-34, Easy

99. The figure shows stages in-



- A) Embryo development in dicot
- B) Embryo development in monocot
- C) Embryo development in gymnosperm
- D) Both A and B

Page No.-34, Easy

2.4 Post Fertilization : Structure and Events

100. Post fertilization includes how many of the following events-
- (i) endosperm development
 - (ii) zygote formation
 - (iii) embryo development
 - (iv) seed formation
 - (v) fruit formation
- A) 5 B) 4 C) 3 D) 2

Page No.-34, Easy

2.4.1 Endosperm

101. Select correct statement-
- A) Endosperm development proceeds embryonic development
 - B) Endosperm development precedes embryonic development
 - C) Embryo development precedes endosperm development
 - D) More than one option is correct

Page No.-35, Easy

102. Endosperm tissue is-
- A) Haploid B) Diploid C) Triploid D) Tetraploid

Page No.-35, Easy

103. In free-nuclear endosperm-
- A) PEN undergoes successive nuclear divisions
 - B) PEC undergoes successive cellular divisions
 - C) PEN undergoes successive cellular divisions
 - D) More than one option is correct

Page No.-35, Easy

104. Cells of endosperm tissue are filled with-
- A) reserve food materials for plant cells
 - B) reserve food material for embryo
 - C) reserve food material for developing zygote
 - D) more than one option is correct

Page No.-35, Easy

105. Coconut water from tender coconut is _____ and white kernel is _____.

- | | |
|---------------------------|------------------------|
| (i) | (ii) |
| A) Cellular endosperm | Free-nuclear endosperm |
| B) Free nuclear endosperm | Cytoplasmic endosperm |

- C) Free-nuclear endosperm Cellular endosperm
 D) Cytoplasmic endosperm Cellular endosperm

Page No.-35, Easy

106. Endosperm is completely consumed by developing embryo before seed maturation in-
 A) Groundnut B) Castor C) Coconut D) All of these

Page No.-35, Easy

107. Endosperm persists in mature seeds in-
 A) Castor B) Pea C) Beans D) More than one option is correct

Page No.-35, Easy

2.4.2 Embryo

108. Embryo develops at
 A) micropylar end
 B) chalazal end
 C) either micropylar or chalazal end
 D) neither micropylar nor chalazal end

Page No.-35, Easy

109. Choose the correct order of embryo development in dicots-
 (i) Zygote (ii) Heart-shaped embryo
 (iii) Mature embryo (iv) Proembryo
 (v) Globular embryo

- A) i-iv-ii-v-ii B) i-iv-ii-v-iii C) i-iv-iii-ii-v D) ii-iv-v-ii-iii

Page No.-35, Easy

110. How many of the given parts are present in dicot embryo-
Embryonal axis, Cotyledons, Scutellum, Hypocotyl, Root cap

- A) 5 B) 4 C) 3 D) 2

Page No.-35, Easy

111. How many of the given parts are present in monocot embryo-
Cotyledon, scutellum, Coleoptile, Radicle, Root cap

- A) 5 B) 4 C) 3 D) 2

Page No.-35, Easy

112. Hypocotyl terminates in-

- A) Plumule B) Radicle C) Root tip D) More than one option is correct

Page No.-35, Easy

113. (i) In dicot embryo, root tip is covered by root cap.
 (ii) In dicot embryo, scutellum is situated towards one side of embryonal axis.
 (iii) Cylindrical portion below the level of cotyledons is hypocotyl in dicots embryo.
 (iv) In dicot embryo, epicotyl terminates with stem tip.

How many of the above statements is incorrect?

- A) Zero B) One C) Two D) Three

Page No.-35, Easy

114. In grass family, the scutellum is-

- A) Cotyledon B) Root tip C) Epiblast D) Shot tip

Page No.-35, Easy

115. Identify the given figures

- A) (i) is embryo of grass B) (ii) is embryo of dicots
 C) (ii) is embryo of monocot D) More than one option is correct

Page No.-35, Easy

116. Identify the correct labels-

- (i) (ii) (iii)

- | | | |
|--------------|-----------|-----------|
| A) Cotyledon | Plumule | Hypocotyl |
| B) Radicle | Cotyledon | Plumule |
| C) Hypocotyl | Plumule | Cotyledon |
| D) Cotyledon | Plumule | Epicotyl |

