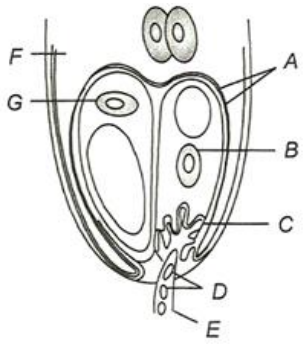
NEET BIOLOGY

SEXUAL REPRODUCTION IN FLOWERING PLANTS

1. Parthenocarpic fruit
   a) Develops from fertilization
   b) Developed from fertilized ovary
   c) Develops from unfertilized ovary
   d) Develops from ovules
2. Seed is
   a) Ripened ovule
   b) Plant part having two generation
   c) Both (a) and (b)
   d) Miniture plant
3. Find out the correct statement
   a) Parthenocarpic fruits are seedless
   b) Parthenocarpy is developed by hormones
   c) Both (a) and (b)
   d) Parthenocarpic seeds are developed by fertilized ovary
4. Vegetative fertilization leading to the formation of endosperm refers to
   a) Fusion of male gamete with diploid secondary nucleus
   b) Fusion of female gamete with diploid secondary nucleus
   c) Fusion of two diploid vegetative cells
   d) Fusion of two male gametes
5. Which of the following is the result of double fertilization?
   a) Cotyledon b) Nucellus c) Endosperm d) None of these
6. Perisprem is found in
   a) Black pepper b) apple c) Beet d) Both (a) and (c)
7. The 'eyes' of the potato tuber are
   a) Flower buds b) Shoot buds c) Axillary buds d) Root buds
8. True fruit is directly derived from
   a) Stem b) Root c) Ovule d) None of the above
9. Intine is made up of
   a) Cellulose b) Pectin c) Both (a) and (b) d) Protein
10. The arrangement of the nuclei in a normal embryo sac in the dicot plants, is
    a) 2+4+2 b) 3+2+3 c) 2+3+3 d) 3+3+2
11. Pericarp is
    a) Wall of ovary b) Wall of fruit c) Both (a) and (b) d) wall of embryo
12. The function innermost layer of pollen sac, tapetum is
    a) Dehiscence b) Nutritive c) Mechanical d) Protective
13. Diagram showing entry of pollen tube to the embryo sac. Identify *A* to *G* in the diagram



a) A-Synergid, B-Filiform apparatus, C-Male gamete, D-Plasma membrane, E-Central cell, F-Egg nucleus, G-Vegetative nucleus
b) A- Filiform apparatus, B- Central cell, C- Egg nucleus, D- Vegetative nucleus, E- Male gamete, F-Synergid, G- Plasma membrane
c) A- Plasma membrane, B- Synergid , C- Filiform apparatus, D- Male gamete, E- Vegetative nucleus, F-Central cell, G-Egg nucleus
d) A- Central cell, B- Egg nucleus, C- Vegetative nucleus, D- Male gamete, E- Synergid, F-Plasma membrane

14. The movement of pollen tube is called
a) Chemotropism b) Thermotaxis c) Thermonastic d) Hydrotropism
15. Which of the following statements is wrong?
a) Pollen grains remain viable for several months because their outer covering is made of sporopollenin
b) No enzyme can degrade sporopollenin
c) Pollen grains are well represented in fossil strata due to sporopollenin
d) Pollen wall has cavities containing proteins
16. Triple fusion in angiosperm is the fusion of second sperm with
a) Antipodal cell and one synergid cell b) Two antipodal cells
c) Two synergid cells d) Two polar nuclei
17. Identify *A* and *B* in diagram given below:

a) A-Stamen; B-Pistil b) A-Filament; B-Anther
c) A-Anther; B-Filament d) A-Pistil, B-Stamen
18. 'Mircrospores arranged in a cluster of four cells called megaspore tetrad'.
The above statement is
a) True b) False
c) Sometimes (a) and sometimes (b) d) Neither (a) nor (b)
19. Insect pollinated flowers are
a) Nector producing b) Colourful c) Fragnance producing d) All of these
20. The fusion of male and female pronuclei of the gametes is called
a) Fertilization b) Conjugation c) Amphimixis d) Panmixis
21. This diagram given below depicts

a) Wind pollinated plant
b) Well exposed stamen
c) Compact inflorescence
d) All of these

22. A scion is grafted to a stock. The quality of fruits produced will be determined by the genotype of
a) Stock b) Scion c) Both (a) and (b) d) Neither (a) nor (b)

23. When pollen is transferred from anther of a flower to stigma of the another of the another flower of the same plant, it is referred to as
a) Allogamy b) Xenogamy c) Geitonogamy d) Autogamy

24. False fruit is a fruit in which
a) Only ovary take part in fruit development
b) Only embryo take part an fruit development
c) Only chalazal cells take part an fruit development
d) Ovary and other floral part included in fruit

25. Synergid's filiform apparatus
a) Guide the pollen tube
b) Guide the style for development
c) Present near the micropylar end
d) Both (a) and (c)

26. Double fertilization occurs among
a) Algae b) Bryophytes c) Angiosperms d) Gymnosperms

27. Scutellum is
a) Cotyledon in dicots
b) Cotyledon in gymnosperm
c) Monocot root
d) Cotyledon in grass family

28. Sporopollenin is chemically
a) Homopolysaccharide
b) Fatty substance
c) Protein
d) Heteropolysaccharide

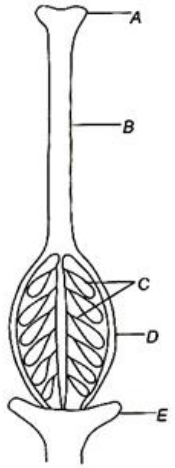
29. Which one of the following is not a correct explanation of cross-pollination?
a) The pollen grains are transferred from one flower to another flower situated on the same plant
b) The pollen grains are transferred from one flower to another flower, of another plant the same species
c) The pollen grains of male flower are transferred to the stigma of the female flower
d) The pollen grains of the flower are transferred to the stigma of the same flower

30. How many cells are found in female gametophyte?
a) 6 b) 8 c) 7 d) 5

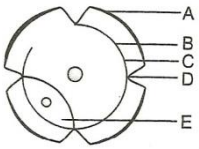
31. Identify the wrong statements regarding post-fertilization development.
a) The ovary wall develops into pericarp
b) The outer integument of ovule develops into tegmen
c) The fusion nucleus (triple nucleus) develops into endosperm
d) The ovule develops into seed

32. Two nuclei with one cell are found in
a) Antipodal cell b) Chalazal cell c) Central cell d) Synergid cell

33. 8-nucleated embryo sac are
    a) Monosporic b) Bisporic c) Tetrasporic d) Any of these
34. Microspore develops into ova. This sentence is
    a) True b) False
    c) Sometimes (a) and sometimes (b) d) Neither (a) nor (b)
35. Identify *A* to *E* in the following diagram

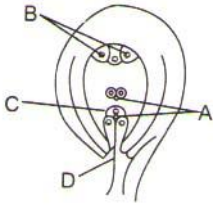


    a) A-Style, B-Stigma, C-Ovules, D-Thalamus, E-Ovary
    b) A- Ovary, B- Thalamus, C- Ovules, D- Style, E- Stigma
    c) A- Thalamus, B- Style, C- Stigma, D- Ovary, E- Ovules
    d) A- Stigma, B- Style, C- Ovules, D- Ovary, E- Thalamus
36. During the formation of embryo sac, the functional megaspore undergoes
    a) Two mitotic divisions b) Two meiotic divisions
    c) Three meiotic divisions d) Three mitotic divisions
37. What would be the number of chromosomes in the cells of the aleurone layer in a plant species with 8 chromosomes in its synergids?
    a) 16 b) 24 c) 32 d) 8
38. In a type of apomixes known as adventive embryony, embryos develop directly from the
    a) Nucellus or integuments b) Synergids or antipodals in an embryo sac
    c) Accessory embryo sacs in the ovule d) Zygote
39. Name the parts A, B, C, D and E in the given diagram.

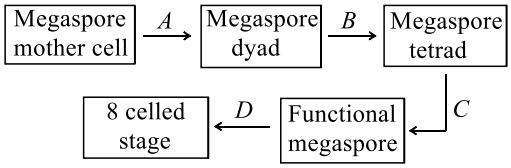


    a) A – Germ pore B – Generative cell
       C – Intine D – Exine
       E - Vegetation cell
    b) A – Germ pore B – Generative cell
       C – Exine D – Intine
       E - Vegetation cell
    c) A – Intine B –Exine
       C – Germ pore D – Generative cell
       E - Vegetation cell
    d) A – exine B –Intine
       C – vegetation cell D –Germ pore
       E-Generative cell
40. Male gametes wheather 2 celled or 3-celled are identical in genetic make up because
    a) Of mitosis b) Of meiosis c) Of amitosis d) Binary fission

41. Apomixis arises due to
    a) Rapid reproduction in plants
    b) Slow reproduction in plants
    c) Both (a) and (b)
    d) None of the above
42. Endosperm is consumed by developing embryo in the seed of
    a) Pea
    b) Maize
    c) Coconut
    d) Castor
43. Haploid plants derived from microspore culture are preferred over diploids for mutation studies, because in haploids
    a) Recessive mutations express immediately
    b) Mutations are readily induced
    c) Haploid cells can be easily cultured
    d) Dominant mutations express immediately
44. Which of the following indicates correct names of A, B, C and D regions of the given diagram?



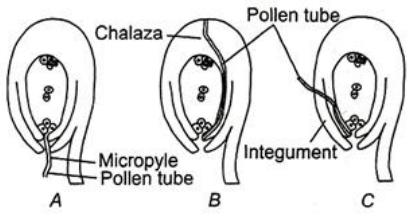
    a) A– Male gamete B – Antipodals
       C – Egg cell D – Pollen tube
    b) A –synergids B – Secondary nucleus
       C – Egg apparatus D – Integuments
    c) A – Antipodals B – Male gametes
       C – Zygote D – Micropyle
    d) A – Secondary nucleus B – Synergids
       C – Egg cell D – Integuments
45. Give the of name the cell division type at *A*, *B*, *C* and *D*



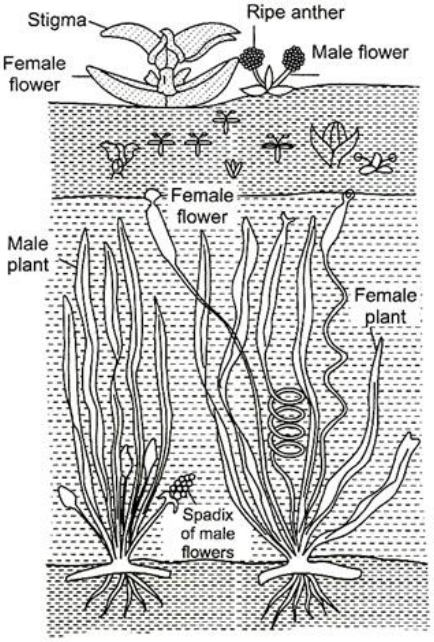
    a) A-Meiosis-I, B-Mitosis, C-Mitosis, D-Meiosis
    b) A- Meiosis-I, B- Meiosis-II, C-No division, D- Mitosis
    c) A- Mitosis, B-No division, C- Meiosis-II, D- Meiosis-I
    d) A- Mitosis, B- Mitosis, C- Meiosis-I, D- Meiosis-I
46. The number of female nuclei involved in double fertilization is
    a) 2
    b) 3
    c) 4
    d) 1
47. A micropyle is a
    a) Small pore through which water enters
    b) Small aperture where no integuments are present
    c) Small pore needed for seed existence
    d) All of the above
48. PEC (Primary Endosperm Cell) is formed
    a) After triple fusion
    b) Before triple fusion
    c) At the time of syngamy
    d) Always persisted
49. In ovule protective covering (integuments) are generally …….. in number
    a) 3
    b) 2
    c) 4
    d) 1
50. These processes are necessary for the complete development of male gametophyte from pollen mother cell.
    a) One meiotic and two mitotic division
    b) One meiotic cell division and one mitotic cell division
    c) two meiotic cell division and one mitotic cell division

d) two meiotic cell division

51. Find out the ploidy nature of A, B, D, E in previous question
    a) $1n, 2n, 3n, 4n$ b) $n, 2n, 3n, n$ c) $1n, 3n, 4n, 2n$ d) $2n, 3n, 1n, 4n$
52. Identify the correct modes of entry of pollen tube in the diagrams given below



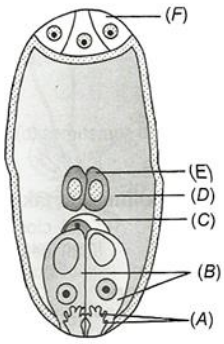
    a) A-Mesogamy, B-Chalazogamy, C-Porogamy
    b) A-Chalazogamy, B-Porogamy, C-Mesogamy
    c) A-Porogamy, B-Chalazogamy, C-Monogamy
    d) A-Porogamy, B-Mesogamy, C-Chalazogamy
53. In previous question name out I, II and III
    a) I-Radicle, II-Suspensor, III-Cotyledon
    b) I- Suspensor, II- Radicle, III- Cotyledon
    c) I- Cotyledon II- Radicle, III- Suspensor
    d) I- Suspensor, II- Cotyledon, III- Radicle
54. Majority of plants are
    a) Biotic agent for pollination b) Non- biotic agent for pollination
    c) Air for pollination d) Animals for pollination
55. The diagram depicts



    a) Water pollination in $Vallisneria$ (tape-grass) b) Air pollination in $Vallisneria$ (tape-grass)
    c) Anemophily in $Vallisneria$ (tape-grass) d) Zoophily in $Vallisneria$ (tape-grass)
56. Individual part or segment of calyx is called
    a) Sepal b) Petal c) Tepal d) Corolla
57. Pollination by insect is
    a) Entomophily b) Chiropterophily c) Anemophily d) Zoophily
58. Sexual reproduction leads to
    a) Genetic recombination b) Polyploidy
    c) Aneuploidy d) euploidy
59. A bisexual flower which never open, is known as

a) Autogamous b) Cleistogamous c) Homogamous d) Allogamous

60. Fruit and seed develops
    a) Simultaneously
    b) First seed than fruit
    c) First fruit than seed
    d) Both develops after endosperm formation
61. Characteristics of wind pollinated pollens is, they are
    a) Non-sticky
    b) Light
    c) Large number in production
    d) All of these
62. In chasmogamy pollination takes place in
    a) Open flower b) Closed flower c) Large flower d) Geitonogamy flower
63. Which is most crucial for seed storage?
    a) Dehydration and dormancy
    b) Endosperm and water
    c) Least amount of development
    d) Endosperm in large quantity
64. Entry of pollen tube with two male gametes and tube nucleus through micropyle, is
    a) Mesogamy b) Porogamy c) Chalazogamy d) None of these
65. Syngamy is the process in which
    a) Male gamete fuses with female gamete
    b) Pollen tube enter into the ovule through micropyle
    c) Pollen tube enter into the ovule through chalaza
    d) Vegetative cell and tube cell fuse
66. Pollen grains of different plants, differ in
    a) Size and shape only
    b) Colour and design only
    c) Size, shape and design only
    d) Size, shape, colour and design
67. Which one of the following is a reference to xenogamy ?
    a) Ripening of androecium earlier to gynoecium
    b) Pollen grains of one flower reaching the stigma of another flower present on the same plant
    c) Pollen grains of one flower reaching the stigma of another flower present on a different plant of the same species
    d) The inability of pollen tube to terminate on the stigma of the same flower
68. *Selaginella* and *Salvinia* considered to represent a significant step towards evolution of seed habit because
    a) Female gametophyte is free and gets dispersed like seed
    b) Female gametophyte lacks archegonia
    c) Megaspore possess endosperm and embryo surrounded by seed coat
    d) Embryo develops in female gametophyte which is retained on the parent sporophyte
69. Zygote is always
    a) Haploid b) Diploid c) Triploid d) Tetraploid
70. Occurrence of more than four spores from a spore mother cell is called
    a) Polysiphony b) Polyspermy c) Polyspory d) Polyembryony
71. Identify *A* to *F* in the diagram



    a) A-Egg, B-Filiform apparatus, C-Synergid, D-Antipodal cell, E-Polar nuclei, F-Central cell
    b) A-Egg, B-Synergid, C-Filiform apparatus, D-Antipodal cell, E-Central cell, F-Polar nuclei

c) A-Central cell, B-Egg, C-Synergid, D-Antipodal cell, E-Filiform apparatus, F-Polar nuclei
d) A-Filiform apparatus, B-Synergid, C-Egg, D-Central cell, E-Polar nuclei, F-Antipodal cell

72. Identify the type of ovary in diagram

a) Multicarpellary apocarpous
b) Multicarpellary syncarpous
c) Multicarpellary pistillate
d) Monocarpellary apocarpous

73. Type of pollination in *commelina* is
a) Chasmogamy b) Geitonogamy c) Xenogamy d) Cleistogamy

74. Pollens have two prominent walls which are … A … and … B …. Here *A* and *B* refers to
a) A-Intine B-Protein coat
b) A-Exine B-Intine
c) A-Sporopollenin B-Intine
d) A-Sporopollenin B-Exine

75. If there are four cells in a anther, what will be the number of pollen grains?
a) 4 b) 9 c) 12 d) 16

76. Xenogamy or cross-pollination is performed by
I. Abiotic agencies
II. Biotic agencies
III. Insects only
Select the correct option for the given question
a) I and III b) II and III c) Only III d) I and II

77. In wind pollination the pollens are feathery, whether it is
a) True
b) False
c) Sometimes (a) and sometimes (b)
d) Neither (a) nor (b)

78. Identify the characters with reference to the plant in which eight nucleated embryo sac was first studied by strasburger.
I – Micropyle, chalaza and funiculus are arranged in the same vertical line
In the ovule.
II – presence of both unisexual and bisexual flowers in the same plant.
III – Filiform apparatus helps in conduction of food materials from
Endosperm to egg apparatus.
IV – Long funiculus coils like a watch spring around the ovule.
a) I and IV b) II and III c) I and II d) III and IV

79. Devices for self-pollination are
a) Dicliny or unicexuality
b) Dichogamy
c) Heterostyly
d) None of these

80. Chalazal pole is present
a) Opposite to micropyle
b) At the origin of integuments
c) Opposite to nucellus
d) Near the embryo sac

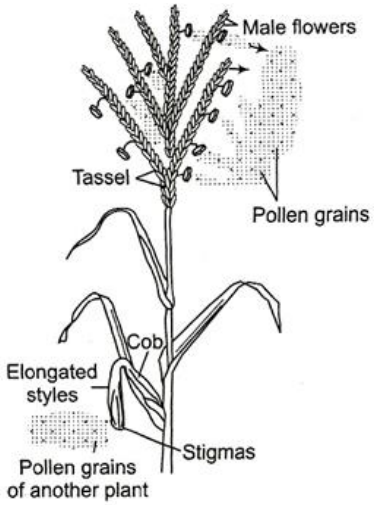
81. Vegetative fertilization is also called
a) Triple fusion
b) True fertilization
c) Syngamy
d) Generative fertilization

82. Vegetative/Asexual reproduction and apomixis are common in
a) Type of cell division
b) Clone nature of offsprings
c) Both (a) and (b)
d) Only in dicot plant

83. Xenia refers to

a) Effect of pollen on endosperm
b) Effect of embryo on sperm
c) Both (a) and (b)
d) None of the above

84. Below diagram depicts



a) Entomochily
b) Wind pollination
c) Myrmecophily
d) Ornithophily

85. Long silky hairs on cob of maize are
a) Anthers
b) Style
c) Stigma
d) Both (b) and (c)

86. The endosperm in angiosperm develops from
a) Zygote
b) Secondary nucleus
c) Chalazal polar nucleus
d) Micropylar polar nucleus

87. What is pollen grain?
a) Microspore mother cell
b) Male gamete
c) Male gametophyte
d) Partially developed embryo

88. Type of cell division takes place in apomixes is
a) Reductional
b) Meiosis
c) Both (a) and (b)
d) Mitosis

89. Out of the following choose the post-fertilisation events
a) Endospermeogenesis
b) Embryogenesis
c) Both (a) and (b)
d) Organogenesis