Page No.-35, Easy

117. Identify the correct labels-

- | | | | |
|-------------|-------------|--------------|-------------|
| (i) | (ii) | (iii) | (iv) |
| A Epiblast | Scutellum | Coleoptile | Root cap |
| B Scutellum | Epiblast | Shoot apex | Radicle |
| C Epiblast | Scutellum | Root cap | Shoot apex |
| D Scutellum | Epiblast | Radicle | Coleoptile |

Page No.-35, Easy

118. Coleoptile is-

- A) hollow structure
- B) solid structure
- C) sometimes hollow and sometimes solid structure
- D) semi-solid

Page No.-35, Easy

119. Coleorhiza is-

- A) hollow structure
- B) foliar structure
- C) undifferentiated sheath
- D) more than one option is correct

Page No.-36, Easy

2.4.3 Seed

120. Read the following statements-

- (i) Seed is final product of sexual reproduction in plant.
- (ii) Seed is fertilized ovule.
- (iii) Seed is formed inside fruit.
- (iv) Seed consists of seed coat(s), cotyledon(s) and embryo axis.

How many of the statements is incorrect?

- A) Zero
- B) One
- C) Two
- D) Three

Page No.-36, Easy

121. Non-albuminous seeds-

- A) have residual endosperm
- B) retain a part of endosperm
- C) is found in castor
- D) None of these

Page No.-36, Easy

122. Groundnut is-

- A) Albuminous
- B) Non-albuminous
- C) Has residual endosperm in mature seed
- D) More than one option is correct

Page No.-36, Easy

123. Perisperm is-

- A) Persistent nucleus
- B) Found in beet
- C) Residual endosperm
- D) More than one option

Page No.-36, Easy

124. Integument of ovules mature into-

- A) Ovary wall
- B) Pericarp
- C) Seed coat
- D) Perisperm

Page No.-36, Easy

125. Micropyle is-

- A) Absent in seed
- B) Present inside seed
- C) Present on surface of seed
- D) Present on seed coat

Page No.-36, Easy

126. Micropyle plays role of-
 A) Stalk for seed
 B) Scar of stalk
 C) Facilitating entry of water into seed
 D) Facilitating escape of seed metabolites
127. Mature seed has-
 A) More water content and more metabolism
 B) Less water content and more metabolism
 C) Less water content and less metabolism
 D) More water content and more metabolism
128. The embryo in a mature seed-
 A) Germinates essentially
 B) May enter dormancy
 C) Always enters dormancy first, followed by germination
 D) Both B and C
129. Choose the correct match regarding the maturing of flower into fruit-
 A) Wall of ovule - pericarp
 B) Nucellus - periderm
 C) Ovary - seed
 D) None of these

Page No.-36, Easy

Page No.-36, Easy

Page No.-36, Easy

Page No.-36, Easy

130. Fleshy fruit is-
 A) Mustard B) Groundnut C) Guava D) More than one

Page No.-36, Easy

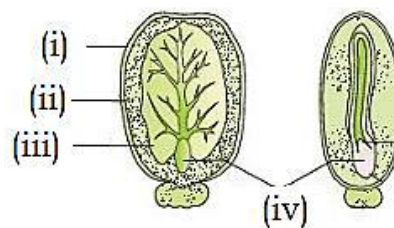
131. In false fruits, select incorrect statement-
 A) Floral parts other than ovary are involved
 B) Thalamus may contribute to fruit formation
 C) Examples include apple, cashew, groundnut
 D) Fruit does not develop from ovary

Page No.-36, Easy

132. Which of these is incorrect about parthenocarpy-
 A) Plant formed without fertilization
 B) Banana is example
 C) Induced by application of growth hormones
 D) Such fruits are seed less

Page No.-36, Easy

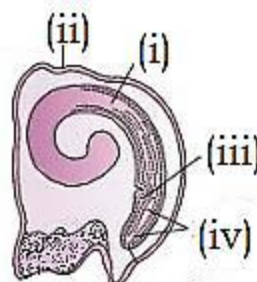
133. Identify the endosperm in the given figure-