90. Apomixis is like
a) Sexual reproduction
b) Fertilization
c) Parthenogenesis
d) Asexual reproduction

91. *Parthenium* or carrot grass is imported with
a) Wheat
b) Grass
c) Rise
d) Maize

92. Pollination by snail and slug is called
a) Ornithophily
b) Chiropterophily
c) Entomophily
d) Malacophily

93. Some plant have a habit of harbouring ants to save the plants from damage by other animals which is known as
a) Entomophily
b) Myrmecophily
c) Anemophily
d) Hydrophily

94. The wall of pollen tube is made of
a) Cellulose
b) Pectin
c) Both (a) and (b)
d) None of these

95. One advantage of cleistogamy is
a) It leads to greater genetic diversity
b) Seed dispersal is more efficient and widespread
c) Seed set is not dependent on pollinators
d) Each visit of a pollinator results in transfer of hundreds of pollen grains

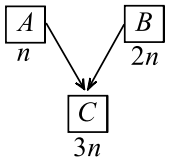
96. Double fertilization involves
a) Fertilization of the egg by two male gametes
b) Fertilization of the egg in the same embryo sac by two sperms brought by one pollen tube
c) Fertilization of the egg and the central cell by two sperms brought by different pollen tubes

d) Fertilization of the egg and the central cell by two sperms brought by the same pollen tube

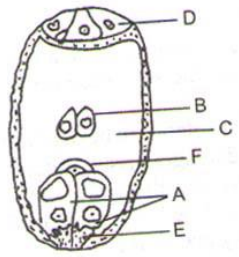
97. Flower is a
    a) Modified male plant only
    b) Modified female plant only
    c) Modified reproductive shoot
    d) Vegetative shoot system
98. Cleistogamous flowers are trictly autogamous because they remain
    a) Always open
    b) Always close
    c) Always fragrance
    d) Are brighty coloured
99. Wind pollinated flowers often have
    a) Single ovule in each ovary
    b) Numerous flowers packed into inflorescence
    c) Both (a) and (b)
    d) None of the above
100. Continued self-pollination results in
    a) Inbreeding depression
    b) Out breeding depression
    c) Hybrid vigour
    d) Better result in offsprings
101. Wind pollinated flowers are
    a) Small, brightly coloured, producing large number of pollen grains
    b) Small, producing large number of dry pollen grains
    c) Large producing abundant nectar and pollen
    d) Small, producing nectar and dry pollen
102. Wind pollination is common in
    a) Lilies b) Grasses c) Orchids d) Legumes
103. 'Cells at the chalazal end are called synergid cells'. The above statement is
    a) True
    b) False
    c) Sometimes (a) and sometimes (b)
    d) Neither (a) nor (b)
104. Orthotropous ovule belongs to
    a) *Urtica* b) *Polygonum* c) *Peperomea* d) All of these
105. Center of each microsporangium is occupied by
    a) Sporogenous tissue
    b) Spongious tissue
    c) Central tissue
    d) Microspore mother cell
106. Which of the following plant products is the hardest?
    a) Lignin b) Cutin c) Suberin d) Sporopollenin
107. Functional megaspore develops into …A… also called …B…
    A and B in the above sentence is
    a) A-Female gametophyte; B-Embryo sac
    b) A-Embryo sac; B-Female gametophyte
    c) A-Endosperm; B-Nucellus
    d) A-Microsporangium; B-Megasporangium
108. Syngamy and triple fusion is called …A… . The central cell becomes …B… develops into …C… and zygote develops into …D…
    A, B, C, D in the above statement are
    a) A-Fusion, B-haploid, C-diploid cell, D-embryo
    b) A-double fertilization, B-PEN, C-endosperm, D-embryo
    c) A-embryo, B-endosperm, C-PEN, D-diploid cell
    d) A-PEN, B-endosperm, C-syngamy, D-fertilisation
109. Dicot embryo consists of
    a) Radicle and plumule
    b) Radicle, plumule, cotyledons and sometimes endosperm
    c) Radicle, plumule, cotyledons and tegmen
    d) Radicle, plumule, cotyledons and tegmen and testa

110. First three layers of microsporangium which does the function of protection are
a) Epidermis, endothecium, middle layer b) Epidermis, mesocarp, endocarp
c) Epidermis, middle layer, endothecium d) Epidermis, endocarp, mesocarp
111. Nucellar polyembryony is reported in species of
a) Gossypium b) *Triticum* c) *Brassica* d) *Citrus*
112. Nucellus forms which of the following parts of fruit?
a) Seed coat b) Perisperm c) Seed d) Raphe
113. Mesogamy is
a) Fusion of male and female gametes
b) Fusion of physiologically similar and morphologically different gametes
c) Entry of pollen tube through integuments
d) None of the above
114. Identify the correct statement.
a) Because of marked climatic variations, plants growing near the sea shore do not produce annual rings
b) The age of the plant can be determined by its height
c) Healing of damaged tissue is because of the activity of sclerenchyma cells
d) Grafting is difficult in monocot plants as they have scattered vascular bundles
115. Which of the following perform microsporogenesis?
a) Microspore mother cell b) Pollen mother cell
c) Both (a) and (b) d) None of these
116. Tapetum is found in
a) Anther b) Microspore c) Male gametophyte d) Female gametophyte
117. Double fertilization was discovered by
a) Nawaschin b) Strasburger c) Emerson d) None of these
118. Microsporangium produces
a) Male gametes b) Female gametes c) Pollen d) Both (a) and (c)
119. Grafting is successful in dicots but not in monocots because the dicots have
a) Vascular bundles arranged in a ring
b) Cambium for secondary growth
c) Vessels with element arranged end to end
d) Cork cambium
120. Megaspore mother cell is found near the region of
a) Micropyle b) Chalaza c) Nucellus d) Integuments
121. Ovule integument gets transformed into
a) Seed b) Fruit wall c) Seed coat d) Cotyledons
122. Triple fusion in angiosperm is the fusion of second sperm with
a) Antipodal cell and one synergid cell b) Two antipodal cells
c) Two synergid cells d) Two polar nuclei
123. Which one of the following pairs of plants structures has haploid number of chromosomes?
a) Megaspore mother cell and antipodal cells b) Egg cell and antipodal cells
c) Nucellus and antipodal cells d) Egg nucleus and secondary nucleus
124. Self-incompatibility is a device for
I. Ensuring cross-pollination
II. Preventing self-pollination
III. Ensuring self-fertilisation
IV. Genetic control for self-fertilisation
Choose the correct statements from those given above
a) I, II and III b) I, II, III and IV c) I, III and IV d) I, II and IV
125. How many number of nuclei are involved in fertilization?
a) 1 b) 2 c) 3 d) 5

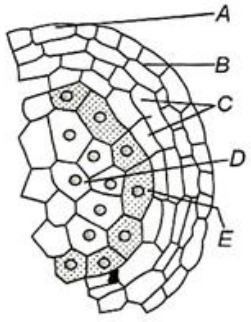
126. Ovules contain many embryo in
a) Citrus b) Orange c) Mango d) All of these
127. Maximum viability of rice and wheat is
a) 60 min b) 50 min c) 40 min d) 30 min
128. Find out *A*, *B* and *C* in the flow chart given below



a) A-Female gamete, B-Male gamete, C-Endosperm
b) A- Endosperm, B- Female gamete, C- Male gamete
c) A- Female gamete, B-Polar nuclei, C- Endosperm
d) A- Female gamete, B- Endosperm C-Male gamete
129. For a gene if AA = male plant, BB = female plant. Find out the genotype of endosperm and embryo
a) AAB, BBA b) AAB, AB c) ABB, AB d) BBA, AAB
130. In the given diagram, parts labelled as A, B, C, D, E and F are respectively identified as



a) Synergids, polar nuclei, central cell, filiform apparatus and egg
b) Polar nuclei, egg, antipodals, central cell, filiform apparatus and polar nucei
c) Egg, synergids, central cell, filiform apparatus, antipodals and polar nuclei
d) Central cell, polar nuclei filiform apparatus, antipodals, synergids and egg
131. Micropyle helps in
a) Germination of pollen grain b) Growth of pollen tube
c) Coming out of pollen tube from pollen grain d) Allowing entry of pollen tube
132. The ovary after fertilization is converted into
a) Embryo b) Endosperm c) Fruit d) Seed
133. Which of these is not essential for allogamy?
a) Self-sterility b) Dichogamy c) Heterogamy d) None of these
134. Identify *A* to *E* in the following diagram



a) A-Tapetum, B-Microspore mother cell, C-Middle layer, D-Endothecium, E-Epidermis
b) A- Epidermis, B- Middle layer, C- Microspore mother cell, D- Tapetum, E- Endothecium
c) A- Middle layer, B- Epidermis, C- Tapetum, D- Microspore mother cell, E- Endothecium
d) A- Epidermis, B- Endothecium, C-Middle layer, D- Microspore mother cell, E- Tapetum
135. 'In coconut the cellular endosperm surrounds the nuclear endosperm'.

The above statement is

a) True b) False

c) Sometimes (a) and sometimes (b) d) Neither (a) nor (b)

136. Hermaphrodite flower have

a) Male and female on same plant b) Male and female on same flower

c) Male and female on different flower d) Male and female on difference plant

137. Unisexuality of flowers prevents

a) Autogamy, but not geitonogamy b) Geitonogamy and xenogamy

c) Geitonogamy, but not xenogamy d) Autogamy and Geitonogamy

138. Stalk with which ovules attached to the placenta is called

a) Funicle b) Raphe c) Hilum d) Chalaza

139. Self-pollination means

a) Occurrence o male and female sex organs in the same flower

b) Germination of pollens within the anther

c) Transference of pollens from anther to the stigma within the same flower

d) Transference of pollens from one flower to another on the same plant

140. Meiotic cell division takes place during

a) Gametogenesis b) Embryogenesis c) Organogenesis d) Parthenogenesis

141. The outermost layer of maize endosperm is known as

a) Perisperm b) aleurone c) Tapetum d) endothelium

142. Why sometimes, even diploid offspring is produced through parthenogenesis?

a) When offspring is produced without fertilization of diploid egg cell

b) When offspring is produced through fertilization of diploid egg cell

c) When offspring is produced without fertilization of haploid egg cell

d) When offspring is produced through fertilization of haploid egg cell

143. The process in which haploid embryo is formed from haploid egg without fertilization is called

a) Apospory b) Agamospermy

c) Apogamy d) Vegetative reproduction

144. Which of the following floral parts forms pericarp after fertilization?

a) Nucellus b) Outer integument c) Ovary wall d) Inner integument

145. Tapetal cells are characterized by

a) Mitotic division b) Meiotic division

c) Endomitosis d) Endomitosis as well as endopolyploidy

146. Pollen grains can cause

a) Bronchial afflications b) Asthma c) Bronchitis d) All of these

147. Non-albuminous seed

a) Has no reserve food b) Also called exalbuminous

c) Has thin cotyledons d) All of these

148. Development of an embryo without fertilization Is called as

a) Apomixis b) Polyembryony c) Parthenocarpy d) Parthenogenesis

149. Non-endospermic seeds are seen in

a) Groundnut b) Pea c) Beans d) All of these

150. The cylindrical portion below the cotyledons is …A… that terminates to …B… and tip called …C… A, B and C here refers to

a) A-radicle, B-hypocotyle, C-root cap b) A- root cap, B- radicle, C- hypocotyle

c) A- hypocotyle, B-root cap, C-radicle d) A- hypocotyle, B-radicle , C-root cap

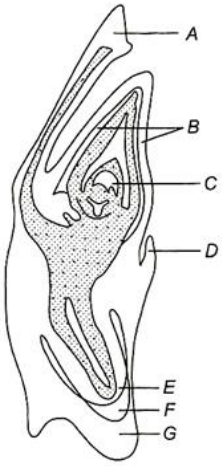
151. The type of pollination adaptation found in *calotropis* is

a) Dicliny b) Herkogamy c) Heterostyly d) Dichogamy

152. Fertilization of egg takes place inside

a) Anther b) Stigma c) Pollen tube d) Embryo sac

153. In figure find out coleoptile, shoot apex and epiblast



a) A, B and C b) B, C and D c) D, F and G d) E, F and G

154. If the number of chromosomes in egg cell is 8, then what is the number of chromosomes on endosperm?
a) 24 b) 8 c) 16 d) 12

155. Find out right statement (s)
I. Most common endosperm is of nuclear type
II. Coconut water is male gametophyte
III. Coconut has both nucellar and cellular type of endosperm
a) I, II and III b) I and III c) II and III d) I and II

156. Number of seeds is equals to the
a) Number of ovules b) Number of ovaries c) Both (a) and (b) d) None of these

157. Nuclear polyembryony is reported in
a) *Citrus* b) *Gossypium* c) *Triticum* d) *Brassica*

158. A normal plant suddenly started reproducing parthenogenetically. The number of chromosomes of the second generation as compared to the parent will be
a) One half b) One fourth c) Same d) Double

159. The process of transfer of pollen grains from anther to stigmatic surface with the help of water is called
a) Anemophily b) Zoophily c) Hydrophily d) Ornithophily

160. Anemophily is a type of pollination found in
a) *Salvia* b) Bottle brush c) *Vallisneria* d) Coconut

161. If stem has $2n = 10$ number of chromosomes than find out
A – number of chromosomes in endosperm
B – number of chromosomes in egg cell
C – number of chromosomes in polar nuclei
a) 15, 15, 20 b) 10, 15, 20 c) 15, 5, 10 d) 10, 5, 15

162. I. Antipodal cell II. Egg cell
III. Synergid cell IV. Polar nuclei
V. Male gamete VI. Nuclear cell
IV. Chalazal cell
Out of the seven names given above, find out haploid cells
a) I, II, IV, V b) II, IV, VI, VII c) I, II, III, V d) II, IV, III, I

163. There are 10 flowers in one individual plant of *crotalaria.* In each microsporangium of every stamen of all the flowers, there are 30 microspore mother cells. How many pollen grains are formed from that plant?
a) 4,000 b) 10,000 c) 24,000 d) 48,000

164. Apomictic embryos in *Citrus* arise from
a) Synergids b) Maternal sporophytic tissue in ovule
c) Antipodal cells d) Diploid egg

165. Chances of pollination in air and water are increased by increasing number of pollens. This statement is

a) True b) False
c) Sometimes (a) and sometimes (b) d) Neither (a) nor (b)

166. Micropyle is formed by
a) Absence of integuments
b) Absence of funicle
c) Absence of nucellus
d) Absence of embryo sac

167. In a flowering plants, megaspore develops into an embryo sac, which contains
a) 4 cells, one of which is an egg b) 6 cells, one of which is an egg
c) 8 cells, one of which is an egg d) None of the above

168. What does the filiform apparatus do at the entrance into ovule?
a) It helps in the entry of pollen tube into a synergid b) It prevents entry of more than one pollen tube into the embryo sac
c) It brings about opening of the pollen tube d) It guides pollen tube from a synergid to egg

169. Function of aleurone layer is to
a) Prepare amylase b) Prepare proteinase c) Prepare peptidase d) Prepare food

170. Pollination by bats is called
a) Anemophily b) Hydrophily c) Ornithophily d) None of these

171. Which one of the following is not a device to promote cross-pollination?
a) Cleistogamy b) Heterostyly c) Herkogamy d) Dichogamy

172. Which cell is bigger and have abundant food reserve material during microsporogenesis?
a) Generative cell b) Vegetative cell c) Vacuole d) Spore mother cell

173. In artificial hybridization the steps involved are
I. Bagging
II. Emasculation
III. Rebagging
Their right arrangement is
a) I → II → III b) II → I → III c) III → II → I d) II → III → I

174. In some plants, anthers and stigmas grow and mature at same time. This phenomenon is called
a) Homogamy b) Syngamy c) Allogamy d) Fusion

175. Double fertilization is fusion of
a) Two eggs
b) Two eggs and polar nuclei
c) One male gamete with egg and other with synergid
d) One male gamete with egg and other with secondary nucleus

176. How many nuclei are found in female gametophyte?
a) 8 b) 7 c) 6 d) 5

177. An ovule is a
a) Differentiated megasporangium
b) Dedifferentiated megasporangium
c) Integumented megasporangium
d) Redifferentiated megasporangium

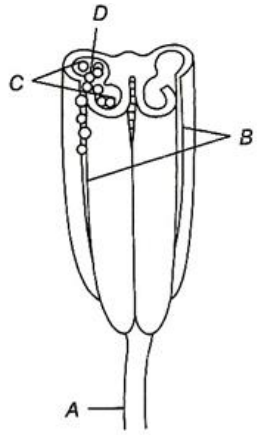
178. Nuclear endosperm has
a) Every nuclear division followed by wall formation
b) Initially free-nuclear divisions followed by wall formation
c) First division followed by wall formation and other free nuclear
d) None of the above

179. A typical angiosperm embryo sac at maturity, is
a) 4 – nucleate, 2 – celled b) 8 – nucleate, 7 – celled
c) 4 – nucleate, 4 – celled d) 8– nucleate,4 – celled

180. Device to discourage self-pollination or increase cross-pollination is
    a) Pollen release and stigma receptivity are not synchronized
    b) Anther and stigma placed at different position
    c) Same height of stamen and stigma
    d) Both (a) and (b)
181. Occurrence of more than one embryo is called
    a) Polyembryony b) Embryony c) Parthenogenesis d) Fertilization
182. Grass family (Poaceae) contains
    a) Exposed stigma b) Versatile anther c) Both (a) and (b) d) Large pollens
183. What is the ratio of equational divisions that take place in *Cycas* and angiosperms respectively leading to the formation to male gametes from pollen grains?
    a) 3: 2 b) 3: 1 c) 2: 1 d) 2: 3
184. Pollen grains are shed at
    a) 1-celled stage b) 2- celled stage c) 2,3- celled stage d) 5- celled stage
185. Which of these cells is the largest cell of the ovule?
    a) Antipodal cell
    b) Central cell
    c) Megaspore mother cell
    d) The size of the cells varies from species to species and none of the given above can be treated as largest
186. In orthotropous ovule, the micropyle and chalaza are
    a) Oblique to funiculus b) Parallel to funculus
    c) At right angle to funiculus d) In straight line with funiculus
187. Pick out the wrong statement.
    a) Double fertilization is unique to gymnosperms and monocotyledons
    b) *Sequoia*, a gymnosperm, is one of the tallest trees
    c) Phaeophyceae members possess chlorophyll-*a*, *c*, carotenoids and xanthophylls
    d) Evolutionarily, pteridophytes are the first terrestrial plants to possess xylem and phloem
188. The onagrad type embroyo, development is found in
    a) *Solanum* b) *Capsella* c) *Lilium* d) *Hibiscus*
189. Male gametes in angiosperms are formed by the division of
    a) Microspore b) Generative cell
    c) Vegetative cell d) Microspore mother cell
190. In the fully organized *Polygonum* type of embryo sac, what is the ratio of haploid, diploid and triploid nuclei?
    a) 3 : 1 : 3 b) 6 : 0 : 1 c) 6 : 1 : 0 d) 3 : 2 : 3
191. Megasporogenesis is
    a) Formation of fruit b) Formation of seeds
    c) Formation of megaspores d) Both (b) and (c)
192. Fibrous thickenings of hygroscopic nature are found in which part of the anther wall?
    a) Epidermis b) Endothecium c) Middle layers d) Tapetum
193. Which one of following represents an ovule, where the embryo sac becomes horse-shoe shaped and the funiculus and micropyle are close to each other
    a) Circinotropous b) Anatropous c) Amphitropous d) Atropous
194. In angiosperm functional megaspore develops into
    a) Embryo sac b) Ovule c) Endosperm d) Pollan sac
195. Ornithophily refers to the pollination by which of the following?
    a) Insects b) Birds c) Snails d) Air
196. Raphe is
    a) Part of flower b) Funicle attached to ovule
    c) Ridge formed by funiculus d) Part of nucellus

197. The pollens are liberated in *cassytha* by
a) Porous dehiscence
b) Longitudinal dehiscence
c) Transverse dehiscence
d) Valvular dehiscence