- A) I B) II C) III D) IV

Page No.-37, Easy

134. Identify cotyledon in the given figure of seed



A) I

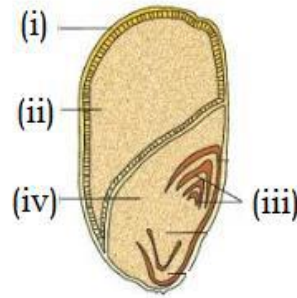
B) II

C) III

D) IV

Page No.-37, Medium

135. Identify scutellum in the given figure -



A) I

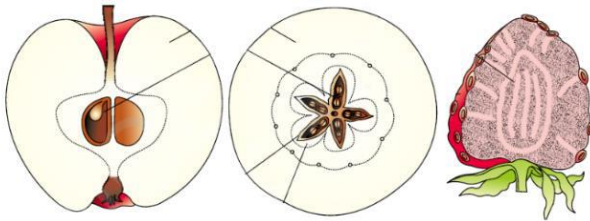
B) II

C) III

D) IV

Page No.-37, Medium

136. The given figure shows -



A) Eucarp of apple and lithi

B) Pseudocarp of apple litchi

C) Eucarp of apple and strawberry

D) Pseudocarp of apple and strawberry

Page No.-37, Medium

137. In angiosperm, pollination and fertilization are -

A) Both independent of water

B) Both dependent of water

C) Only pollination is essentially on water

D) Only fertilization is dependent on water

Page No.-37, Medium

138. For storage of seeds -

A) Dehydration is important

B) Dormancy is important

C) Neither dehydration nor dormancy is needed

D) Both dehydration and dormancy are crucial

Page No.-37, Easy

139. The oldest yet viable seed found is -

A) Lupinus from arctic tundra

B) Phoenix from arctic tundra

C) Lupinus from king herod's palace

D) Phoenix from king herod's palace

Page No.-37, Easy

140. *Phoenix dactylifera* is commonly known as-

A) Fig

B) Coconut

C) Cashew

D) None of these

Page No.-37, Easy

2.5 Apomixis and Polyembryony

141. Apomixis is -

A) Fruit without fertilization

B) Seed without fertilization

C) Plant without fertilization

D) More than one option

Page No.-38, Easy

142. Apomixis is -

- A) A form of sexual reproduction that mimics asexual reproduction
 B) A form of asexual reproduction that mimics sexual reproduction
 C) Both of the above
 D) None of these

Page No.-38, Easy

143. Apomixis is found in –

- A) Solanaceae B) Liliaceae C) Asteraceae D) Brassicaceae

Page No.-38, Easy

144. Mango contains –

- A) Multiple ovaries in a flower B) Multiple ovules in an ovary
 C) Multiple embryo in an ovule D) More than one option is correct

Page No.-38, Easy

145. What is the major constraint associated with hybrid?

- A) Hybrids are not accepted by farmers
 B) Hybrids are costly
 C) Hybrid seeds have to be produced every year and the seeds from hybrid cannot be sown
 D) More than one option is correct

Page No.-38, Easy

146. What is the problem with sowing seeds from hybrid plant?

- A) Seeds will not germinate (low germination rate)
 B) Progeny will be unhealthy
 C) Hybrid characters will be lost due to segregation
 D) All of these

Page No.-38, Easy

NEET PREVIOUS YEARS QUESTIONS

1. Which of the following has proved helpful in preserving pollen as fossils? [2018]
 (a) Pollenkitt (b) Cellulosic intine (c) Sporopollenin (d) Oil content
2. Pollen grains can be stored for several years in liquid nitrogen having a temperature of : [2018]
 (a) - 120°C (b) - 80°C (c) - 160°C (d) - 196°C
3. Double fertilisation is: [2018]
 (a) fusion of two male gametes of a pollen tube with two different eggs.
 (b) fusion of one male gamete with two polar nuclei.
 (c) syngamy and triple fusion.
 (d) fusion of two male gametes with one egg.
4. Attractants and rewards are required for [2017]
 (a) Entomophily (b) Hydrophily (c) Cleistogamy (d) Anemophily
5. Flowers which have single ovule in the ovary and are packed into inflorescence are usually pollinated by: [2017]
 (a) Bee (b) Wind (c) Bat (d) Water
6. A dioecious flowering plant prevents both: [2017]
 (a) Autogamy and geitonogamy (b) Geitonogamy and xenogamy