198. Identify *A* to *D* in the following diagram



a) A-Filament, B-Pollen sac, C-Pollen grain, D-Line of dehiscence
b) A-Filament, B-Pollen sac, C-Line of dehiscence, D-Pollen grain
c) A-Filament, B- Line of dehiscence, C- Pollen sac, D-Pollen grains
d) A-Filament, B- Line of dehiscence, C- Pollen sac, D-Pollen grains

199. Pollen kit material is secreted by
a) Tapetum
b) Endothecium
c) Epidermis
d) Endodermis

200. Wind pollinated flower have long well exposed stigma. This statement is
a) True
b) False
c) Sometimes (a) and sometimes (b)
d) Neither (a) nor (b)

201. Microsporangia develops in to
a) Pollens
b) Microgametes
c) Megagametes
d) Pollen sacs

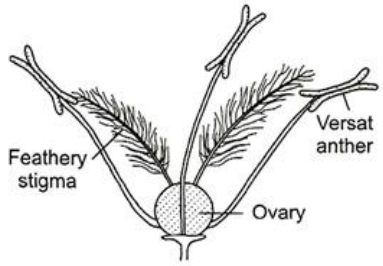
202. Pollen grains have ability to tolerate extreme temperatures because of the presence of
a) Sporopollenin
b) Suberin
c) Cubin
d) Callose

203. An interesting modification of flower shape for insect pollination occurs in some orchids in which a male insect mistakes the pattern on the orchid flower for the female of his species and tries to copulate with it, thereby pollinating the flower. This phenomenon is called
a) Pseudoparthenocarpy
b) Mimicry
c) Pseudopollination
d) Pseudocopulation

204. Petals together form
a) Corolla
b) Gynoecium
c) Androecium
d) Pistil

205. Cleistogamous flowers
a) Never open
b) Always open
c) Sometimes they open
d) Remain still

206. The diagram (below) depicts a flower with

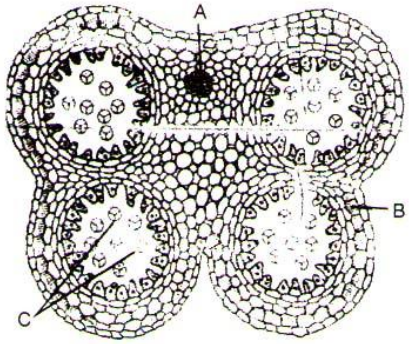


a) Air pollination
b) Anemophily
c) Water pollination
d) Hybridization

207. Autogamy stands for
a) Self-pollination in same flower
b) Self-pollination in different flower
c) Pollination in two flowers
d) Division in embryo

208. Inflorescence is
a) Development of flower
b) Distribution of flowers
c) Arrangement of flower
d) All of these

209. The following is the diagram of TS of anther. Identify the parts labelled as A,B and C.

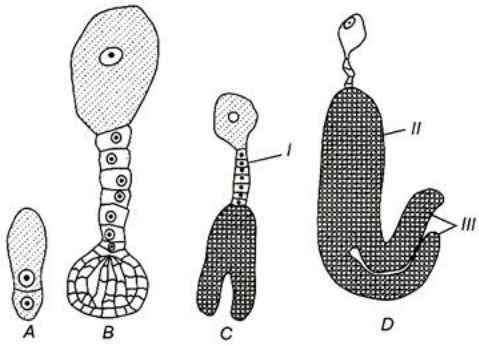


a) A-Connective, B-Endothecium, C-Pollen grain
b) A- Endothecium, B- Connective, C-Pollen grain,
c) A-Pollen grain, B- Connective, C-Endothecium,
d) A- Endothecium, B-Pollen grain, C-Connective,

210. Pollens outer layer is called …A… . This is made up of …B… . This is absent on the …C… . Fill in the blanks A, B and C
a) A-Intine, B-organic compound, C-micropyle
b) A-exine, B-sporopollenin, C-germ pore
c) A-exine, B-intine, C-micropyle
d) A-micropyle, B-intine, C-exine

211. "In Western countries a large number of …… Product in the form of tablets and ……. are available in market. Pollen consumption claimed to increase the …… of athelete". The words to fill blanks in sequential order are
a) Pistil, syrup, power
b) Stamen, food, sexual urge
c) Carpel, yoghurt, labido
d) Pollen, syrup, performance

212. Identify the different stages in embryogenesis in the given diagram *A*, *B*, *C* and *D*



a) A-Two celled stage, B-Heart-shaped, C-Globular, D-Mature embryo
b) A-Two celled stage, B-Mature embryo, C-Heart-shaped, D-Globular type
c) A-Two celled stage, B-Globular type, C-Heart-shaped, D-Mature embryo
d) A-Mature embryo, B-Heart-shaped, C-Globular type, D-Two celled stage

213. Tapetum is
a) Protective
b) Reproductive
c) Nutritive
d) Respiratory

214. Formation of diploid embryo sac from diploid vegetative structure, eg, nucellus or integument, etc, without meiosis is called
a) Apospory
b) Apomixis
c) Diplospory
d) Adventive polyembryony

215. The terminal structure of stamen is called
a) Pollen
b) Filament
c) Anther
d) All of these

216. Generally pollen tube enters through
a) Micropylar region
b) Antipodal region
c) Chalazal end
d) Nuclear region

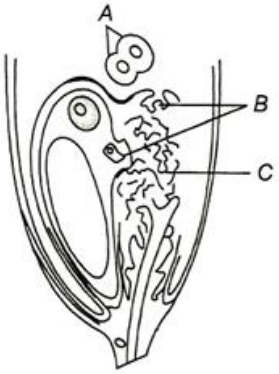
217. Identify the type of flower *A* and *B*

a) A-Cleistogamous; B-Chasmogamous
b) A-Homogamous; B-Heterogamous
c) A-Chasmogamous; B-Cleistogamous
d) A-Heterogamous; B-Homogamous

218. Water pollinated plant is
a) *Vallisneria* b) *Hydrilla* c) *Zostera* d) All of these

219. Endospermic seeds are seen in
a) Castor b) Coconut c) Both (a) and (b) d) None of these

220. Diagram showing discharge of gametes in the egg apparatus. Identify *A*, *B* and *C*



a) A-Polar nuclei, B-Female gametes, C-Synergid cell
b) A- Male gametes, B- Synergid cell, C- Polar nuclei
c) A- Synergid cell, B- Male gametes, C- Polar nuclei
d) A- Polar nuclei, B- Male gametes, C- Synergid cell

221. Parthenogenesis is a type of
a) Sexual reproduction
b) Asexual reproduction
c) Budding
d) Regeneration

222. The diagram given below represents the sectional view of

a) Amphitropous ovule
b) Campylotropous ovule
c) Anatropous ovule
d) Orthotropous ovule

223. Banana fruits are seedless, because
a) Auxins are sprayed for rapid development of fruits
b) Of vegetative propagation of plants
c) Of triploid plants
d) Fruits are artificially ripened

224. Which of the following is not true for double fertilization?

a) Discovered by Nawaschin
b) Male gamete and secondary nucleus fused to form endosperm nucleus
c) endosperm nucleus is diploid
d) endosperm nucleus nutrition to embryo

225. Mature male gametophyte is derived from a 'pollen mother cell' by
a) Three meiotic divisions
b) One meiotic, one mitotic division
c) Single mitotic division
d) Two mitotic divisions

226. Embryo sac is also known as
a) Micro-gametophyte b) Mega-gametophyte c) Micro-sporangium d) Mega - sporangium

227. Albuminous seed
a) Has no endosperm b) Has thick cotyledons
c) Have food storage in cotyledons d) Both (b) and (c)

228. How many nuclei take part in double fertilization of flowering plants?
a) 3 b) 2 c) 4 d) 8

229. A typical dicotyledonous embryo consist of an …A… axis and …B… cotyledons.
The portion of embryonal axis above the level of cotyledons is …C… which terminates with the …D… or stem tip
A, B, C, D in the above statement are
a) A-Plumule, B-epicotyle, C-cotyledons, D-embryonal axis
b) A- embryonal axis, B- cotyledons, C- epicotyle, D- Plumule
c) A- embryonal axis, B- epicotyle, C- cotyledons, D- Plumule
d) A- embryonal axis, B- Plumule, C- cotyledons, D- epicotyle

230. Transfer of pollen grains from one flower to another flower of same plant is
a) Geitonogamy b) Autogamy c) Allogamy d) Cleistogamy

231. Which one of the following statements is not true?
a) Pollen grains are released from anthers at 2-celled state
b) Sporogenous cell directly behaves as the megaspore mother cell
c) Megaspore divides twice to form an eight nucleate embryo sac
d) Egg and synergids always lie near the micropylar end of ovule

232. In embryo sac the number of → synergid → egg cell → central cell → antipodal cell follows the order
a) 1-1-2-3 b) 2-1-3-2 c) 2-1-2-3 d) 3-2-1-2

233. Choose the mis –matched option.
a) Wind – *Cannabis* – Anemophily b) Water – *Zoostera* – Hydrophily
c) Insect – *Salvia* – Entomophily d) Birds – *Adansonia* – Ornithophily

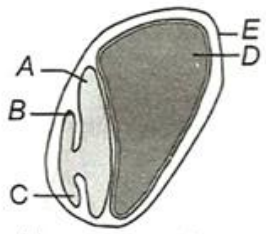
234. Which one of the following would not lead to formation of clones?
a) Double fertilization b) Apomixis
c) Vegetative reproduction d) Tissue culture

235. Apomixis is seen in
a) Asteracea b) Grasses c) Both (a) and (b) d) None of these

236. Ovary develops into
a) Fruit b) Seed c) Fruit wall d) Embryo

237. Pollination is
a) Shedding of pollens b) Maturing of anther
c) Transfer of pollen to stigma d) Formation of pollen

238. Find out the type of seed and identify cotyledons epicotyle and endosperm



Monocot seed structure

a) Monocots- *A*, *B* and *C* b) Dicots-*B*, *A* and *C* c) Monocots-*A*, *B* and *D* d) Dicots-*D*, *E* and *A*

239. Approximate diameter of pollen grain is
a) 25-50 micrometer b) 50-75 micrometer c) 75-100 micrometer d) 25-35 micrometer

240. In porogamy, pollen tube enters the ovule through the
a) Chalazal end b) Integument c) micropyle d) Ovary wall

241. A seed matures if water content is reduced to …'A' ….. . If the general metabolism …B…. . The embryo enter a state called … C … .
Choose correct option for A,B and C
a) A-50-60%, B-fast, C-infertile b) A-10-15%, B-slow down, C-dormancy
c) A-35-50%, B-slow down, C-development d) A-35-60%, B-fast, C-Embryogenesis

242. What will be the gametic chromosome number of a cell, if somatic cell have 40 chromosomes?
a) 10 b) 20 c) 30 d) 40

243. Stem cutting are commonly used for the propagation of
a) Banana b) Rose c) Mango d) Cotton

244. The fertilization in which male gametes are carried through pollen tube, is known as
a) Syngamy b) Porogamy c) Siphonogamy d) Chalazogamy

245. If endosperm has 36 number of chromosomes then find out the chromosome number of male and female gamete
a) 18, 18 b) 17, 18 c) 20, 20 d) 12, 12

246. For the formation of tetrasporic embryo sac, how many megaspore mother cells are required?
a) 1 b) 2 c) 3 d) 4

247. The phenomenon in which, anther and stigma grow and mature at same time is called
a) Homogamy b) Syngamy c) Allogamy d) Fusion

248. Emasculation is not required in
a) Unisexual flower b) Bisexual flower c) Dioecious flower d) Both (a) and (c)

249. Testa of a seed is produced from
a) Ovary wall b) Hilum
c) Outer integument of ovule d) Funicle

250. Thalamus contributes in the fruit formation in
a) Apple b) Strawberry c) Cashewnut d) All of these

251. Most oldest viable seed is of
a) Lupine b) *Ficus* c) Date palm d) Phoenix

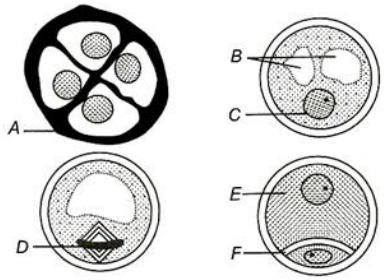
252. Which one of the following was observed for the first time by Trenb?
a) Entry of the pollen tube into the ovule through the micropyle in *ottetia*
b) Entry of the pollen tube into the ovule through the chalaza in *casuarina*
c) Entry of the pollen tube into the ovule through the integuments
d) Formation of many pollen tube into the ovule through the grain in *hibiscus*

253. If male plant have genotypes = S_A S_B and female plant have genotypes = S_C S_B. Then the result would be
a) All of the pollen will germinate
b) All pollen will die
c) Fertilization doesn't occur
d) Half pollen die and half will germinates on stigma

254. Self incompatibility is

a) For incouraging self-fertilisation pollination
b) Genetic method for preventniig self-pollination
c) Both (a) and (d)
d) Found in unisexual flower

255. Identify the structures marked *A* to *F* in the given diagram



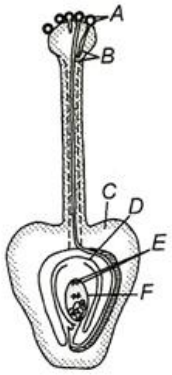
a) A-Asymmetric nucleus, B-Nucleus, C-Generative cell, D-Vegetative cell, E-Pollen, F-Pollen tetrad
b) A- Pollen tetrad , B- Pollen, C-Generative cell, D-Vegetative cell, E-Asymmetric spindle, F-Nucleus
c) A-Pollen tetrad, B-Vacuole, C-Nucleus, D-Asymmetric spindle, E-Vegetative cell, F-Generative cell
d) A-Vacuole, B-Nucleus, C-Pollen tetrad, D-Vegetative cell, E-Asymmetric spindle, F-Generative cell

256. In embryo sac, n, $2n$, $3n$, conditions are found respectively in
a) Egg, antipodal, endosperm
b) Nucleus, endosperm, egg
c) Antipodal, zygote, endosperm
d) Endosperm, nucleus, egg

257. Which one of the following is resistant to enzyme action?
a) Cork
b) Wood fibre
c) Pollen exine
d) Leaf cuticle

258. Pollens are considered as well preserved fossils due to the presence of
a) Exine
b) Intine
c) Mexine
d) Protein

259. Identify *A* to *F* in the following diagram



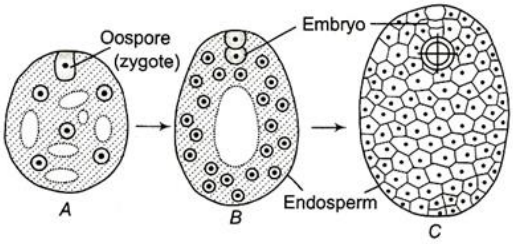
a) A-Pollen tube, B-Ovary, C-Ovule, D-Antipodal cell, E-Pollen grain, F-Secondary nucleus,(polar nuclei)
b) A-Polar nuclei (secondary nucleus), B-Antipodal cell, C-Ovule, D-Ovary, E-Pollen tube, F-Pollen grain
c) A-Pollen grain, B-Pollen tube, C-Ovary, D-Ovule, E-Antipodal cell, F-Secondary Nucleus (polar nuclei)
d) A-Antipodal cell, B-Ovule, C-Ovary, D-Secondary nucleus, E-Pollen grain, F-Pollen tube

260. Double fertilization involves
a) Syngamy and triple fusion
b) Double fertilization
c) Development of antipodal cell
d) None of the above

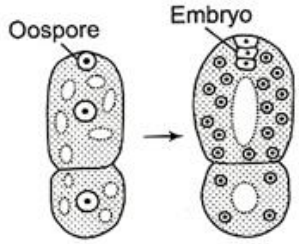
261. Seed germination requires
I. Light II. Temp (suitable
III. Moisture IV. Oxygen
Select correct option
a) I, II and III
b) II, III and IV
c) I, III and IV
d) II, IV and I

262. In which one pair, both the plants can be vegetatively propagated by leaf pieces?
a) *Bryophyllum* and *kalanchoe*
b) *Chrysanthemum* and *Agave*
c) *Agave* and *kalanchoe*
d) *Asparagus* and *Bryophyllum*

263. Larger nucleus in a pollen grain is
a) Tube nucleus b) Sperm nucleus c) Generative nucleus d) None of these
264. Tallest flower is *Amorphophallus*. It is
a) True b) False
c) Sometimes (A) and sometimes (b) d) Neither (a) nor (b)
265. Anthesis is
a) Development of pollen b) Development of anther
c) Opening of flower d) Reception of pollen by stigma
266. Single megasporic development is called
a) Single sporic b) Unisporic c) Monosporic d) Nulleiporic
267. Identify the type of endosperm to given diagram



a) Cellular b) Helobial c) Nuclear d) None of these
268. Consider the following statements and choose the correct option.
I. The genetic constitution of a plant is unaffected in vegetative propagation.
II. Rhizome in ginger serves as an organ of vegetative reproduction.
III. Totipotency of cells enables us to micropropagate plants.
a) Statements I and II alone are true
b) Statements II and III alone are true
c) Statements II alone is true
d) All the three Statements I, II and II are true
269. Micropyle exists in
a) Seed b) Ovule c) Both (a) and (b) d) Fruit only
270. Which one of the following is surrounded by a callose wall?
a) Microspore mother cell b) Male gamete
c) Egg d) Pollen grain
271. In *Amorphophallus* and *Yucca*, the moth lay egg into the
a) Locule of ovary b) On stigma c) Into the fruit wall d) On style
272. Which of the following is incorrect in angiosperm?
a) Pollen grain - Haploid
b) Megaspore - Diploid
c) Synergid - Haploid
d) Endosperm - Triploid
273. Aleurone layer is found in
a) Dicotyledons b) Monocotyledons c) Both (a) and (b) d) None of these
274. Advantage of seed is/are
a) Given variation to upcoming new plants b) Better dispersal
c) Protect embryo d) All of the above
275. Identify the type of endosperm in given diagram

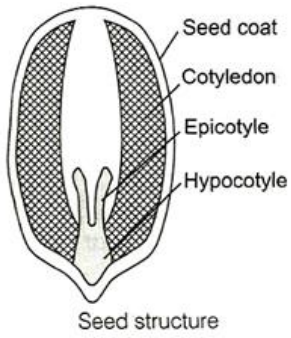


a) Cellular b) Nucleus c) Helobial d) Persist

276. Epicotyle is the upper part of embryonal axis in
a) Monocots b) Dicots c) All plants d) All of these

277. Ruminate endosperm is found in the seeds of family
a) Compositae b) Cruciferae c) Euphorbiaceae d) Annonaceae

278. Find out the type of seed and three embryonal parts out of the four labellings given below



a) Monocot (seed coat, cotyledon, epicotyle) b) Dicot (seed coat, epicotyle, hypocotyle)
c) Monocot (seed coat, hypocotyle, cotylodon) d) Dicot (cotyledon, epicotyle, hypocotyle)

279. The process of embryo formation without fertilization, is known as
a) Apospory b) Apogamy c) Parthenocarpy d) Polyembryony

280. In previous figure find out F and G
a) F-Radicle; G-Root cap b) F-Root cap; G-Coleorhiza
c) F-Epiblema; G-Radicle d) F-Root cap; G-Epiblema

281. Micropyle is useful for the entry of
a) Pollen grain b) Pollen tube c) Water d) Male gamete

282. Cleistogamous flower is found in
a) Tobacco b) Viola c) Mirabilis d) None of these

283. Select the correct order of endosperm types.

a) Cellular, Helobial, Free nuclear b) Cellular, Free nuclear, Helobial
c) Helobial, Free nuclear, Cellular d) Free nuclear, Cellular, Helobial

284. Find out the odd one.
a) Micropyle b) Embryo sac c) Nucellus d) Pollen grain

285. The outermost and inner most wall layers of microporangium in anther are (respectively)
a) Endothecium and tapetum b) Epidermis to endodermis
c) Epidermis to middle layer d) Epidermis and tapetum