- (c) Cleistogamy and xenogamy (d) Autogamy and xenogamy
7. Functional megaspore in an angiosperm develops into: [2017]
 (a) Endosperm (b) Embryo sac (c) Embryo (d) Ovule
8. Which one of the following statements is not true? [2016]
 (a) Tapetum helps in the dehiscence of anther.
 (b) Exine of pollen grains is made up of sporopollenin.
 (c) Pollen grains of many species cause severe allergies.
 (d) Stored pollen in liquid nitrogen can be used in the crop breeding programmes.
9. Which of the following statements is not correct? [2016]
 (a) Pollen grains of many species can germinate on the stigma of a flower, but only one pollen tube of the same species grows into the style.
 (b) Insects that consume pollen or nectar without bringing about pollination are called pollen/nectar robbers.
 (c) Pollen germination and pollen tube growth are regulated by chemical components of pollen interacting with those of the pistil.
 (d) Some reptiles have also been reported as pollinators in some plant species.
10. Filiform apparatus is characteristic feature of : [2015]
 (a) Nucellar embryo (b) Aleurone cell (c) Synergids (d) Generative cell
11. Which one of the following may require pollinators, but is genetically similar to autogamy? [2015]
 (a) Xenogamy (b) Apogamy (c) Cleistogamy (d) Geitonogamy
12. Which one of the following statements is not true? [2015]
 (a) Pollen grains of some plants cause severe allergies and bronchial afflictions in some people.
 (b) The flowers pollinated by flies and bats secrete foul odour to attract them.
 (c) Honey is made by bees by digesting pollen collected from flowers.
 (d) Pollen grains are rich in nutrients, and they are used in the form of tablets and syrups.
13. The hilum is a scar on the [2015]
 (a) fruit, where it was attached to pedicel. (b) fruit, where style was present.
 (c) seed, where micropyle was present. (d) seed, where funicle was attached.
14. Which of the following are the important floral rewards to the animal pollinators? [2015]
 (a) Nectar and pollen grains. (b) Floral fragrance and calcium crystals.

- (c) Protein pellicle and stigmatic exudates. (d) Colour and large size flower.
15. Geitonogamy involves [2014]
- (a) fertilisation of a flower by the pollen from another flower of the same plant.
 (b) fertilisation of a flower by the pollen from the same flower.
 (c) fertilisation of a flower by the pollen from a flower of another plant in the same population.
 (d) fertilisation of a flower by the pollen from a flower of another plant belonging to a distant population.
16. Male gametophyte with least number of cell is present in [2014]
- (a) *Pteris* (b) *Funaria* (c) *Lilium* (d) *Pinus*
17. Function of filiform apparatus is to [2014]
- (a) recognise the suitable pollen at stigma. (b) stimulate division of generative cell.
 (c) produce nectar. (d) guide the entry of pollen tube.
18. Non-albuminous seed is produced in: [2014]
- (a) Maize (b) Castor (c) Wheat (d) Pea
19. Which one of the following statements regarding post-fertilization development in flowering plants is incorrect ? [NEET-2019]
- (1) Ovary develops into fruit (2) Zygote develops into embryo
 (3) Central cell develops into endosperm (4) Ovules develop into embryo sac
20. Persistent nucellus in the seed is known as : [NEET-2019]
- (1) Chalaza (2) Perisperm (3) Hilum (4) Tegmen
21. What is the fate of the male gametes discharged in the synergid? [NEET-2019]
- (1) One fuses with the egg, other(s) degenerate(s) in the synergid.
 (2) All fuse with the egg.
 (3) One fuses with the egg, other(s) fuse(s) with synergid nucleus.
 (4) One fuses with the egg and other fuses with central cell nuclei.
22. Which is the most common type of embryo sac in angiosperms ? [NEET-2019 ODISSA]
- (1) Tetrasporic with one mitotic stage of divisions
 (2) Monosporic with three sequential mitotic divisions
 (3) Monosporic with two sequential mitotic divisions
 (4) Bisporic with two sequential mitotic divisions
23. What type of pollination takes place in Vallisneria? [NEET-2019 ODISSA]
- (1) Pollination occurs in submerged condition by water