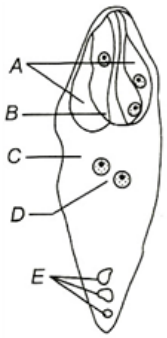
286. Microsporogenesis is
a) Formation of microspores b) Formation of female gametes
c) Formation of tapetum d) All of the above

287. Function of micropyle is

a) Helps in germination
b) Helps in surviving
c) Both (a) and (b)
d) Helps in endosperm formation

288. Bright colouration of flowers is an adaptation for
a) Anemophily
b) Hydrophily
c) Malacophily
d) Entomophily

289. Identify A and E in the diagram given below



a) A-Antipodal, B-2 Polar nuclei, C-Center cell, D-Egg, E-Synergids
b) A- Antipodal, B-Central cell, C-2 Polar nuclei, D-Egg, E-Synergids
c) A-2 Polar nuclei, B-Central cell, C-Antipodal cell, D-Egg, E-Synergids
d) A-Synergids, B-Egg, C-Central cell, D-2 Polar nuclei, E- Antipodal cell

290. If root of flowering plant has 24 chromosomes then its gamete has how many chromosomes?
a) 24
b) 12
c) 4
d) 8

291. If stock contains 58 chromosomes and scion contains 30 chromosomes,
Then how many chromosomes are present in root and egg cell of resultant plant respectively?
a) 30 and 29
b) 15 and 58
c) 58 and 15
d) 29 and 30

292. In previous figure find out scutellum, radicle
a) A and E
b) E and F
c) F and G
d) G and B

293. In some organisms, karyokinesis is not followed by cytokinesis as a result of which, multinucleate condition arises leading to the formation of syncytium. The perfect example for this is
a) Appearance of a furrow in cell membrane
b) Liquid endosperm in coconut
c) Sexual reproduction
d) Fertilization

294. The process of formation of microspore from the microspore mother cell is called megasporogenesis. The above statement is
a) True
b) False
c) Sometimes (a) and sometimes (b)
d) Neither (a) nor (b)

295. From which cells of embryo, plumule is produced?
a) Proembryo
b) Hypophysis
c) Apical octant
d) Micropylar octant

296. Triploid tissue in angiosperms, is
a) Nucellus
b) Endosperm
c) endothelium
d) Tapetum

297. … A… egg cell, …B… zygote, …C… endosperm. Find out the correct ploidy nature of A, B and C
a) $\mathrm{A}-2n, \mathrm{B}-3n, \mathrm{C}-4n$
b) $\mathrm{A}-1n, \mathrm{B}-1n, \mathrm{C}-3n$
c) $\mathrm{A}-1n, \mathrm{B}-2n, \mathrm{C}-3n$
d) $\mathrm{A}-1n, \mathrm{B}-2n, \mathrm{C}-4n$

298. The ovule attached to the placenta of ovary wall by
a) Raphae
b) Micropyle
c) Funicle
d) Hilum

299. Apomixis is the development of
a) Seeds with fertilization
b) Seeds without fertilization
c) Seed from vegetative cells
d) Seeds from reproductive cells

300. The plant part which consists of two generations one within the other, is
a) Germinated pollen grain
b) Embryo
c) Unfertilized ovule
d) Seed

301. Find out right statement (s)
I. Endosperm formation is the prior event than zyote formation

II. Angiospermic endosperm is $3n$
III. Gymnospermic endosperm is n

a) Only I b) II and III c) I and III d) I, II and III

302. Transfer of pollen grains from the anther to the stigma of another flower of the same plants is called
a) Xenogamy b) Geitonogamy c) Karyogamy d) Autogamy

303. After fertilization, the outer integument forms
a) Testa b) Tegmen c) Perisperm d) Pericarp

304. Water pollination
a) Is rare in flowering plant
b) Is limited to 30 genera
c) Takes place mostly in monocotyledons
d) All of the above

305. Plants of which one of the following groups of genera are pollinated by the same agency?
a) *Triticum, mussanda, zea mays* b) Kadam, *cannabis*
c) *Salvia, calotropis* d) *Salvia, pinus, ophrys*

306. Pollens are be stored at which temperature
a) $-196°C$ b) $196°C$ c) $10°C$ d) $0°C$

307. The total number of nuclei involved in double fertilization in angiosperms are
a) Two b) Three c) Four d) Five

308. In a flowering plant, the pollen tube first arrives in
a) Egg b) An antipodal cell c) A synergid d) Central cell

309. Filiform apparatus are
a) Special cellular thickning at antipodal cell
b) Special cellular thickning at micropylar end
c) Special cellular thickning at synergid cells
d) Special cellular thickning at nuclear end

310. What would be the number of chromosomes of the aleurone cell of a plant with 42 chromosomes in its root tip cells?
a) 63 b) 84 c) 21 d) 42

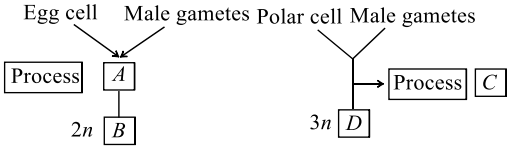
311. Filiform apparatus is a characteristic feature of
a) Egg b) Synergid c) Zygote d) Suspensor

312. An angiospermic leaf carries 16 chromosomes. The number of chromosomes in its endosperm will be
a) 16 b) 24 c) 12 d) 8

313. Embryo developed from the somatic cells are called
a) Cybrids b) Embryoid c) Callus d) Hybrids

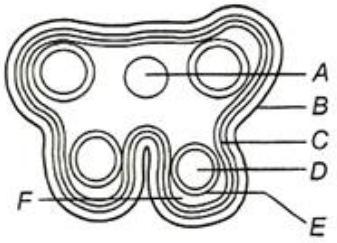
314. Wind pollinated and water pollinated plants
a) Are colourful b) Are non-colourful c) Are small in size d) Produce nector

315. Identify A, B, C and D



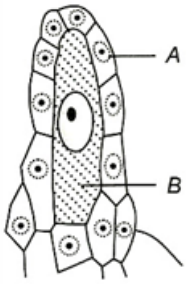
a) A-Syngamy, B-Embryo, C-Triple fusion, D-Endosperm
b) A- Endosperm, B- Syngamy, C- Embryo, D- Triple fusion
c) A- Endosperm, B- Triple fusion, C- Syngamy, D-Embryo
d) A- Endosperm, B- Triple fusion, C- Embryo, D-Syngamy

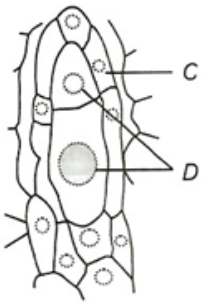
316. Identify A and E in the following diagram



a) A-Epidermis, B-Endodermis, C-Connective tissues, D-Sporogenous tissue, E-Middle layer, F-Tapetum
b) A- Endodermis, B- Connective tissues, C- Epidermis, D- Tapetum, E- Sporogenous tissue, F- Middle layer
c) A- Tapetum, B- Middle layer, C- Sporogenous tissue, D- Connective tissues, E- Endodermis, F- Epidermis
d) A- Connective tissues, B- Epidermis, C-Endothecium, D-Sporogenous tissue, E- Tapetum, F- Middle layer

317. Identify the labelling of given diagrams





a) A-MMC, B-Megaspore dyad, C-Nucellus, D-Nucleus
b) A- Nucellus, B- Megaspore dyad, C- Nucellus, D-MMC
c) A- Nucellus, B-MMC, C- Nucellus, D- Megaspore dyad
d) A-MMC, B- Nucellus, C- Megaspore dyad, D- Nucleus

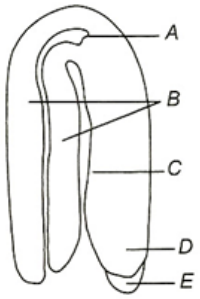
318. The endosperm in angiosperms develops from
a) Zygote
b) Secondary nucleus
c) Chalazal polar nucleus
d) Micropylar polar nucleus

319. 'Cells in the micropylar region are called antipodal cell'
a) True
b) False
c) Sometimes (a) and sometimes (b)
d) Neither (a) nor (b)

320. 'Sporopollenin is made up of organic material'. The above statement is
a) True
b) False
c) Sometimes (a) and sometimes (b)
d) Neither (a) nor (b)

321. Viability of date palm seed is
a) 2000 yr
b) 1000 yr
c) 500 yr
d) 100 yr

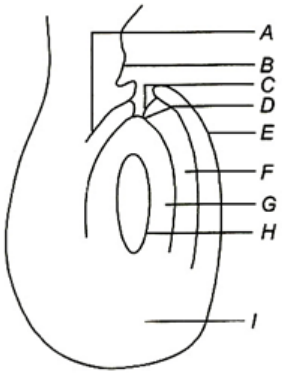
322. Identify the *A* to *E* in following diagram



a) A-Cotyledons, B-Hypocotyle, C-Plumule, D-Root cap, E-Radicle
b) A- Radicle, B- Root cap, C- Plumule, D- Hypocotyle, E- Cotyledons
c) A- Hypocotyle, B- Cotyledons, C- Plumule, D- Radicle, E- Root cap
d) A- Plumule, B- Cotyledons, C- Hypocotyle, D- Radicle, E- Root cap

323. Coleorhiza is
a) Lower end of embryonal axis in monocot
b) Lower end of embryonal axis in dicots
c) Lower end of embryonal axis in potato family
d) Lower end of embryonal axis in monocot

324. Identify *A* to *H* in the given diagram



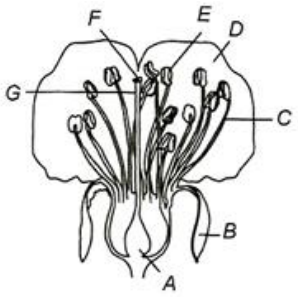
a) A-Chalazal end, B-Embryo sac, C-Nucellus, D-Inner integuments, E-Outer integuments, F-Micropylar pole, G-Micropyle, H-Funicle, I-Hilum
b) A- Inner integuments, B- Nucellus, C-Embryo sac, D- Chalazal end, E- Hilum, F- Funicle, G- Micropyle, H- Micropylor end, I- Outer integuments
c) A- Hilum, B- Funicle, C- Micropyle, D- Micropylar pole, E- Outer integuments, F- Inner integuments, G- Nucellus, H- Embryo sac, I- Chalazal pole
d) A- Micropylar end, B- Micropyle, C- Funicle, D- Hilum, E- Outer integuments, F- Inner integuments, G- Nucellus, H- Embryo sac, I- Chalazal end

325. Sugarcane is cultivated through
a) Stem cutting b) Root cutting c) True seed d) Adventitious roots

326. 'Sporopollenin is absent at the germpore'. The above statement is
a) True b) False
c) Sometimes (a) and sometimes (b) d) Neither (a) nor (b)

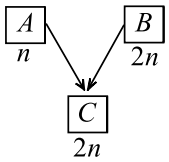
327. Why seed dormancy takes place?
a) Due to favourable conditions b) Due to unfavourable conditions
c) Due to embryonic conditions d) Due to specific endosperm conditions

328. Identify *A* to *G* in following figure and answer accordingly



a) A-Ovary, B-Filament, C-Sepal, D-Petal, E-Style, F-Stigma, G-Anther
b) A-Petal, B-Ovary, C-Petal, D-Filament, E-Anther, F-Stigma, G-Style
c) A-Ovary, B- Sepal, C- Filament, D- Petal, E-Anther, F-Stigma, G-Style
d) A- Petal, B- Anther, C- Stigma, D- Style, E- Filament, F- Sepal, G- Ovary

329. Find out *A*, *B* and *C* in the flow chart given below



a) A-Female gamete, B-Male gamete, C-Embryo
b) A- Male gamete, B- Female gamete, C-Embryo
c) A- Female gamete, B- Male gamete, C- Embryo
d) A- Male gamete, B- Embryo, C-Female gamete

330. One of the most resistant known biological material is
a) Lignin b) Hemicellulose c) sporopollenin d) Lignocellulose

331. It is process of embryo sac formation from cell of nucellus, without undergoing meiosis.
a) Polyembryony b) incompatibility c) Parthenocarpy d) Parthenogenesis

332. Study the following statements and choose the correct option.
I – Tapetum nourishes the developing pollen grains.
II- Hilum represents the junction between ovule and funicle
III– In aquatic plants such as water hyacinth and water lily, pollination is by water.
IV- The primary endosperm nucleus is tripoid.
a) I and II are correct but III and IV are incorrect
b) I, II and IV are correct but III is incorrect
c) II, III and IV are correct but I is incorrect
d) I and IV are correct but II and III are incorrect

333. Mass of cells enclosed by integuments is called
a) Nucellus b) Embryo c) Ova d) Pollen

334. Which of the following statements about sporopollenin is false?
a) Exine is made up of sporopollenin
b) Sporopollenin is one of the resistant organic materials
c) Exine has apertures called germ pores where sporopollenin is present
d) Sporopollenin can withstand high temperatures and strong acids

335. Genotype of endosperm is ZZA, find out the genotype of male and female plant respectively
a) ZZ, AA b) ZA, ZA c) AA, ZZ d) ZAA, ZZA

336. An ovule which becomes curved so that the nucellus and embryo sac lie at right angles to the funicle is
a) Hemitropous b) Campylotropous c) Anatropous d) Orthotropous

337. Polar nuclei are located in
a) Embryo sac b) Thalamus c) Pollen tube d) Ovule

338. A typical angiosperm anther is
a) Bilobed b) Dithecous c) Both (a) and (b) d) Monothecous

339. Study the following pairs.

I. Modified aerial stem	- Unisexual flowers Develop Acropetally	- Chalazal entry of pollen tube

II. Flowers achlamydeous	- Pedicels of all the flowers are of same Length	- Presence of false whorl
III. Cohesion of Bracts forming a cup	- Centrifugal opening of flowers	- Male flowers many
IV. flower Formation on One side in a Spiral manner	- Presence of rachilla	- terminal part of the peduncle is flowerless

Select the correct pair of answers in which the former represents the set of characters present in *poinsettia* and the latter in the pair represents the set of characters present in *casuarina.*

a) II and III b) I and II c) IV and III d) III and I

340. Identify the type of ovary in diagram

a) Monocarpellary syncarpous b) Monocarpellary apocarpous
c) Multicarpellary syncarpous d) Multicarpellary apocarpous

341. Wind pollination is common in grassess. This statement is
a) True b) False
c) Sometimes (a) and sometimes (b) d) Neither (a) nor (b)

342. Study the following and find correct option
I. Tapetum nurishes the developing pollen grain
II. Hilum represents the junction between ovule and funicle
III. In aquatic plants such as water hyacinth and lilly pollination is by water
IV. The primary endosperm nucleus is triploid
a) I and II b) I, II and IV c) II, III and IV d) II and IV

343. Apogamy is
a) Reproduction of virus b) Failure of fusion of gametes
c) Development of bacteria d) Loss of function of reproduction

344. Number of microsporangia in an angiospermic anther is
a) 1 b) 2 c) 3 d) 4

345. Which of the following statement is/are true
I. Endothecium lies behind epidermis
II. Fusion of egg with male gamete is called apogamy.
III. Synergids are haploid
IV. The point at which funicle touches the ovule is raphe.
a) II and IV only b) I and II only c) I and IV only d) I and III only

346. Egg apparatus of angiosperms consist of
a) One synergid and two egg cells
b) Two synergids and one egg cell
c) One central cell, two synergids and three antipodal cells

d) One egg cell, two polar nuclei and three antipodal cells

347. Pollen tube enters through
a) Filiform apparatus b) Synergid cells c) Antipodal cells d) Chalazal cells

348. Aquatic plant like water-hyacinth and water lily are pollinated by
a) Water b) Air c) Insect d) Both (b) and (c)

349. In the given diagram of pistil in which part fertilization takes place

a) D b) C c) B d) A

350. Function of tapetum is to provide
a) Protection b) Nutrition c) Respiration d) All of these

351. Root has 42 chromosome then find out the chromosomal number of synergid
a) 7 b) 14 c) 21 d) 28

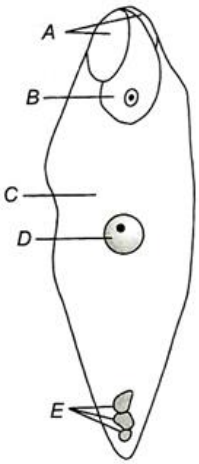
352. In nature, cleistogamous flowers are
a) Self-pollinated b) insect-pollinated c) Wind-pollinated d) Bird-pollinated

353. Among the sets of terms given below, identify those that are associated with gynoecium
a) Pistil, style, ovule, pollens b) Ovule, ovary, tepatum, embryo sac
c) Egg, embryo sac, nucellus, pollens d) Stigma, ovule, embryo sac, placenta

354. The nutritive layer of microsporangia of cypsella
a) Endothecium b) Exothecium c) Sporogenous tissue d) Tapetum

355. A longitudinal groove runs lengthwise separating the theca. This groove is called line of dehiscence. The above sentence is
a) True b) False
c) Sometimes (a) and sometimes (b) d) Neither (a) nor (b)

356. In the given embryo sac identify *A* to *E*



a) A-Degeneration antipodal cell, B-Primary endosperm nucleus, C-Primary endosperm cell, D-Synergid cell, E-Zygote
b) A- Synergid cell, B- Antipodal cell, C- Zygote, D- Endosperm cell, E-Chalazal cell

c) A-Degenerating Synergids, B- Zygote, C-Primary endosperm cell, D-Primary endosperm nucleus, E-Degenerating antipodal cell

d) A- Zygote, B-Synergid, C-Primary endospermal cell, D-Primary endospermal nucleus, E-Degenerating antipodal cell

357. For good growth of pollen tube, necessary element is

a) Ca b) B c) Mg d) Mo

358. In the angiosperm ovule, central cell of the embryo sac, prior to the entry of pollen tube, contains

a) A single haploid nucleus
b) One diploid and one haploid nuclei
c) Two haploid polar nuclei
d) One diploid secondary nucleus

359. Anemophily is pollination by

a) Wind b) Air c) Insects d) Birds

360. Polyembryony is reported in

I. Citrus
II. Mango
III. *Gossypium*

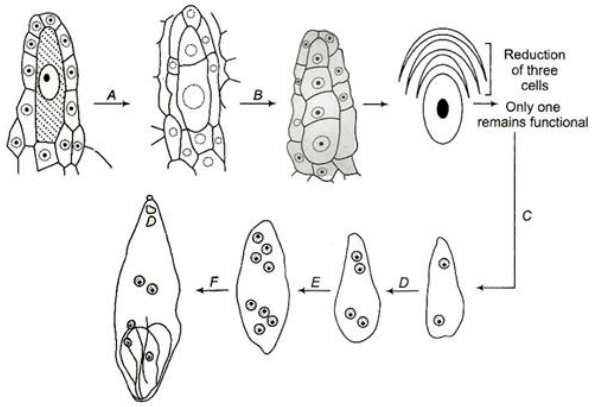
Correct name are

a) I and III b) II and III c) I, II and III d) I and II

361. Polyembryony is a type of

a) Apomixis b) Fertilization c) Fusion d) Embryogenesis

362. Identify *A* to *F* in diagram given below



a) A-Mitosis, B-Meiosis-I, C-Meiosis II, D-Mitosis, E-Meiosis, F-Meiosis
b) A-Meiosis-I, B-Meiosis-II, C-Mitosis, D-Mitosis, E-Mitosis, F-Embryo
c) A-Embryo, B-Meiosis-I, C-Meiosis-II, D-Mitosis, E-Mitosis, F-Mitosis
d) A-Mitosis, B-Mitosis, C-Mitosis, D-Meiosis, E-Meiosis, F-Meiosis

363. Viability of lupine seed is

a) 10000 yr b) 5000 yr c) 2000 yr d) 1000 yr

364. Perisprem is

a) Remnents of nucellus
b) Remnents of embryo
c) Remnents of endosperm
d) None of these

365. Which of the following statement is true with reference to cross pollination in angiosperms?

a) It requires the production of a large number of pollen grains
b) It can fail to occur due to distance barrier
c) It occurs only in unisexual flowers
d) It most often results in high yield of plants

366. In which one of the following pollination is autogamous?

a) Xenogamy b) Chasmogamy c) Cleistogamy d) Geitonogamy

367. In an angiosperm, male plant is diploid and female plant is tetraploid then endosperm will be

a) Haploid b) Triploid c) Tetraploid d) Pentaploid

368. Through which cell of the embryo sac, does the pollen tube enter the embryo sac?

a) Egg cell
b) Central cell

c) Persistant synergid d) Degenerated synergid

369. Milky water of tender coconut is
a) Liquid gametes b) Liquid nucellus
c) Liquid female gametophyte d) Liquid endosperm

370. The ovule in which the funicle, chalaza and micropyle lie in one vertical plane, is called
a) Campylotropous b) Amphitropous c) Orthotropous d) Anatropous

371. Pericarp is formed of
a) Endosperm b) Ovary wall c) Tapetum d) Epidermis

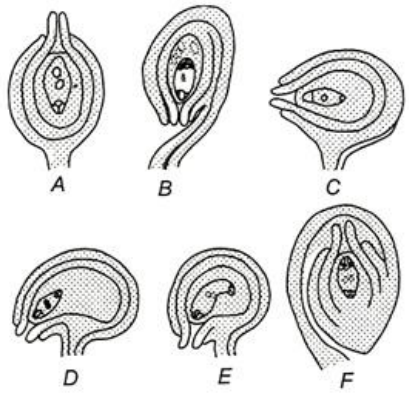
372. Which of the following is pollinated by water?
a) *Viola* b) *Yucca* c) *Oxalis* d) *Commelina*

373. Ubisch bodies are secreted by
a) Tapetum b) Exine
c) Microspore mother cells d) Endothecium

374. Which of the following parts in angiosperms are diploid and triploid, respectively?
a) Secondary nucleus and endosperm b) Microspore mother cell and egg cell
c) Polar nucleus and secondary nucleus d) Endosperm and antipodal cells

375. Which type of pollen grains are found in insect pollinated flowers?
a) Hygroscopic b) Light and sticky c) Light and rough d) Heavy and coloured

376. Identify different ovules of diagrams *A* to *F*



a) A-Circinotropous, B-Amphitropous, C-Camplyotropous, D-Hemitropous, E-Anatropous, F-Orthotropous
b) A- Camplyotropous,B- Anatropopous, C- Hemitropous, D- Amphitropous, E- Circinotropous,F-Orthotropous
c) A- Orthotropous, B- Anatropous, C- Hemitropous, D- Camplyotropous, E- Amphitropous, F-Circinotropous
d) A- Camplyotropous, B- Anatropous, C- Hemitropous, D- Amphitropous, E- Orthotropous, F-Circinotropous

377. Male gamete in angiosperm is produced by
a) Generative cell b) Microspore cell c) Vegetative cell d) Tube cell

378. Synergids are
a) Haploid b) Diploid c) Triploid d) Tetraploid

379. Exine of pollen grain is made up of
a) Pectocellulose b) Lignocellulose c) Sporopollenin d) Pollen kit

380. The process of formation of microspores
I. From pollen mother cell through …A… formed …B…
II. Microspore are arranged in …C…
III. Microspore changes into the …D…
A to D in the above statements are
a) A-Pollen grains, B-Microspore tetrad, C-Microsporogenesis, D-Meiosis
b) A- Microspore tetrad, B- Microsporogenesis, C-Meiosis, D- Pollen grains
c) A- Microsporogenesis, B- Microspore tetrad, C- Pollen grains, D- Meiosis

d) A- Meiosis, B- Microsporo, C- Microspore tetrad, D- Pollen grains

381. Viability of pollen grains depends on
a) Temperature b) Humidity c) Both (a) and (b) d) Pressure

382. 60% of the angiosperms shed their pollens at the
a) 2-celled stage b) 3-celled stage c) 4-celled stage d) 1-celled stage

383. The inner most layer of microsporangium is
a) Tapetum b) Endothecium c) Middle layer d) Epidermis

384. Male gametophyte of angiosperms is reduced to
a) One cell b) Two cells c) Three cells d) Four cells

385. Long , ribbon-like pollen grains are seen in some
a) Aquatic plants b) Wind-pollinated grasses
c) Gymnosperms d) Bird-pollinated flowers

NEET BIOLOGY

SEXUAL REPRODUCTION IN FLOWERING PLANTS

: ANSWER KEY :

1)	c	2)	d	3)	c	4)	c	165)	a	166)	a	167)	d	168)	d
5)	c	6)	a	7)	c	8)	a	169)	a	170)	d	171)	a	172)	b
9)	c	10)	b	11)	c	12)	b	173)	a	174)	a	175)	d	176)	a
13)	c	14)	a	15)	d	16)	d	177)	c	178)	b	179)	b	180)	d
17)	c	18)	b	19)	d	20)	c	181)	a	182)	c	183)	c	184)	b
21)	a	22)	b	23)	c	24)	d	185)	d	186)	d	187)	d	188)	b
25)	d	26)	c	27)	d	28)	b	189)	b	190)	c	191)	c	192)	b
29)	d	30)	c	31)	b	32)	c	193)	c	194)	a	195)	b	196)	c
33)	a	34)	b	35)	d	36)	d	197)	d	198)	d	199)	a	200)	a
37)	c	38)	a	39)	d	40)	a	201)	a	202)	a	203)	d	204)	a
41)	a	42)	a	43)	a	44)	a	205)	a	206)	a	207)	a	208)	d
45)	b	46)	b	47)	d	48)	a	209)	a	210)	b	211)	a	212)	c
49)	b	50)	a	51)	b	52)	c	213)	c	214)	a	215)	c	216)	a
53)	b	54)	a	55)	a	56)	a	217)	c	218)	d	219)	c	220)	d
57)	a	58)	a	59)	b	60)	a	221)	b	222)	d	223)	c	224)	c
61)	d	62)	a	63)	a	64)	c	225)	b	226)	b	227)	d	228)	c
65)	a	66)	d	67)	c	68)	d	229)	b	230)	a	231)	c	232)	c
69)	a	70)	c	71)	d	72)	b	233)	d	234)	a	235)	c	236)	a
73)	d	74)	b	75)	d	76)	d	237)	c	238)	c	239)	a	240)	c
77)	a	78)	c	79)	d	80)	a	241)	b	242)	b	243)	b	244)	c
81)	a	82)	c	83)	a	84)	b	245)	d	246)	d	247)	a	248)	d
85)	d	86)	b	87)	c	88)	d	249)	c	250)	d	251)	a	252)	b
89)	c	90)	d	91)	a	92)	d	253)	d	254)	b	255)	c	256)	c
93)	b	94)	c	95)	c	96)	d	257)	c	258)	a	259)	c	260)	a
97)	c	98)	b	99)	c	100)	a	261)	b	262)	a	263)	a	264)	a
101)	b	102)	b	103)	b	104)	d	265)	c	266)	c	267)	c	268)	d
105)	d	106)	d	107)	a	108)	b	269)	c	270)	a	271)	a	272)	b
109)	b	110)	c	111)	d	112)	b	273)	b	274)	d	275)	c	276)	b
113)	c	114)	d	115)	c	116)	a	277)	d	278)	d	279)	b	280)	b
117)	a	118)	d	119)	b	120)	a	281)	b	282)	b	283)	c	284)	d
121)	a	122)	d	123)	b	124)	b	285)	d	286)	a	287)	c	288)	d
125)	d	126)	d	127)	d	128)	c	289)	d	290)	b	291)	c	292)	a
129)	c	130)	a	131)	d	132)	c	293)	b	294)	b	295)	c	296)	b
133)	d	134)	d	135)	a	136)	b	297)	c	298)	c	299)	b	300)	d
137)	a	138)	a	139)	c	140)	a	301)	a	302)	b	303)	a	304)	d
141)	b	142)	a	143)	b	144)	c	305)	c	306)	a	307)	d	308)	c
145)	d	146)	a	147)	d	148)	d	309)	c	310)	a	311)	b	312)	b
149)	d	150)	d	151)	b	152)	d	313)	b	314)	b	315)	a	316)	d
153)	b	154)	a	155)	b	156)	a	317)	a	318)	b	319)	b	320)	a
157)	a	158)	a	159)	c	160)	d	321)	a	322)	d	323)	a	324)	a
161)	c	162)	c	163)	d	164)	b	325)	a	326)	a	327)	c	328)	c

329)	**b**	**330)**	**c**	**331)**	**d**	**332)**	**b**	**361)**	**d**	**362)**	**d**	**363)**	**a**	**364)**	**a**
333)	**a**	**334)**	**c**	**335)**	**c**	**336)**	**a**	**365)**	**a**	**366)**	**c**	**367)**	**d**	**368)**	**d**
337)	**a**	**338)**	**c**	**339)**	**d**	**340)**	**d**	**369)**	**d**	**370)**	**c**	**371)**	**b**	**372)**	**a**
341)	**a**	**342)**	**b**	**343)**	**b**	**344)**	**d**	**373)**	**a**	**374)**	**a**	**375)**	**b**	**376)**	**c**
345)	**d**	**346)**	**b**	**347)**	**b**	**348)**	**c**	**377)**	**a**	**378)**	**a**	**379)**	**c**	**380)**	**d**
349)	**b**	**350)**	**b**	**351)**	**c**	**352)**	**a**	**381)**	**c**	**382)**	**a**	**383)**	**a**	**384)**	**c**
353)	**d**	**354)**	**d**	**355)**	**a**	**356)**	**c**	**385)**	**a**						
357)	**b**	**358)**	**c**	**359)**	**a**	**360)**	**c**								

NEET BIOLOGY

SEXUAL REPRODUCTION IN FLOWERING PLANTS

: HINTS AND SOLUTIONS :

1 **(c)**
Fruit developed from unfertilized ovary.
In most of the species fruits are results of fertilization. There are few species in which fruits develop without fertilization. Such fruit are called parthenocarpic fruits. Banana is one such example. Parthenocarpy can be induced through application of growth hormones and such fruit are seed less

2 **(d)**
Seeds carry two generations first their parent genes and second its upcoming plant gene. That's why it is called plant part having two generation. Seed is the ripened ovule

3 **(c)**
In most of the species fruits are results of fertilization. There are few species in which fruits develop without fertilization. Such fruit are called parthenocarpic fruits. Banana is one such example. Parthenocarpy can be induced through application of growth hormones and such fruit are seed less

4 **(c)**
The chromosome number in gamete (*n*) of *Ophioglossum* (a tern) is 630, of rice is 12, of potato is 24, and of man is 23

5 **(c)**
Double fertilization is the fusion of one male gamete with the egg cell (real fertilization) and another male gamete with the secondary nucleus, which resulted into triploid endosperm. Double fertilization found only in angiosperms and discovered by **Nawaschin** in 1898.

6 **(a)**
Sometimes the nucellus does not completely consumed so it persist. It is found in many plant like black pepper and beet. This nucellus is called perisperm

7 **(c)**
Tuber is oval or spherical swollen underground modified stems lacking adventitious roots. It possesses a number of spirally arranged depressions called eyes. Each eye represents node and consists of 1-3 axillary buds in the axils of small scally leaves.

8 **(a)**
In most of the species fruits are results of fertilization. There are few species in which fruits develop without fertilization. Such fruit are called parthenocarpic fruits. Banana is one such example. Parthenocarpy can be induced through application of growth hormones and such fruit are seed less

9 **(c)**
Pollen grain are generally 25-50 µm in diameter.
Pollen grains have two main layers
(i) **Outer Layer** It is also called **exine**. It is made up of **sporopollenin.** It is hard and protective in nature. Due to sporopollenin pollen can with stand extreme temperatures.
(ii) **Inner layer** It is also called **intine.** It is made up of cellulose and pectin. It is very thin as compared to the outer layer

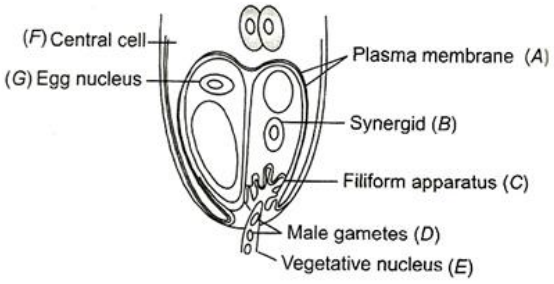
10 **(b)**
In angiosperms (dicots), the *Polygonum* type of embryo sac is most common. In this emryo sac, the arrangement of the nuclei is 3 + 2 + 3 , *ie,* 3 in antipodals cells, 2 as polar nuclei (which later fuse and form a diploid secondary nucleus); and 3 in egg apparatus (2 in synergids and 1 in egg cell).

11 **(c)**
Pericarp is wall of ovary which develops later into wall of fruit

12 **(b)**
Tapetum is the innermost layer of the wall of pollen sac. Tapetum cells are **nutritive** in function.

13 **(c)**
After entering the ovule the pollen tube is attracted toward the micropylar end. The attractant is secreted by filiform apparatus. The pollen tube pierce one of the two synergid and releases its gametes. Out of the two male gametes

one fuses with egg to perform generative fertilization (syngamy)
It gives rise to the diploid zygote. The nucleus of the second male gametes fuses with the two haploid polar nuclei to form triploid endosperm nucleus. This second fertilization is called vegetative fertilization



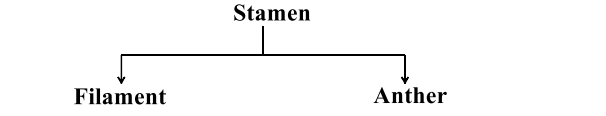
Egg apparatus showing entry of pollen tube into a synergid

14 **(a)**
The movement of pollen tube towards embryo sac is **chemotropism** as it occurs in response to certain chemical substances like auxin and carbohydrates.

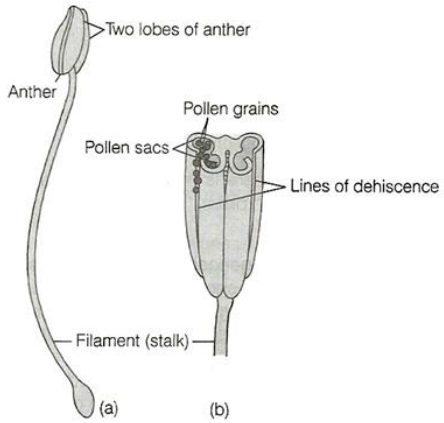
15 **(d)**
Pollen wall comprises of two principal layers the inner intine and outer exine. The intine is pectocettulosic in nature. A special feature of intine is the presence of beads, ribbons or plates of enzymatic proteins particularly in vicinity of germ pores. The exine is composed of sporopollenin which is derived from carotenoids by oxidative polymerization. It is resistant to physical and biological decomposition. Due to this, pollen walls are often preserved for long periods in fossil deposits.

16 **(d)**
Triple fusion in angiosperm is the fusion of second sperm with two polar nuclei or the secondary nucleus which results in the formation of a triploid **Primary Endosperm Nucleus** (PEN).

17 **(c)**



(i) A typical angiospermic anther is a bilobed structure having two theca at each lobe
(ii) It is tetragonal in shape with 4 microsporangia located at each lobe in its corners
(iii) Microsporangia develop into pollen sac, which produces pollen



(a) A typical stamen
(b) Three-dimensional cut section of an anther

18 **(b)**
Microspore tetrad.
Microsporogenesis During developmental phase of anther the cells of sporogenous tissue undergoes meiotic division to form microspore tetrad. The process of formation of microspore from pollen mother cell is called microsporogenesis. The microspores are formed and arranged in a group of four cells called microspore tetrad. Microspore develops into the pollen grain and represents the male gametophyte

19 **(d)**
Majority of insect pollinated flower are large, colourful, fragrant and rich in nectar in order to attract the insects for pollination

20 **(c)**
The term **amphimixis** is used in the sense of a true sexual reproduction. It involves the fusion of male and female pronuclei of the gametes and the formation of a zygote.

21 **(a)**
Diagram is showing compact infloresence and well exposed stamens. These are the characters of wind pollinated plant

22 **(b)**
In grafting technique, two parts of two related plants are joined, so as to form a **composite plant**
The quality of fruits is determined by the scion (shoot part).

23 **(c)**
When pollen grains of one flower are transferred to the stigma of another flower belonging to either the same plant or genetically similar plant, it is referred to as **geitonogamy**.

24 **(d)**
Ovary and other floral part makes fruit.

In most of the plants the fruit develops from the ovary (true fruits) and other floral part degenerate and fall off. However in a few species such as apple, strawberry, cashew, etc., the thalamus also contributes to fruit formation such fruits are called false fruit

The transformation of part of flower

Before Fertilisation		After Fertilisation
Calyx, corolla	-	Wither
Androecium, style and stigma	-	Fruit
Ovary		
Ovary wall	-	Pericarp
Ovule	-	Seed
Integuments	-	Seed coat
Outer integuments	-	Testa
Inner integuments	-	Tegaman
Micropyle	-	Micropyle
Funicle	-	Stalk of seed
Nucellus (if persistant)	-	Perisperm
Egg cell	-	Zygote (oospore)
Synergid	-	Disintegrate

25 **(d)**

Both (a) and (c)

Filiform apparatus are the special thickening of synergid cells for guiding the pollen tube and male gametes, so that the fusion takes place property

26 **(c)**

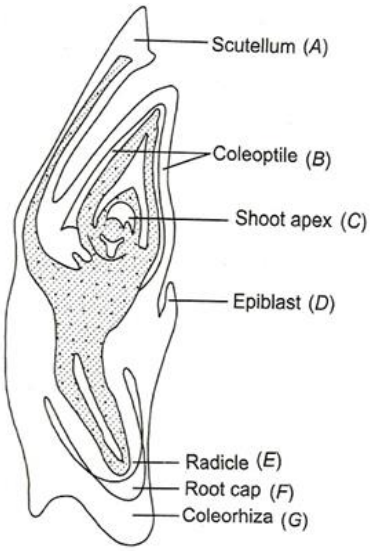
Double fertilization is the fusion of one male gamete with female gamete (syngamy) and other male gamete with diploid secondary nucleus (triple fusion), *i. e.*, double fertilization=syngamy + triple fusion.

Double fertilization is characteristic feature of angiosperms. It does not take place in algae, bryophytes, pteridophytes and most gymnosperms.

27 **(d)**

Embryos of monocotyledons possess only one cotyledon. In the grass family the cotyledon is called scutellum that is situated toward the one side (lateral) of the embryonal axis. At its lower end, the embryonal axis has the radical and root cap enclosed in an undifferentiated sheath called coleorhiza.

The portion of the embryonal axis above the level of attachment of scutellum is epicotyl. Epicotyl has a shoot apex and few leaf primordial enclosed in hallow structure the coleoptile



LS of an embryo of grass

28 **(b)**

Sporopollenin is biologically most resistant organic material (fatty substance) found in the exine (outer wall) of spores and pollen grains. It consists of complex polymers with an emperical formula ($C_{90}H_{142}O_{36}$), formed by oxidative polymerization of carotenoids and their esters.

29 **(d)**

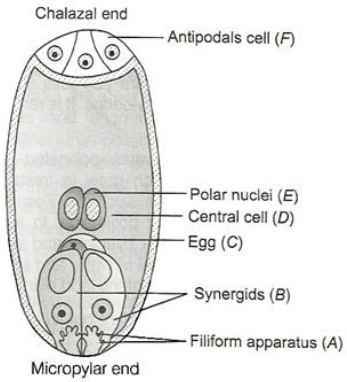
Cross pollination is the transfer of pollen grains of a male flower to the stigma of female flower, which occurs either on the same plant (monoecious) or on the different plant (dioecious).

30 **(c)**

Female gametophyte is 7-celled and 8-nucleus structure due to joining of two polar cells.

Six out of the eight nuclei are surrounded by cell walls and organized into cells (egg cells and antipodal cells) and remaining two nuclei called polar nuclei are situated below the egg apparatus in large central cell. Thus, a typical angiospermic embryo sac at maturity is 8-nucleate and 7-celled.