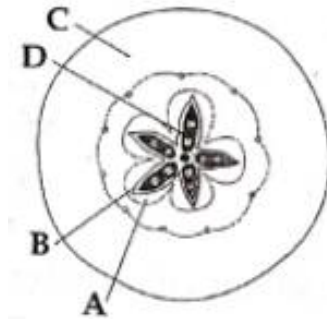
- (2) Flowers emerge above surface of water, and pollination occurs by insects.
- (3) Flowers emerge above water surface, and pollen is carried by wind.
- (4) Male flowers are carried by water currents to female flowers at surface of water
24. In which one of the following, both autogamy and geitonogamy are prevented? [NEET-2019 ODISSA]
- (1) Wheat (2) Papaya (3) Castor (4) Maize
25. Which of the following is incorrect for wind-pollinated plants? [NEET-2020 COVID]
- (1) Well exposed stamens and stigma (2) Many ovules in each ovary
- (3) Flowers are small and not brightly coloured (4) Pollen grains are light and non-sticky
26. The body of the ovule is fused within the funicle at [NEET-2020]
- 1) Chalaza 2) Hilum 3) Micropyle 4) Nucellus
27. In water hyacinth and water lily, pollination takes place by [NEET-2020]
- 1) Insects and water 2) Insects or wind 3) Water currents only 4) Wind and water
28. The plant parts which consist two generations -one within the other. [NEET-2020]
- a) Pollen grains inside the anther b) Germinated pollen grain with two male gametes
- c) Seed inside the fruit d) Embryo sac inside the ovule
- 1) a and d 2) a only 3) a, b, and c 4) c and d
29. A typical angiosperm embryo sac at maturity is [NEET-2021]
- 1) 7- nucleate and 8 - celled 2) 7- nucleate and 7- celled
- 3) 8 -nucleate and 8- celled 4) 8- nucleate and 7- celled
30. The term used for transfer of pollen grains from anthers of one plant to stigma of a different plant which during pollination, brings genetically different types of pollen grains to stigma is [NEET-2021]
- 1) Geitonogamy 2) Chasmogamy 3) Cleistogamy 4) Xenogamy
31. In some members of which of the following pairs of families, pollen grains retain their visibility for months after release? [NEET-2021]
- 1) Poaceae ; Leguminosae 2) Poaceae ; Solanaceae
- 3) Rosaceae ; Leguminosae 4) Poaceae ; Rosaceae
32. Identify the incorrect statement related to pollination: [NEET-2022]
- 1) Pollination by water is quite rare in flowering plants
- 2) Pollination by wind is more common amongst abiotic pollination
- 3) Flowers produce foul odours to attract flies and beetles to get pollinated
- 4) Moths and butterflies are the most dominant pollinating agents among insects
33. Given below are two statements: [NEET-2022]
- Statement I: Cleistogamous flowers are invariably autogamous
- Statement II: Cleistogamy is disadvantageous as there is no chance for cross pollination
- In the light of the above statements, choose the correct answer from the options given

Below.

- 1) Both Statement I and Statement II are correct
- 2) Both Statement I and Statement II are incorrect
- 3) Statement I is correct but Statement II is incorrect
- 4) Statement I is incorrect but Statement II is correct

34. Which part of the fruit, labelled in the given figure makes it a false fruit?

[NEET-2022]



- 1) A → Mesocarp
- 2) B → Endocarp
- 3) C → Thalamus
- 4) D → Seed

35. Identify the set of correct statements:

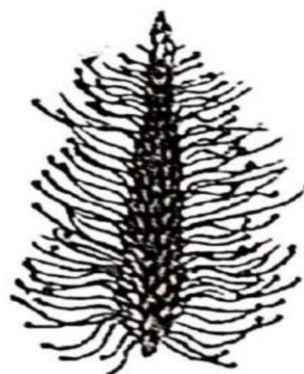
- A. The flowers of Vallisneria are colourful and produce nectar.
- B. The flowers of water lily are not pollinated by water.
- C. In most of water-pollinated species, the pollen grains are protected from wetting.
- D. Pollen grains of some hydrophytes are long and ribbon like.
- E. In some hydrophytes, the pollen grains are carried passively inside water.

Choose the correct answer from the options given below.

- (a) C, D and E only
- (b) A, B, C and D only
- (c) A, C, D and E only
- (d) B, C, D and E only

[NEET 2024]

36. Identify the correct description about the given figure:



- (a) Wind pollinated plant inflorescence showing flowers with well exposed stamens.
- (b) Water pollinated flowers showing stamens with mucilaginous covering.
- (c) Cleistogamous flowers showing autogamy
- (d) Compact inflorescence showing complete autogamy

[NEET 2023]

37. Transfer of pollen grains from another to stigma of another flower of same plant is known as :

- (a) Geitonogamy (b) Xenogamy
(c) Autogamy (d) Cleistogamy

[NEET 2023 Manipur]

38. In angiosperms the correct sequence of events in formation of female gametophyte in the ovule is :

- (A) 3 successive free nuclear divisions functional megaspore.
(B) Degeneration of 3 megaspores.
(C) Meiotic division in megaspore mother cell.
(D) Migration of 3 nuclei towards each pole.
(E) Formation of wall resulting in seven celled embryo sac.

Choose the correct answer from the options given below :

- (a) (A), (B), (C), (D), (E)
(b) (C), (E), (A), (D), (B)
(c) (B), (C), (A), (D), (E)
(d) (C), (B), (A), (D), (E)

[NEET 2023 Manipur]

39. What is the function of tassels in the corn cob?

- (a) To trap pollen grains
(b) To disperse pollen grains
(c) To protect seeds
(d) To attract insects

[NEET 2023 Manipur]

40. Large, colourful, fragrant flowers with nectar are seen in

- (a) Bird pollinated plants
(b) Bat pollinated plants
(c) Wind pollinated plants
(d) Insect pollinated plants

[NEET 2023]

41. Given below are two statements : One labelled as Assertion A and the other labelled as Reason R :

Assertion A : In gymnosperms the pollen grains are released from the microsporangium and carried by air currents.