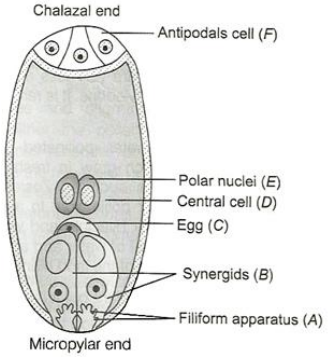
Mature embryo sac



A diagrammatic representation of the mature embryo sac

31 **(b)**
The outer integument of ovule develops into **testa**. The inner integument of ovule develops into **tegmen**.

32 **(c)**
Central cell.
Six out of the eight nuclei are surrounded by cell walls and organized into cells (egg cells and antipodal cells) and remaining two nuclei called polar nuclei are situated below the egg apparatus in large central cell. Thus, a typical angiospermic embryo sac at maturity is 8-nucleate and 7-celled.
Mature embryo sac



A diagrammatic representation of the mature embryo sac

33 **(a)**
8 nuclei are found in one embryo sac so it is monosporic

34 **(b)**
Pollen grains.
Microsporogenesis During developmental phase of anther the cells of sporogenous tissue undergoes meiotic division to form microspore tetrad. The process of formation of microspore from pollen mother cell is called microsporogenesis. The microspores are formed and arranged in a group of four cells called microspore tetrad. Microspore develops into the pollen grain and represents the male gametophyte
Microspore mother cell and pollen mother cell are the same term and form male gametes (pollens) by the process called microsporogenesis

35 **(d)**
A-Stigma - Landing ground for pollen grains
B-Style - Passage for pollen tube
C-Ovary - Embryos sac/fruit
D-Ovules – Formation of seed
E-Thalamus – Receptakle for ovary

36 **(d)**
The *Polygonum* type of ovule, the functional haploid megaspore enlarges in size and by means of **three** successive mitotic divisions, gives rise to an eight-nucleate embryo sac.

37 **(c)**
Cross Pollination is the transfer of pollen grains from the anther of one flower to the stigma of genetically different flower, it requires various external agents.
Zoophily It is a pollination performed by animals. Sticky pollens or hooked, barbed(hairy) pollens gets attached to fur or body of animals.

Ornithophily pollination brought about by the agency of bird (*e.g.,* long beaked humming bird, crow, parrot, etc) Ornithophilous flowers are large more nectar and edible part, *e.g., Bombax, Agave, Callistemon, Erythrina.*

Entomophily It is a pollination performed by the insects. Most common type of pollination performed by the insects. Most common type of pollination, such flowers are brightly coloured, aromatic with sticky stigmas and pollen kit, *e.g.,* jasmine, *Adhatoda, Magnolia,* etc.

Cheriopterophily An allogamous pollination brought about by the agency of bats. The flowers produce strong aroma, much nectar, *e*. *g*, *Adansonia*, *Anthocephalus* (Kadam), etc.

38 **(a)**
In adventive embryony, embryos develop directly from the **nucellus** or **integuments**.

39 **(d)**
A –Exine
B – Intine
C – Vegetative cell
D- Germ pore
E – Generative cell

40 **(a)**

Two or three celled stage of male gametes are formed by the mitotic cell division and in mitosis the genetic make up remains identical. That is why generative cell and vegetative cell in male gametes are identical in genetic make up

41 **(a)**

In apomixes there is no fertilization so, the time consuming is less as compared to plants which reproduces by sexual method. Hence, it is the rapid mode of reproduction in plants

42 **(a)**

Endosperm may either be completely consumed by the developing embryo ($e.g.$, pea, ground nut, beans) before seed maturation or it may persist in mature seed ($e.g.$, castor and coconut) and may be used up during seed germination. The first condition is called endospermic, while second condition is called non-endospermic

43 **(a)**

In haploids, recessive mutations express immediately.

44 **(a)**

A – Male gamete; B- Antipodal cells; C – Egg cell; D-Pollen tube.

In angiosperms, the pollen tube carries two male gametes, one fuses with egg to produce zygote, while second fuses with secondary nucleus to produce triploid primary endosperm nucleus.

45 **(b)**

After the meiosis-I and II megaspore tetrad is formed three out of four cells died from it only one remain functioning called functional megaspore and in that three mitotic division give rise to 8 called stage

46 **(b)**

Two polar nuclei one egg cell (total 3 nuclei)

47 **(d)**

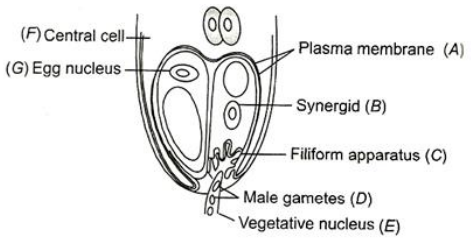
It is very essential for seed existence because through this pore the water goes inside and germination takes place and gaseous exchange take place through that pores

48 **(a)**

Primary endosperm cell ($3n$) formed by fusion of male and polar nuclei.

After entering the ovule the pollen tube is attracted toward the micropylar end. The attractant is secreted by filiform apparatus. The pollen tube pierce one of the two synergid and releases its gametes. Out of the two male gametes one fuses with egg to perform generative fertilization (syngamy)

It gives rise to the diploid zygote. The nucleus of the second male gametes fuses with the two haploid polar nuclei to form triploid endosperm nucleus. This second fertilization is called vegetative fertilization



Egg apparatus showing entry of pollen tube into a synergid

49 **(b)**

Generally, there are two integuments (bitegmic), but sometimes one integuments also found (unitegmic) in the ovule. They protect the ovule from external injuries

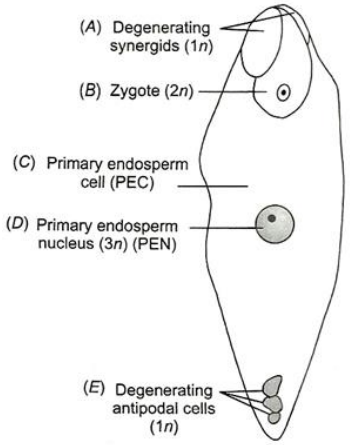
50 **(a)**

During microsporogenesis, the sporogeneous cells may directly acts as microspore mother cells or pollen mother cells or PMCs. Each PMC, by a meiotic division, gives rise to a group of four haploid microspores, which are combinedly referred to as microspore tetrad.

The first mitotic division in a pollen grain or microspore results into two unequal cels. The large is the vegetative cell, which eventually forms the pollen tube. The smaller one is the generative cells which produce the male gametophyte by another mitosis.

51 **(b)**

$n, 2n, 3n, n.$

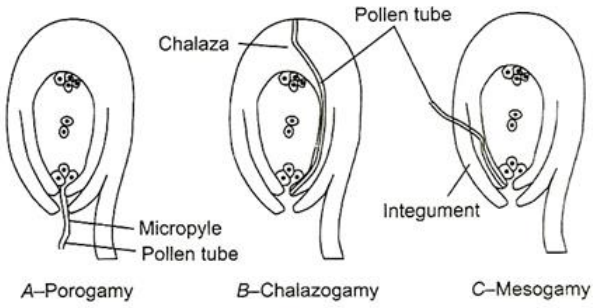


Fertilised embryo sac showing zygote and Primary Endosperm Nucleus (PEN)

52 **(c)**

Modes of entity of pollen tube

(i) **Porogamy** Entry of pollen tube takes place through micropylar end *e*. *g*., Lily
(ii) **Chalazogamy** Entry of pollen tube takes place through the chalazal end, *e*. *g*., *Causarina, Juglans*
(iii) **Mesogamy** Entry of pollen tube takes place through the integuments *e*. *g*.,*Cucurbita, Populus*



53 **(b)**
I- Suspensor, II- Radicle, III- Cotyledon

54 **(a)**
Majority of plants use biotic agents for pollination because that reduce the chances of wasting pollens

55 **(a)**
Water pollination in *Vallisnaria* (tape grass). In water pollinated plants the water is the carrier of pollen. Water does the same work as air in the air pollinated flowers both produces large amount of male gametes

56 **(a)**
Calyx Accessory part of the flower. The individual leaf of calyx is called **sepal**. They may be green or variously coloured.
Function protection of flower

57 **(a)**
Pollination is a process of transfer of pollen grains from an anther to the stigma of the same flower or of different flower. Pollination may be **self pollination** (or **autogamy**), *i*. *e*, (transfer of pollen grains from anther to the stigma of same flower) or **cross pollination** (or **allogamy**), *i*. *e*., transfer of pollen grains to the stigma of different flower.
Some agencies used in cross pollination are:
1.Insects (Entomophily)

2.Wind (Anemophily)

3.Water (Hydrophily)

4.Birds (Ornithophily)

5.Bats (Cheitropterophily).

58 **(a)**
Sexual reproduction includes syngamy and meiosis. Syngamy is the nuclear fusion of male and female gamete. The meiosis is reduction of chromosome number to haploid during meiosis. **Genetic recombination** occurred as a result of crossing over.

59 **(b)**
The flowers which never open or which never expose their sex organs to environment are called **cleistogamous** flowers and this phenomenon is called cleistogamy.

60 **(a)**
Fruit and seed generally develops simultaneously. From ovary and ovules respectively

61 **(d)**
Wind pollens are non-sticky, light so that they can go far away and are produced in large numbers, because there is a lot of wastage of pollens

62 **(a)**
Chasmogamy is the type of autofertilisation (self-fertilisation) in which both male and female gametes present on same flower but pistil and stamen have special adaptation like bending length, etc., so that fertilization takes place. They are open flower not closed like cleistogamous flowers

63 **(a)**
In dehydration there is less amount of water. In less amount of water the seed's enzyme can't works so there is no germination. Dormancy is the time period in which seed can't grow due to undevelopment of embryo or lacking of other necessary condition for growing

64 **(c)**
The chromosome number in gamete (*n*) of *Ophioglossum* (a tern) is 630, of rice is 12, of potato is 24, and of man is 23

65 **(a)**
Syngamy is the fusion of gametes, *i*. *e*, the union of nuclei of male gamete and female gamete in the process of reproduction. In angiosperms, generative fertilization is also called, syngamy.

66 **(d)**
Pollens of different species are different in size, shape, colour and because different species are adopted differently according to their environment

67 **(c)**

Transfer of pollen grains to the stigma of another flower is known as **cross pollination**. It is further classified depending on whether the pollination has occurred between two flowers on the same plant, i.e, **geitonogamy** or between two flowers on different plants of same species i.e., **xenogamy**.

68 **(d)**

Development of embryo in female parent body is a major step in seed development because in this there is no need of water. In lower plants, water is always needed for fertilization. So, it is the revolutionary step

69 **(a)**

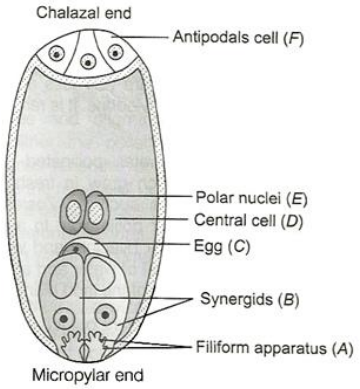
Fusion of male and female **haploid** gametes leads to the formation of a diploid zygote

70 **(c)**

Polyspory is the occurrence of more than four spores form a spore mother cell.

71 **(d)**

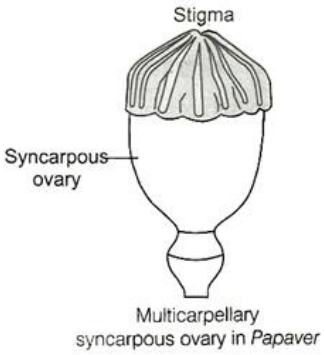
Mature embryo sac



A diagrammatic representation of the mature embryo sac

72 **(b)**

The gynoecium represents the female reproductive part of the flower. The gynoecium may consist of single pistil (monocarpelllary) or may have more than one pistil (multicarpellary) When there are more than one pistil fused together than the pistil is called multicarpellary syncarpous pistil when the pistils are not in fused condition than this type of ovary is called multicarpellary apocarpous pistil



Multicarpellary syncarpous ovary in *Papaver*

73 **(d)**

Cleistogamous flowers never open and in them only self-pollination is operated. In *Commelina benghalensis* (kankauoa), the underground flowers are cleistogamous, in which Cleistogamy (a type of self-pollination) occurs.

74 **(b)**

A-Exine, B-Intine

75 **(d)**

According to **Farmer** and **Moore**, four daughter cells are formed from single cell in meiosis. As a result of microsporogenesis (meiotic division) in four microspore mother cells, 16 pollen grains will be produced.

77 **(a)**

True, because due to the presence of feathers they can cover more distance

78 **(c)**

Strasburger (1879) first time described *Polygonum* type of embryo sac on *Polygonum divaricum*. Orthotropous ovule is found in *Polygonum.* It is the simplest and primitive type, in which micropyle, chalaza and funiculus lie in one vertical plane.

79 **(d)**

Autogamy (self-pollination) involve participation of just one flower for pollination. The devices for self pollination are homogamy, bisexuality, cleistogamy, etc.

80 **(a)**

Chalazal pole is present just, opposite to the micropylar end and chalaza represents the basal part of the ovule

81 **(a)**

Vegetative fertilization occuring in angiosperms is also known as triple fusion. It involves the fusion of second male gamete with two polar nuclei or their fusion product (*i.e,* secondary nucleus). This result in the formation of a triploid Primary Endosperm Nucleus (PEN) which divides and

gives rise to the triploid endosperm. True fertilization or generative fertilization and syngamy involves the fusion of first male gamete with the egg and results into diploid zygote.

82 **(c)**
In asexual and apomictic reproduction the mitotic cell division takes place. Due to mitotic cell division in both these type of reproduction resultant progeny are identical to parents

83 **(a)**
Xenia refers to the effect of pollen on endosperm.

84 **(b)**
Diagram depict wind pollination in maize

85 **(d)**
Long silky hairs on cob maize are the stigma and style of the maize plant

86 **(b)**
In angiosperms, endosperms is a triploid ($3n$) nutritive tissue, which develops form secondary nucleus.

87 **(c)**
Pollen grain is the haploid (n) small, male gametophyte covered by two membrane outer 'exine' and inner 'intine'.

88 **(d)**
In apomixes the diploid egg is formed without the reductional division. This diploid egg may derived directly from the somatic cell (apospory), in some plants Megaspore Mother Cell (MMC) act as the diploid egg called diplospory

89 **(c)**
Though organogenesis is a part of post fertilization events but it is included in the embryogenesis. Endospermogenesis is the post-fertilisation event under which formation of endosperm takes place

90 **(d)**
Asexual reproduction.
Although seeds. In general are the product of fertilization, a few flower plants such as some species of Asteraceae and grasses, have evolved special mechanism to produced seed without fertilization called **apomixis**

91 **(a)**
Parthenium is also called congress grass, which came with wheat variety imported from Maxico. Now, it is a serious weed of wheat and produce large number of pollen grains which causes bronchial allergies

92 **(d)**
Pollination by snail and slug is called malacophily

93 **(b)**
Myrmecophily id defence mechnism through 'Ants'. Some plants (*e.g.,* mango, litchi, guava) protect the plants from attack of other animals by harbouring ants on them.

94 **(c)**
Pollen tube is formed by intine of pollen, hence made of pectocellulose (Pectin+cellulose).

95 **(c)**
Cleistogamy is the phenomenon, where flowers never open and in them only self-pollination occurs within the bud (unopened flower). It has the advantage that seed set is not dependent on pollinators.

96 **(d)**
Double fertilization is the unique feature of flowering plants, whereby, from a single pollen grain, the two sperm nuclei within the pollen tube fuse with different nuclei within the embryo sac of the ovule. Fusion of one sperm with egg cell nucleus forms zygote and the fusion of other sperm with diploid secondary nucleus forms triploid primary endosperm nucleus.

97 **(c)**
Flower is a modified shoot meant for reproduction

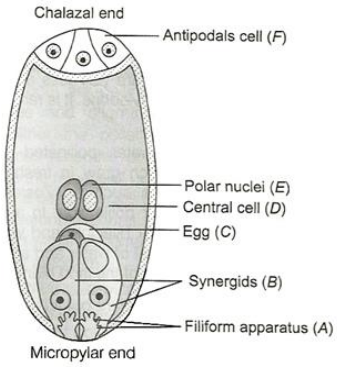
98 **(b)**
They remain close for ensuring self-pollination

99 **(c)**
Wind pollinated flowers often have single ovule in each ovary and numerous flowers packed into an inflorescence. A familiar example is corn comb

100 **(a)**
Continued self breeding means there is continuation of genetic material to the progeny from the parents. As they are the product of same genotype of same plant. This leads to less productivity called inbreeding depression

101 **(b)**
Wind pollinated flowers are small, producing large number of pollen grains.

103 **(b)**
False In the embryo sac the cells, which are present at the chalazal end are called antipodal cells. At the micropylar end the synergid and egg cells are present.
Mature embryo sac



A diagrammatic representation of the mature embryo sac

104 **(d)**
In **orthotropous ovule** (also called atropous or erect ovule), chalaza, micropyle and funicle lie in straight line, e.g., *Urtica, Polygonum* and *Peperomea*. This is a primitive type of ovule.

105 **(d)**
In center there is microspore mother cell. In which meiosis takes place which leads to formation of pollen grains

106 **(d)**
Sporopollenin is a polymer, tougher than lignin but with similar properties, composed chiefly of carotenoids, makes the exine of spores and pollen grains of plants providing resistance to biodegradation. It is the hardest plant product.

107 **(a)**
A-female gametophyte, B-embryo sac. Female gametophyte is the combination of many cells. They are synergid cell, egg cell, antipodal cell and polar nuclei

108 **(b)**
A-double fertilization, B-PEN, C-Endosperm, D-Embryo

109 **(b)**
Dicot embryo has radicle, plumule, cotyledons and sometimes endosperm.

110 **(c)**
Epidermis middle layer, endothecium, they are present outerly and have the function of protection. But sometime endothecium does the function of nourishment

111 **(d)**
Occurrence of more than one embryo in a seed is reffered as **polyembryony**. In many **Citrus** and mango varieties, some of the nucellar cells surrounding the embryo sac start dividing, protrude into the embryo sac and develop into the embryos. In such species, each ovule contains many embryos (nucellar polyembryony).

112 **(b)**
The post fertilization changes in the seeds are as follows:
Ovule – Seed Ovary - Fruit
Nucellus – Perisperm (a nutritive tissue)
Integument – Seed coat.

113 **(c)**
In rare cases, the pollen tube may pierce through integuments as in *Populus*, *Cucurbita* or through funiculus as in *Pistacia*. It is called **mesogamy**.

114 **(d)**
Grafting is difficult in monocot plants as they have scattered vascular bundles. Vascular bundles with cambium is necessary for grafting while in monocot, no such cambium is present in vascular bundles.

115 **(c)**
Microspore mother cell and pollen mother cell are the same term and form male gametes (pollens) by the process called microsporogenesis

116 **(a)**
Tapetum is the innermost layer of **anther** wall.

117 **(a)**
Double fertilization was discovered by **Nawaschin** and **Strasburger.**

118 **(d)**
Pollens contain male gametes hence both the terms are used in angiosperms during sexual reproduction

119 **(b)**
In grafting technique, two parts of two related plants are joined, so as to form composite plant. In this, one plant having strong root system, is called **stock**, while the other having better shoot is called **scion** or **graft**. The grafting technique is successful in two related plants having vascular cambium (characteristic feature of dictoyledons). Later is absent in monocotyledons, so grafting cannot be possible in monocots.

120 **(a)**
Ovules generally differentiate a single Megaspore Mother Cell (MMC) in the micropylar region of the undifferentiated tissue (nucellus). It is a large cell containing dense cytoplasm and prominent nucleus. The MMC undergoes meiotic division

121 **(a)**
The common asexual reproductive structures in sponges are gemmules, and in *penicillium* are conidia. The vegetative propagules in *Agave*,

water hyacinth and *bryophyllum* are bulbil, offset and leaf buds, respectively.

122 **(d)**
In angiosperm, fusion of second sperm with two polar nuclei is called **triple fusion**.

123 **(b)**
In most cases, the mature embryo sac contains 7 cells and 8 nuclei, *i.e.,* egg apparatus with two haploid synergid cells and one haploid egg cell at micropylar end, two haploid polar nuclei in a single central cell (which later fuse to form diploid secondary nucleus) at the middle and three haploid antipodal cells at the chalazal pole.