Reason R : Air currents carry the pollen grains to the mouth of the archegonia where the male gametes are discharged and pollen tube is not formed.

In the light of the above statements, choose the correct answer from the options given below :

- (a) Both A and R are true but R is NOT the correct explanation of A
(b) A is true but R is false
(c) A is false but R is true
(d) Both A and R are true and R is the correct explanation of A

[NEET 2023]

42. In angiosperm, the haploid, diploid and triploid structures of a fertilized embryo sac sequentially are :

- (a) Antipodals, synergids, and primary endosperm nucleus
(b) Synergids, Zygote and Primary endosperm nucleus
(c) Synergids, antipodals and Polar nuclei
(d) Synergids, Primary endosperm nucleus and zygote

[NEET 2023]

43. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A): Both wind and water pollinated flowers are not very colourful and do not produce nectar.

Reason (R): The flowers produce enormous amount of pollen grains in wind and water pollinated flowers.

In the light of the above statements, choose the correct answer from the options given below:

- (a) Both A and R are true and R is the correct explanation of A.

- (b) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.
(c) **A** is true but **R** is false.
(d) **A** is false but **R** is true.

[NEET 2025]

44. In the seeds of cereals, the outer covering of endosperm separates the embryo by a protein-rich layer called:

- (a) Coleoptile
(b) Coleorhiza
(c) Integument
(d) Aleurone layer

[NEET 2025]

45. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A): A typical unfertilized, angiosperm embryo sac at maturity is 8 nucleate and 7-celled.

Reason (R): The egg apparatus has 2 polar nuclei.

In the light of the above statements,

choose the correct answer from the options given below:

- (a) Both **A** and **R** are true and **R** is the correct explanation of **A**.
(b) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.
(c) **A** is true but **R** is false.
(d) **A** is false but **R** is true.

[NEET 2025]

46. Match List I with List II.

List I

- A. Scutellum
B. Non-albuminous seed
C. Epiblast
D. Perisperm

List II

- I. Persistent nucellus
II. Cotyledon of Monocot seed
III. Groundnut
IV. Rudimentary cotyledon

Choose the option with all correct matches.

- (a) A-II, B-III, C-IV, D-I
(b) A-IV, B-III, C-II, D-I
(c) A-IV, B-III, C-I, D-II
(d) A-II, B-IV, C-III, D-I

[NEET 2025]

47. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A): Cells of the tapetum possess dense cytoplasm and generally have more than one nucleus.

Reason (R): Presence of more than one nucleus in the tapetum increases the efficiency of nourishing the developing microspore mother cells.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (a) Both **A** and **R** are true and **R** is the correct explanation of **A**
(b) Both **A** and **R** are true but **R** is not the correct explanation of **A**
(c) **A** is true but **R** is false
(d) **A** is false but **R** is true

[NEET 2025]

NCERT LINE BY LINE QUESTIONS – ANSWERS

1) D	2) A	3) B	4) A	5) D	6) A	7) B	8) C	9) B	10) C
11) A	12) A	13) B	14) D	15) A	16) B	17) D	18) C	19) D	20) D
21) B	22) A	23) C	24) A	25) B	26) B	27) A	28) A	29) B	30) C
31) A	32) B	33) A	34) B	35) B	36) C	37) B	38) A	39) A	40) D
41) C	42) A	43) C	44) B	45) A	46) D	47) A	48) A	49) B	50) C
51) C	52) C	53) B	54) C	55) D	56) C	57) B	58) A	59) D	60) C
61) B	62) C	63) A	64) C	65) D	66) D	67) D	68) C	69) C	70) C
71) D	72) A	73) A	74) D	75) C	76) B	77) C	78) A	79) D	80) D
81) B	82) A	83) A	84) B	85) D	86) B	87) A	88) B	89) C	90) C
91) A	92) C	93) B	94) D	95) D	96) C	97) B	98) A	99) A	100) B
101) B	102) C	103) A	104) D	105) C	106) A	107) A	108) A	109) D	110) B
111) B	112) D	113) B	114) A	115) C	116) C	117) C	118) A	119) C	120) A
121) D	122) B	123) B	124) C	125) D	126) C	127) C	128) B	129) D	130) C
131) A	132) A	133) B	134) A	135) D	136) D	137) A	138) D	139) A	140) D
141) B	142) B	143) C	144) C	145) D	146) C				

NEET PREVIOUS YEARS QUESTIONS-ANSWERS

- 1 (c) 2 (d) 3 (c) 4 (a) 5 (b) 6 (a) 7 (b) 8 (a) 9 (a) 10 (c)
- 11 (d) 12 (c) 13 (d) 14 (a) 15 (a) 16 (c) 17 (d) 18 (d) 19 (4) 20 (2)
- 21 (4) 22 (2) 23 (4) 24 (1) 25 (2) 26 (2) 27 (2) 28 (1) 29 (4) 30 (4)
- 31 (3) 32 (4) 33 (1) 34 (3) 35(d) 36(a) 37(a) 38(d) 39(a) 40(d) 41(b)42(b) 43(b) 44(d) 45(c) 46(a) 47(c)

NEET PREVIOUS YEARS QUESTIONS-EXPLANATIONS

1. (c) Sporopollenin cannot be degraded by enzyme; strong acids and alkali, therefore it is helpful in preserving pollen as fossil.
2. (d) Pollen grains can be stored for several years in liquid nitrogen at -196°C (cryopreservation).
3. (c) Double fertilisation is a unique phenomenon that occurs in angiosperms only.
4. (a) Insect pollinated plants provide rewards as edible pollen grain and nectar as usual rewards. In order to materialise and maximise pollination, flowers have developed a set of attributes which are aimed at attracting the pollinators called attractants.
5. (b) Wind pollination or anemophily occurs in flowers which are having a single ovule in each ovary, and numerous flowers packed in an inflorescence. It is a nondirectional pollination.
6. (a) Autogamy occurs in bisexual flowers. Geitonogamous flowers are unisexual but present in the same plant. Dioecious condition is observed when unisexual male and female flowers are present on different plants and it prevents both autogamy and geitonogamy.
7. (b) The first cell of female gametophytic generation in angiosperm is megaspore. It undergoes three successive mitotic division to form 8-nucleated and 7-celled embryo sac.

8. (a) Tapetum is important for the nutrition and development of pollen grains, as well as a source of precursors for the pollen coat.
9. (a) Pollen grains of different species are incompatible, so they fail to germinate. If the pollen-stigma interaction is compatible, the pollen grain hydrates and germinates shortly following landing on the stigma.
10. (c) Synergids have filiform apparatus.
11. (d) Geitonogamy, genetically, shows similarity with autogamy because the pollen grains are borne on the same plant.
12. (c) Honey is produced by worker bees using nectar (fructose) of flowering plants.
13. (d) The hilum is a scar found on the seed coat through which the developing seeds are attached to the fruit.
14. (a) Nectar and pollen grains are the usual floral rewards which the animal pollinators get.
15. (a) Geitonogamy is the transfer of pollen grains in different flowers of same plant.
16. (c) Male gametophyte is highly reduced in angiosperm and is known as pollen grain. It is 2 or 3-celled.
17. (d) Filiform apparatus helps in the entry of pollen tube into a synergid in ovule. Filiform apparatus is in form of finger like projection comprising a core of microfibrils enclosed in a sheath. It resembles transfer cells meant for short distance movement of metabolites. It is responsible for the absorption of food from the nucleus.
18. (d) Exalbuminous (non-endospermic) seeds usually store reserve food material in cotyledons. In these seeds, the endosperm is used up and not present in mature seeds, e.g., bean, gram and pea.
26. The body of the ovule is fused within the funicle at hilum
27. water hyacinth and water lily are aquatic plants pollinated by insects or wind
28. Pollen grains is male gametophyte present within the parental sporophytic structure anther
Embryo sac is female gametophyte present within the parental sporophytic structure ovule
29. 8-nucleate and 7-celled
30. Xenogamy
31. Rosaceae; Leguminasae
32. Bees are the most dominant pollinates agents among insects.
33. Both the statement are correct
34. 'C' is thalamus which is edible part in the apple fruit

35. Ans. (d)

Explanation

Flowers of Vallisneria are not colourful and do not produce nectar. Waterlily is pollinated by insect or wind. In water-pollinated species, pollen grains are protected from wetting by a mucilaginous covering. In some hydrophytes such as Vallisneria pollen grains are carried passively by water current.

36. Ans.(a)

Explanation

The given diagram shows a wind pollinated plant showing compact inflorescence and well exposed stamens.