124 **(b)**
I, II, III and IV are correct
Flowering plants have developed many devices to discourage self-pollination. In some species, pollen, releases and stigma receptibility is non-syncronised, *i.e.,* either the pollen is released before the stigma becomes receptive or stigma becomes receptive much before the release of pollen.
In some other species the anther and stigma are placed at the different positions so that the pollen can not come in contact with the stigma of same flower. Both these devices prevent autogamy.
The third device to prevent inbreeding is self-incompatibility. This is genetic a mechanism and prevents self pollination (from same flower or other flower of same plant) from fertilizing the ovules by inhibiting pollen germination or pollen tube growth in pistil

125 **(d)**
Nuclei involved in fertilization Two nuclei from polar cell, two nuclei from male gametes (generative and vegetative) and one nucleic from egg cell

126 **(d)**
In citrus, mango plants some of the nucellar cell surrounding the embryo sac starts dividing, protrude into embryo sac and develop into many embryos. In such species each ovule contains many embryos. Occurrence of more than one embryo is referred to as polyembryony

127 **(d)**
30 min.
The period in which the pollen grains remain viable is highly variable. It depends on the temperature and humidity. In some cereals such as rice and wheat, the pollen grains loose viability with in 30 minutes of their release and in some members of Rosaceae, Leguminosae and Solanaceae, they maintain variability for months

129 **(c)**
Endosperm Genotype Endosperm is formed by fusion of male gamet and polar nuclei so, the genotype of endosperm is ABB
Embryo Genotype Embryo is formed by fusion gametes ($1n$) of male and female. So, the embryo genotype is AB

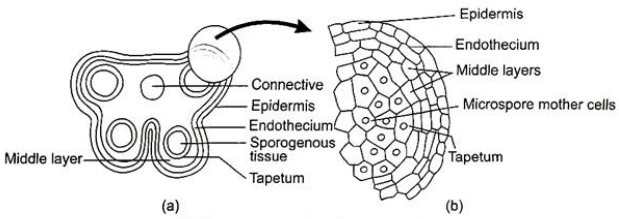
130 **(a)**
Polyhonum type of embryo sac is 7-celled, 8-nucleate, *i. e*., composed of 3 antipodals, 2 synergids one egg and one central cell.

131 **(d)**
Micropyle is the narrow or passage left by the integuments at one end of the ovule. It allows the entry of pollen tube into the ovule. This phenomenon is known as porogamy, *e.g.,* lily.

132 **(c)**
A **fruit** is a seed containing part of a plant that develops from a fertilized ovary and often from other tissue that surround it.

133 **(d)**
Allogamy is also known as cross pollination, *i.e.,* involvement of male and female gametes of two different flowers.

134 **(d)**
Microsporangium is mainly surrounded by four layers/wall, *i. e*., Epidermis, endothecium, middle layer and tapetuem
(i) Epidermis endothecium and middle layer help in protection and dehiscence of anther from pollen
(ii) Tapetum nourishes the developing pollen grain



(a) Transverse section of a young other
(b) Enlarged view one micro sporangium showing wall layers

135 **(a)**
True.
In coconut endosperm two type of division takes place, cellular and nuclear and it is the female gametophyte not male. In coconut endosperm

cellular endosperm surrounds the nuclear endsopores

136 **(b)**
Hermaphrodite flower is also called monoecious or bisexual flower. Majority of plants have this type of flowers

137 **(a)**
Unisexuality of flowers prevents autogamy(self pollination) but not geitonogamy(pollination between separate male and female flowers on the same plant).

138 **(a)**
The funiculus is stalk like part, which attaches the ovule to placenta in an ovary.

139 **(c)**
Self-pollination involves the transfer of pollen grains from the anther to the stigma of the same flower.

140 **(a)**
Meiosis is a type of cell division in which the chromosomes number becomes half. This type of division takes place only during **gametogenesis**, because gametes have haploid or half chromosomes than parents

141 **(b)**
In cereals, one of few outer layers of endosperm are thick-walled with dense cytoplasm having pits. These are mainly filled with **aleurone grains** (highly protein rich) and hence, called **aleurone tissue** or **aleurone layer**.

142 **(a)**
Development of an egg (ovum) into a complete individual without fertilization is known as **parthenogenesis**. A diploid offspring is produced without fertilization of a diploid egg cell through parthenogenesis.

143 **(b)**
Apomixis or **agamospermy** is a reproductive process in plants that superficially resembles normal sexual reproduction but in which there is no fusion of gametes. In some apomictic flowering plants, there is no fertilization by pollen and the embryos develop simply by division of a diploid cell of the ovule.

144 **(c)**
After fertilization, the nature, ripened ovary develops into fruit. The ovary wall forms the covering of the fruit called fruit wall or pericarp. Some other post fetrilization changes also occur like nucellus develops into perisperm, ovules develop into seeds, outer integument forms testa, inner integument forms tegmen, etc.

145 **(d)**
Tapetum is the innermost layer of anther wall. It is the major nourishing layer. Its cells become multinucleate and polyploid through endomitosis and endopolyploidy.

146 **(a)**
Pollen grains of many species cause severe allergies and bronchial afflications. In some people often leading to chronic respiratory disorders, *i.e.,* asthma, bronchitis, etc. Remember that *Parthenium* or carrot grass that came to India as a contaiminant with imported wheat has become obiquitous in occurance and cause pollen allergy

147 **(d)**
Non-albuminous seeds are also called ex-albuminous. In them reserve food consumed by embryo so their cotyledons are very thin

148 **(d)**
Parthenogenesis is development of an embryo from an unfertilized egg or if a spermatozoan does penetrate the egg, there is no union of male and female pronuclei. It is found in many plants (dandelions and hawk weeds) and animals (aphids and honey bees).

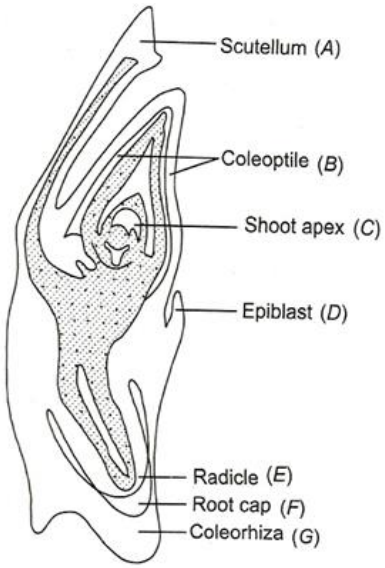
149 **(d)**
Endosperm may either be completely consumed by the developing embryo (*e*. *g*., pea, ground nut, beans) before seed maturation or it may persist in mature seed (*e*. *g*., castor and coconut) and may be used up during seed germination. The first condition is called endospermic, while second condition is called non-endospermic

150 **(d)**
A- Hypocotyle, B- Radicle , C- Root cap

151 **(b)**
Calotropis is insect pollinating plant (cross pollination). **Herkogamy** is a type of cross pollination adaptation in which pollens transfer from the anther of one flower to the stigma of a genetically different flowers with the help of various biotic or abiotic agencies is fovoured.

152 **(d)**
Fertilization of egg takes place inside **embryo sac** because egg is the part of embryo sac.

153 **(b)**



LS of an embryo of grass

Embryos of monocotyledons possess only one cotyledon. In the grass family the cotyledon is called scutellum that is situated toward the one side (lateral) of the embryonal axis. At its lower end, the embryonal axis has the radical and root cap enclosed in an undifferentiated sheath called coleorhiza.

The portion of the embryonal axis above the level of attachment of scutellum is epicotyl. Epicotyl has a shoot apex and few leaf primordia enclosed in hallow structure the coleoptile

154 **(a)**

Egg cell is haploid, whereas endosperm is triploid as it is formed by fusion of one male gamete with two polar nuclei. Therefore, the number of chromosomes in endosperm will be 8×3=24.

155 **(b)**

In coconut endosperm two type of division takes place, cellular and nuclear and it is the female gametophyte not male. In coconut endosperm cellular endosperm surrounds the nuclear endsopores

156 **(a)**

It is the ovules which develop into seed so number of seeds is equal to the number of ovules

157 **(a)**

Occurrence of more than one embryo in a seed is reffered as **Polyembryony.** In many citrus and mango varieties some of the nucellar cells surrounding the embryo sac start dividing, protrude into embryo sac and develop into the embryos. In such species, each ovule contains many embryos (nucellar polyembryony)

158 **(a)**

In parthenogenesis, the number of chromosomes of the second generation as compared to the parent remains half.

159 **(c)**

Pollination refers to the transfer of pollens to stigma. **Hydrophily** is the pollination by water. Hydrophily is commonly seen in members of Ceratophylaceae, Najadaceae, Hydrocharitaceae, etc.

160 **(d)**

Anemophily is a mode of cross-pollination, which is accomplished through the agency of wind. It occurs in **coconut**, date palm, maize, etc.

161 **(c)**

Endosperm $= 3n = 5 \times 3 = 15$ chromosome
Egg cell $= 1n = 1 \times 5 = 5$ chromosome
Polar cell $= 2n = 2 \times 5 = 10$ chromosome

162 **(c)**

(i) Antipodal cell – Haploid
(ii) Egg cell – Haploid
(iii) Synergid cell – Haploid
(iv) Polar nuclei – Diploid
(v) Male gamete – Haploid
(vi) Nuceller cell – diploid
(vii) Chalazal cell - diploid

163 **(d)**

Crotalaria is a member of Papilionaceae (Fabacese), in which 10 stamens are present in a flower. Each stamen has four microsporangia, in which microspore mother cells are found. Each microspore mother cell gives rise to a pollen tetrad.

Thus, 10 flowers (with 10 stamens in each) having 30 microsporangia in each microsporangium will form **48,000** pollen grains.

164 **(b)**

In *citrus*, apomictic embryos arise from maternal sporophytic tissue in ovule.

165 **(a)**

True Plants, in which the water or air pollination is prevelant, produces large number of pollens because of wastage of pollen during pollination by abiotic means

166 **(a)**

Absence of integuments.

Micropyle is found is both seed and ovule. In seed it is the pore through which water goes inside during germination. In ovule the absense of integuments form micropyle

167 **(d)**

An ideal embryo sac contains 7-cells and 8-nuclei. 3-cells are present at the micropylar end and form **egg apparatus**, mid of which egg cell and rest two lateral form synergids. One cell present in the centre of embryo sac, known as central cell and contains two nuclei and rest three cells are present at chalazal end for **antipodal cells.**

168 **(d)**

Synergid cells are characterized by the presence of finger like projections called filiform apparatus attached to their upper wall at micropyler end. This filiform apparatus is known to attract and guide the pollen tube.

169 **(a)**

Aleurone layer prepare amylase (an enzyme), which acts on the starch and frees the glucose unit for developing embryo

170 **(d)**

Pollination by bats is called **cheiropterophily**.

171 **(a)**

Cleistogamy is the condition when flowers remain closed and self-pollination is the rule. *Commelina benghalensis* produces underground cleistogamous and aerial chasmogamous flowers. Cleistogamy is also seen in *Impatiens, Viola , Subularia*, etc.

172 **(b)**

Pollen Grain when pollen grain matures *it contains two cells*

(i) **Vegetative cell** Vegetative cell is bigger and has abundant food reserve and a large irregular shaped nucleus

(ii) **Generative cell** The generative cell is small and floats in the cytoplasm of vegetative cell. It is spindle-shaped with dense cytoplasm and a nucleus

173 **(a)**

Artificial Hybridisation In such crossing experiments where it is important to make sure that only the desired pollen grains are used for pollination and stigma is protecting from contaimination (from unwanted pollen), this technique is used.

Steps in Artificial Hybridisation

(i) **Emasculation** Removal of anthers from the flower bud before the anther dehiscence using forceps. This step referred to as emasculation

(ii) **Bagging** Emasculated flowers have to be covered with a bag of suitable size, generally made up of butter paper to prevent contamination of its stigma with unwanted pollen. This process is called bagging.

(iii) **Rebagging** When the stigma of bagged flower attains receptivity, mature pollen grains collected from the anthers of the male parent are dusted on the stigma and the flowers are rebagged, and the fruits allowed to developed

174 **(a)**

Homogamy is the condition, in which male and female parts of a flower mature simultaneously.

175 **(d)**

The double fertilization was discovered by **S G Nawaschin** (1898) and **Guignard** in *Lilium* and *Fritilaria.* Double fertilization is restricted only to angiosperms. When pollen tube enters ovule, it strikes one of the synergids and burst open to release the two male gametes, which fuse with two different structures in the same female gametophyte. Thus, **double fertilization** can be distinguished as :

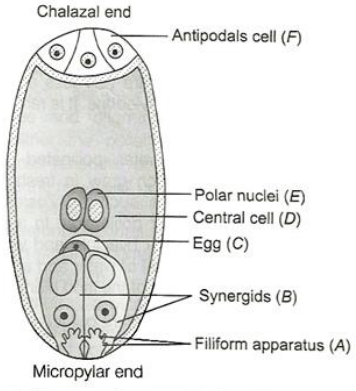
1.Generative Fertilization: Fusion of one male gamete with the egg producing diploid zygote or oospore.

2.Vegetative Fertilization: Fusion of nucleus of second male gamete with the diploid secondary (fused) nucleus or the triple fusion, *i. e*., fusion of one male polar nuclei forming endosperm ($3n$).

176 **(a)**

Six out of the eight nuclei are surrounded by cell walls and organized into cells (egg cells and antipodal cells) and remaining two nuclei called polar nuclei are situated below the egg apparatus in large central cell. Thus, a typical angiospermic embryo sac at maturity is 8-nucleate and 7-celled.

Mature embryo sac



A diagrammatic representation of the mature embryo sac

177 **(c)**

An ovule is an integumented megasporangium found in spermatophytes, which develops into

seed after fertilization. An angiospermic ovule is typically an ovoid and whitish structure. It occurs inside the ovary, where it is attached to a parenchymatous tissue called placenta either singly or in a cluster

178 **(b)**
During the development of nuclear endosperm, the primary endosperm nucleus divides repeatedly without wall formation, *i.e,* produce large number of free nuclei. The multinucleate cytoplasm undergoes cleavage and gives rise to multicellular tissue, *e.g.,* maize, wheat, rice, sunflower, etc.

179 **(b)**
Polygonum type of embryo sac is the most common in angiosperms. It is 7-celled and 8-nucleate. The nuclei are arranged in such a way that three organized at micropylar end and form egg apparatus (one egg and two synergids), two nuclei migrate to centre and form polar nuclei in a single central cell and three nuclei at chalazal pole organized into antipodal cells.

180 **(d)**
Flowering plants have developed many devices to discourage self-pollination. In some species, pollen, releases and stigma receptibility is non-syncronised, *i.e.,* either the pollen is released before the stigma becomes receptive or stigma becomes receptive much before the release of pollen.
In some other species the anther and stigma are placed at the different positions so that the pollen can not come in contact with the stigma of same flower. Both these devices prevent autogamy.
The third device to prevent inbreeding is self-incompatibility. This is genetic a mechanism and prevents self pollination (from same flower or other flower of same plant) from fertilizing the ovules by inhibiting pollen germination or pollen tube growth in pistil

181 **(a)**
Occurrence of more than one embryo is called polyembryony. It is generally formed in family-Citraceae. Orange and lemon are common examples of polyembryony in which nucellar polyembryony is formed

182 **(c)**
Flowers of grass family (Poaceae) are generally pollinated by the wind. They have exposed stigma and versatile anther

183 **(c)**
2:1 is the right answer.

184 **(b)**
Pollen grains protoplast is uninucleate (1-celled) in the beginning but at the time of liberation, it becomes 2, 3-celled.

185 **(d)**
Central cell is the largest cell of embryo sac and is mother cell of endosperm. The enlargement of the embryo sac after the last nuclear division is largely due to inflation of the large central vacuole of central cell.

186 **(d)**
In orthotropous (atropous) ovule, the micropyle, funicle and chalaza lie in a straight line.

187 **(d)**
True fertilization together with triple fusion is known as double fertilization, a unique phenomenon only occurs in angiosperms (absent in gymnosperms) and first time demonstrated by **Nawaschin** in *Fritillaria* and *Lilium*.

188 **(b)**
In onagrad type embroyo development, the apical cell of two-celled proembryo dividies by a vertical wall. Basal cell play little or no role in development, e.g., *Capsella.*

189 **(b)**
Before pollination, the pollen grain cytoplasm divides in generative cell and vegetative cell. The generative cell divides to form two male gametes.

190 **(c)**
A fully organised *Polygonum* type of embryo sac in a 7-celled, 8-nucleate structure. The cells of egg appratus and antipodal are haploid, whereas the central cell is diploid, *i.e.,* contains two polar nuclei. Triploid endosperm is formed after triple fusion, *i.e,* fusion of second male gamete with polar nuclei.

191 **(c)**
Megaspore is commonly called as ovum. These terms are generally used in case of plants and animals. The process of formation of ova or megaspore called oogenesis or megasporogenesis respectively

192 **(b)**
Endothecium is an unilayer of radially elongated cells occurs between the epidermis and middle layers of an angiospermic anther wall.

Cells of endothecium have fibrous thickening in their cell walls due to which they become hygroscopic and thus, help in the dehiscence of mature anther.

193 **(c)**
In **amphitropous** ovule, the body of embryo becomes curved and looks like anatropous ovule but here the embryo sac also curves and becomes horse shoe shaped, *e.g.*, Alismaceae.

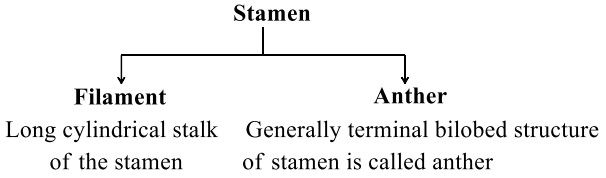
194 **(a)**
In angiosperm the functional megaspore develops into the embryo sac, which is having synergid cells, egg cell, polar nuclei and antipodal cell respectively

195 **(b)**
Allogamous pollination performed by birds is called ornithophily. Entomophily is pollination carried out by insects.

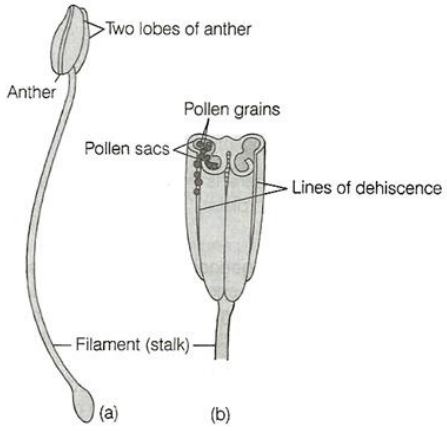
196 **(c)**
In anatropous ovule, the funiculus fuses with body of ovule beyond the hilum to give rise to longitudinal ridge called **raphe.**

197 **(d)**
Valvular dehiscence is found in *Cassytha*, in which slits are present in anther lobes, through these slits pollen grains are liberated.

198 **(d)**



(i) A typical angiospermic anther is a bilobed structures having two theca at each lobe
(ii) It is tetragonal in shape with 4 microsporangia located at each lobe in its corners
(iii) Microsporangia develop into pollen sac, which produces pollen



1. A typical stamen
2. Three-dimensional cut section of an anther

199 **(a)**
In insect pollinated plants, a sticky material is deposited on the pollen grains known as 'pollen kit material', which is secreted by the tapetum.

200 **(a)**
True, in wind pollination the stigma is large and open for more chances of pollination as there is no biotic agency for pollination

201 **(a)**
Microsporangia is like a sac in which pollen develops. Also called pollen sac at the time of maturity

202 **(a)**
Sporopollenin.
Pollen grains are generally 25-50 µm in diameter.
Pollen grains have two main layers
(i) **Outer Layer** It is also called **exine**. It is made up of **sporopollenin.** It is hard and protective in nature. Due to sporopollenin pollen can with stand extreme temperatures
(ii) **Inner layer** It is also called **intine.** It is made up of cellulose and pectin. It is very thin as compared to the outer layer

203 **(d)**
Pseudocopulation describes behaviours similar to copulation that serves a reproductive function for one or more or both the participants but not involve actual sexual union between the individuals. It is most generally applied to a pollinant attempting to copulate with a flower. Orchids commonly achieve reproduction in this manner.