Stamens are exposed so complete autogamy does not occur.

37.Ans. (a)

Explanation

The correct answer is :

Option a : Geitonogamy

Explanation :

Geitonogamy refers to the transfer of pollen from the anther of one flower to the stigma of another flower on the same plant. While this process involves pollination between different flowers, because it occurs on the same plant, it does not increase genetic diversity.

Here's a quick overview of the other terms :

Xenogamy refers to the transfer of pollen grains from the anther of a flower to the stigma of a flower on a different plant. This is cross-pollination and promotes genetic diversity.

Autogamy refers to the transfer of pollen from the anther to the stigma of the same flower. This is self-pollination.

Cleistogamy refers to a type of automatic self-pollination where the flowers do not open and are therefore self-pollinated before they open.

38.Ans.(d)

Explanation

The process of female gametophyte formation in angiosperms, also known as megagametogenesis, involves several steps :

1. Meiotic division in the megaspore mother cell (megasporocyte) - This division leads to the production of four haploid cells, which are the megaspores.
2. Degeneration of three of the four megaspores - Typically, three of these megaspores degenerate, leaving a single functional megaspore.
3. Successive mitotic divisions (not meiotic) in the functional megaspore These divisions are typically free-nuclear (the nuclear membrane does not break down between divisions), and result in a multinucleate cell.
4. Migration of the nuclei to the cell periphery and formation of cell walls This results in the creation of a seven-celled structure known as an embryo sac or female gametophyte.
5. The final structure of the female gametophyte includes an egg apparatus (one egg cell and two synergids), two polar nuclei in the central cell, and three antipodal cells.

Given these steps, the correct sequence of events in the formation of the female gametophyte is :

Option d : (C), (B), (A), (D), (E)

39.Ans.(a)

Explanation

Tassels in the com cob represents stigma and style which wave in the wind to trap pollen grains.

40.Ans.(d)

Explanation

Large, colorful, fragrant flowers with nectar are features that attract biotic pollinators. Insect pollinated plants, also known as entomophilous plants, often have these characteristics to attract insects such as bees, butterflies, and moths, which play a significant role in their pollination process.

41.Ans.(b)

Explanation

The correct answer is Option b : A is true but R is false.

Assertion A is true. In gymnosperms, the pollen grains are indeed released from the microsporangium and are typically carried by air currents, a method of pollination known as anemophily.

Reason R is false. Although it's true that air currents carry the pollen grains, the pollen grains do not directly reach the mouth of the archegonia in gymnosperms. Instead, they land on the ovule, where they germinate and form a pollen tube that delivers the male gametes to the egg. Therefore, a pollen tube is formed in gymnosperms, contrary to what Reason R suggests

42. Ans. (b)

Explanation

Synergids are the cells of gametophyte and hence these are haploid. Zygote is formed by fusion of two gametes and thus it is diploid.

Primary endosperm nucleus is formed by the fusion of diploid secondary nucleus with a male gamete. Therefore, it is triploid

43. Ans. (b)

Explanation

Assertion is true- Both wind and water pollinated flowers are not very colourful and do not produce nectar.

Reason is also correct- In wind and water pollination, pollen reaching the stigma is a chance factor. To compensate for this, flowers produce a large number of pollen grains compared to the number of ovules. But reason is not a correct explanation of assertion.

44. Ans. (d)

Explanation

In the seeds of cereals such as maize the seed coat is membranous and generally fused with the fruit wall. The endosperm is bulky and stores food. The outer covering of endosperm separates the embryo by a proteinous layer called aleurone layer.

45. Ans. (c)

Explanation

- Assertion (A) is true: A mature angiosperm embryo sac is 8-nucleate and 7-celled (3 antipodals, 2 synergids, 1 egg cell, and 1 central cell with 2 polar nuclei).
- Reason (R) is false: The egg apparatus contains 1 egg cell and 2 synergids, not 2 polar nuclei. The 2 polar nuclei are present in the central cell, not the egg apparatus.

46. Ans. (a)

Explanation

- A. Scutellum - II. Cotyledon of monocot seed
- B. Non-albuminous seed - III. Groundnut (no residual endosperm)
- C. Epiblast - IV. Rudimentary cotyledon (found in monocots)
- D. Perisperm - I. Persistent nucellus (e.g., in black pepper, beet)

47. Ans. (c)

Explanation

Assertion is true- Cells of the tapetum possess dense cytoplasm and generally have more than one nucleus. But reason is false- The innermost wall layer is the tapetum which nourishes the developing pollen grains.

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