204 **(a)**
Corolla The leaf lifer covering of flower is called **corolla**. The individual segment of corolla is called **petals**
Petals are variously coloured.
Function To attract the pollinators and protection of male and female reproductive part

205 **(a)**
Never open.
Chasmogamy is the type of autofertilisation (self-fertilisation) in which both male and female gametes present on same flower but pistil and stamen have special adaptation like bending length, etc., so that fertilization takes place. They are open flower not closed like cleistogamous flowers

206 **(a)**

Presence of feathery and exposed stigma are the characters of wind-pollinated plant

207 **(a)**

Self-pollination When the process of pollination occurs in the same plant, it is called self-pollination. *It is of two types*

(i) **Autogamy** When pollination takes of place in the same flower of a plant. Here, no pollinating agent is required

(ii) **Geitonogamy** Transfer of pollen grains from anther to stigma of another flower of same plant. Although the geitonogamy is functionally cross-pollination involving a pollinating agent, genetically it is similar to autogamy since the pollen grains come from the same plant

209 **(a)**

Pollen grains which contribute the male gametes are formed within an anther. A typical anther is tetrasporangiate. It has a column of sterile tissues called connective. Mature anther wall comprises an epidermis followed by endothecium, 2 or 3 middle layer and single layered tapetum.

210 **(b)**

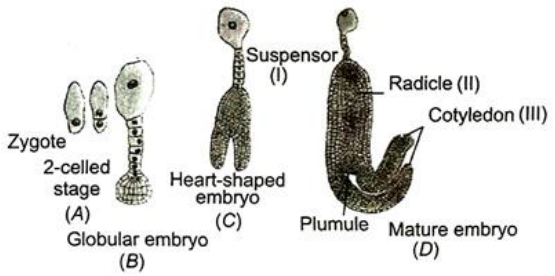
A-Exine, B-Sporopollenin, C-Germ pore

211 **(a)**

Pollen, syrup increase/improve performance because pollen contain highly nutritive material in the form of vegetative cell

212 **(c)**

Embryo develops at the micropylar end of the ovule or embryo sac, where the zygote is situated. Most zygote divide only after certain amount of endosperm is formed. The early stages of embryonic development is same in both monocotyledons and dicotylendons. The zygote give rise to the proembryo and subsequently into globular, heart-shaped and mature embryo



213 **(c)**

Tapetum is the innermost layer of the wall of pollen sac. The tapetum is **nutritive** in function. The tapetal cells are multinucleate and contain Ubish bodies.

214 **(a)**

Formation of diploid embryo sac from diploid vegetative structure (nucellus or integument) without meiosis is called **apospory**.

215 **(c)**

Terminal structure of stamen is called anther, which contain pollen grain (male gametophyte). Pollen grains are haploid in nature

216 **(a)**

Micropylar region the most common way for entry of pollen tube (porogamy)

217 **(c)**

A-Chasmogamous-male and female part remain on the same flower but there are modification for ensuring self-fertilisation

B-Cleistogamous (closed flower)

Autogamy (*Auto*-self; *gamous*-marriage)

Homogamy/Chasmogamy	Cleistogamy
The anthers and stigma of open flower is brought together by growth, bending or folding so that pollination takes place in same flower. *e.g.,* Four O' clock, *Catharanthus* (Vinea) etc.	(*Kleisto*-closed; *gamy*-marriage) In that the flower never opens to ensure the self pollination. *e.g., Commelina Viola, Oxalis,* etc.

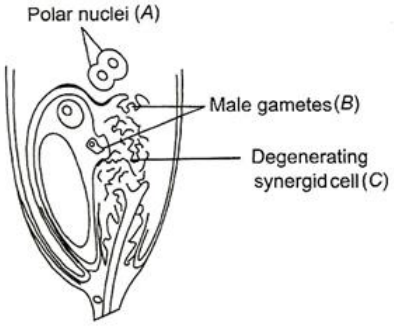
218 **(d)**

Some examples of water pollinated plants are *Vallisneria* and *Hydrilla,* which grow in fresh water and several marine sea-grasses such as *Zostera*. Not all aquatic plants use water for pollination. In a majority of aquatic plants such as water hyacinth and water lily the flower emerge above the level of water and are pollinated by insects of wind as in most of the land plants

219 **(c)**

Endosperm may either be completely consumed by the developing embryo (*e. g.*, pea, ground nut, beans) before seed maturation or it may persist in mature seed (*e. g.*, castor and coconut) and may be used up during seed germination. The first condition is called endospermic, while second condition is called non-endospermic

220 **(d)**



Discharge of male gametes into a synergid and the movements of the sperms, one into the egg the other into the central cell

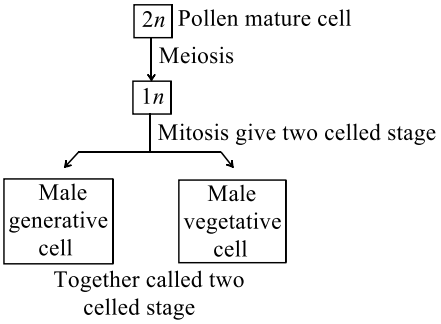
221 **(b)**
Parthenogenesis is a type of **asexual reproduction** because it involves an unfertilized egg cell only.

222 **(d)**
When the micropyle, body of the ovule and funicle lie in one vertical plane, the ovule is called orthotropous, *e.g., Polygonum*.

223 **(c)**
Genetic parthenocarpy is produced by mutation or hybridization. Most of banana varieties are **triploid** and triploidy is associated with seedlessness.

224 **(c)**
Double fertilization is characteristic feature of angiosperms. It was discovered by **S G Nawaschin** in 1898. In double fertilization, one male gamete fused with ovum to form diploid zygote and the second male gamete fused with diploid secondary nucleus to form the triploid primary endosperm nucleus, which develops into endosperm. The endosperm provides nutrition to the developing embryo.

225 **(b)**
Mature male gametophyte is derived by one meiosis and one mitotic division. Two celled stage of male gametophyte is called mature male gametophyte



226 **(b)**
The **mega-gametophyte** or female gametophyte also called embryo sac, is mostly a 7-celled structure.

227 **(d)**
Albuminous seed retain a part of endosperm as it is not completely used up during embryonic development, *e*. *g*., Wheat, maize, barley, castor, sunflower. Their cotyledons are fleshy and thick as compared to the non-albuminous seed

228 **(c)**
Double fertilization is characteristic feature of angiosperms. It is a fusion of two male gamates brought by a pollen tube to two different cells of the same female gametophyte to produce zygote and endosperm. A total of five nuclei takes part in double fertilization (sometimes called four as the two polar nuclei fuses to form one).

229 **(b)**
A- Embryonal axis, B- cotyledons, C- Epicotyle, D- Plumule

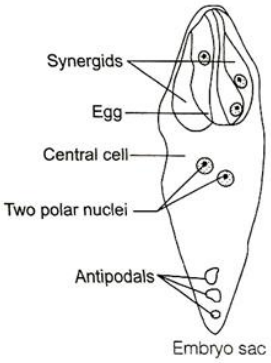
230 **(a)**
Geitonogamy involves the transfer of pollen grains from a male flower to the stigma of an other female flower growing on the same plant. Thus, geitonogamy operates only in monoecious plant, *i.e*, plants having male and female flowers on different places, e.g., *Zea mays*.

231 **(c)**
Megaspore mother cell is developed inside the nucellus and by a meiotic division, it forms four megaspores. Out of these, generally three degenerate and remaining one is called functional megaspore. It undergoes mitosis three times without cytoplasmic division to form an eight nucleate embryo sac.

232 **(c)**
2-1-2-3

Development of Female Gametophyte

(i) Megaspore mother cell undergoes the reductional/meiotic division that give rise to four megaspores
(ii) Three of them die (in majority of plants) only one remains viable. This method of embryo sac formation is called monosporic development
(iii) The nucleus of the functional megaspore divides mitotically to form two nuclei, which move to the opposite poles forming two nucleate embryo sac
(iv) Two more sequential mitotic nuclear divisions results in the formation of four nucleate and later 8 nucleate stages of embryo sac
(v) After the 8 nucleate stage cell walls are laid down leading to the organization of typical female gametophyte



233 **(d)**

Pollination of flowers by birds is called **ornithophily**. Ornithophilous flowers are large sized, brightly coloured, odourless and produce a large amount of mucilagenous nectar as drinking material of birds, *e.g.*, *Strelitzia reginae, Bigonia, Aloe vera, Salmelia.*

Pollination of flowers by means of bats is called cheiropterophily. *Eidoling helvum,*a large and strictly vegetarian bat visit the flowers of *Adansonia digitata* to extract nectar.

234 **(a)**

Clone is an individual obtaining from single parent through apomixis, vegetative reproduction and tissue culture. The process of fusion of two male gametes in a single embryo sac is called **double fertilization.** It is found in sexual reproduction of angiosperms only and discovered by **Nawaschin** (1898).

235 **(c)**

Although seeds. In general are the product of fertilization, a few flower plants such as some species of Asteraceae and grasses, have evolved special mechanism to produced seed without fertilization called **apomixis**

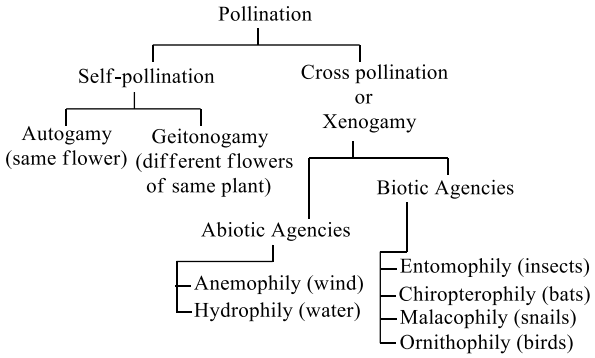
236 **(a)**

The transformation of part of flower

Before Fertilisation		**After Fertilisation**
Calyx, corolla	-	Wither
Androecium, style and stigma	-	Fruit
Ovary		
Ovary wall	-	Pericarp
Ovule	-	Seed
Integuments	-	Seed coat
Outer integuments	-	Testa
Inner integuments	-	Tegaman
Micropyle	-	Micropyle
Funicle	-	Stalk of seed
Nucellus (if persistant)	-	Perisperm
Egg cell (oospore)	-	Zygote
Synergid	-	Disintegrate

237 **(c)**

Pollination Transfer of pollen grains to the stigma is called pollination



238 **(c)**

Monocot A-Cotyledon, B-Epicotyle, C-Radicle, D-Endosperm, E-Seed coat

239 **(a)**

Pollen grain are generally 25-50 µm in diameter.

Pollen grains have two main layers

(i) **Outer Layer** It is also called **exine**. It is made up of **sporopollenin.** It is hard and protective in nature. Due to sporopollenin pollen can with stand extreme temperatures.

(ii) **Inner layer** It is also called **intine.** It is made up of cellulose and pectin. It is very thin as compared to the outer layer

240 **(c)**

In porogamy, pollen tube enters the ovule through the **micropyle**. It is the most common way of the entry of pollen tube inside ovule.

241 **(b)**

A-10-15%, B-Slowdown, C-Dormancy

242 **(b)**

Gametes are haploid structures, containing chromosome number half of somatic cells. When somatic cell has 40 chromosomes, the gametes will have 20 chromosomes.

243 **(b)**

Rose, sugarcane, cocoa and *Baugainvillea* are propagated by stem cutting.

244 **(c)**

Fusion of male and female gametes (i.e, syngamy) in seed plants, occurs through **siphonogamy** as the gametes are carried through the pollen tube.

Pollen tube can enter the ovule by three methods:

1.Porogamy- through micropyle

2.Chalazogamy- through chalaza

3.Mesogamy –pollen tube penetrates laterally through integuments or funiculus.

245 **(d)**
Endosperm $-3n$
Chromosome given $= 36$
Haploid number $\frac{36}{3} = 12$ chromosome male and female gametes are haploid, so answer is 12 and 13

246 **(d)**
When all the fourmegaspore nuclei take part in the formation of the female gametophyte (embryo sac), this type of development is called as **tetrasporic**. In tetrasporic emryo sacs, meiosis is not accompanied by wall formation.

247 **(a)**
Homogamy is condition, in which male and female parts of a flower mature simultaneously.

248 **(d)**
Emasculations is the removal of anther. It is done only in bisexual of mionoecious plants

249 **(c)**
The outer seed coat (testa) of a seed is produced from outer integument of ovule. The inner integument forms tegmen (inner seed coat). Ovary wall forms pericarp (fruit wall).

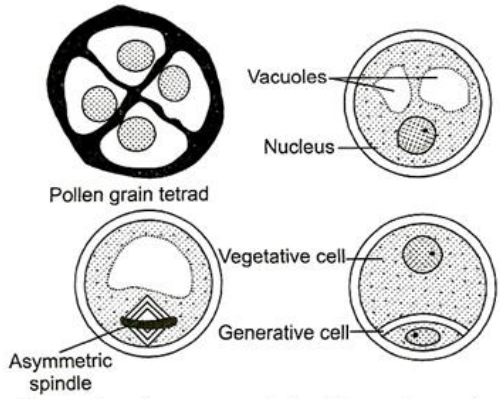
250 **(d)**
In most of the plants the fruit develops from the ovary (true fruits) and other floral part degenerate and fall off. However in a few species such as apple, strawberry, cashew, etc., the thalamus also contributes to fruit formation such fruits are called false fruit

251 **(a)**
Viability means ability to grow. This is a certain time period in which plant seed have ability to germinate. Lupine have the viability period about 10,000 years

252 **(b)**
Trenb observed entry of pollen tube into the ovule through chalazal end in *Casuarina.* This is known as chalazogamy.

254 **(b)**
Genetic method for preventing self-fertilisation
Flowering plants have developed many devices to discourage self-pollination. In some species, pollen, releases and stigma receptibility is non-syncronised, *i.e.,* either the pollen is released before the stigma becomes receptive or stigma becomes receptive much before the release of pollen.
In some other species the anther and stigma are placed at the different positions so that the pollen can not come in contact with the stigma of same flower. Both these devices prevent autogamy.
The third device to prevent inbreeding is self-incompatibility. This is genetic a mechanism and prevents self pollination (from same flower or other flower of same plant) from fertilizing the ovules by inhibiting pollen germination or pollen tube growth in pistil

255 **(c)**
Stage of microsporogenesis forming pollens.
Pollen Grain When pollen grain matures *it contains two cells*
(i) **Vegetative cell** Vegetative cell is bigger and has abundant food reserve and a large irregular shaped nucleus
(ii) **Generative cell** The generative cell is small and floats in the cytoplasm of vegetative cell. It is spindle-shaped with dense cytoplasm and a nucleus



Stages of a microscope maturing into a pollen grain

256 **(c)**
In angiosperms, the functional megaspore is haploid, which undergoes mitotic division and form 7-celled, 8-nucleate embryo sac. Therefore, each nucleus of embryo sac is haploid. At the time of fertilization, one male gamete fused with egg nucleus to form zygote ($2n$), whereas the second male gamete fuses with two polar nucleus(central cell) to form endosperm ($3n$). This type of fertilization is called double fertilization. Double fertilization is unique in angiosperms and discovered by **Nawaschin** (1898).

257 **(c)**
The pollen wall consists of two layers, the outer exine and inner intine. The exine is chiefly made up of sporopolenin, which is derived by the oxidative polymerization of carotenoids.

Sporopollenin is one of the most resistant biological materials known. Exine is thin in beginning but become very thick with maturity.

258 **(a)**
Pollens are well preserved because the sporopollenin. It is hard and resistable to many organic and inorganic compounds

260 **(a)**
In angiosperms, one male gamete fuses with the egg to form the diploid zygote. The process is called **syngamy**. The other male gamete fuses with the two polar nuclei to form triploid primary endosperm nucleus. The process is called **triple fusion**. These two acts of fertilization constitute the process of **double fertilizaiton**.

261 **(b)**
During the germination the light is not needed. But later stage of development light plays a greater role in making food

262 **(a)**
Both *Bryophyllum* and *kalanchoe are* propagated by leaf pieces.

263 **(a)**
Pollen grain is the mother cell of male gametophyte. Development of male gametophyte begins inside the micro sporangium. The microspore nucleus divide mitotically to form a smaller generative cell and a much large, vegetative cell (tube cell) the generative cell produces two male gametes, whereas, the vegetative cell form pollen tube after pollination. Pollen grain contains two cells, *i*. *e*, tube cell and generative cell at the time of pollination.

264 **(a)**
Amorphophallus (6 feet height)
In some species floral rewards are seen in providing safe places to lay eggs: an example is that of the tallest flower *Amorphophallus.* A similar relationship exist between a species of moth and the plant *Yucca* where both the species moth and plant cannot complete their life cycles without each other.
The moth deposits its eggs in the locule of the ovary and flower in turn gets pollinated by moth. The larvae of moth come out of the eggs as the seed starts developing

265 **(c)**
Opening of flower is called anthesis

266 **(c)**
Although the meaning of unisporic monosporic, single sporic cell is same but only monosporic term is used for single megaspore

267 **(c)**
There are three types of endosperm development
(i) **Nuclear Type** The primary endosperm nucleus divides repeatedly without wall formation to produce a large number of free nuclei. *e*. *g*., Maize, coconut and wheat
(ii) **Cellular Type Endosperm** Every division of the primary endosperm nucleus is followed by cytokinesis *e*. *g*., *Balsam, Datura, Petunia*
(iii) **Helobial Endosperm** The first division of primary endosperm nucleus is followed by transverse cytokinesis to form two cells. Further development in both the cells occurs like that of nuclear endosperm

268 **(d)**
In vegetative propagation, there is no genetic recombination, so the genetic constitution of a plant is unaffected in vegetative propagation. In ginger (*Zingiber officinale*), the means of vegetative propagation is fleshy, dorsiventral, horizontal, branched, underground, perennial, straggling rhizome (modified stem).
Totipotency is the capability of any plant cell to develop into entirely new plant when provided with the suitable growing medium. it enables us to micropropagate plants.

269 **(c)**
Micropyle is found is both seed and ovule. In seed it is the pore through which water goes inside during germination. In ovule the absense of integuments form micropyle

270 **(a)**
The wall of the pollen mother cell (microspore mother cell) is deposited by callose β-1, 3-glucan).

271 **(a)**
In some species floral rewards are seen in providing safe places to lay eggs: an example is that of the tallest flower *Amorphophallus.* A similar relationship exist between a species of moth and the plant *Yucca* where both the species moth and plant cannot complete their life cycles without each other.
The moth deposits its eggs in the locule of the ovary and flower in turn gets pollinated by moth. The larvae of moth come out of the eggs as the seed starts developing

272 **(b)**

In angiosperm, a single diploid Megaspore Mother Cell (MMC) matures within an ovule. Through first meiosis, it gives rise to a dyad cell and then second meiosis takes place which forms four megaspores (haploid). In most plants, only one of these megaspore, survives, the rest are absorbed by the ovule.

273 **(b)**

Aleurone layer is the layer surrounds the endosperm. It is made up of protein. It is found only in mococotyledons

274 **(d)**

Seeds offer several advantages to angiosperms. Seeds have better adaptive strategies for dispersal to new habitats. Testa (outer covering) of seed protect embryo from injuries. Being products of sexual reproduction, they generate new genetic recombination leading to variation to upcoming new plants

275 **(c)**

Helobial.

There are three types of endosperm development

(i) **Nuclear Type** The primary endosperm nucleus divides repeatedly without wall formation to produce a large number of free nuclei. *e*. *g*., Maize, coconut and wheat

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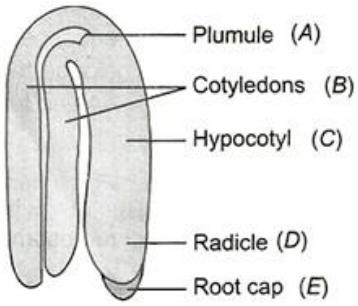
276 **(b)**

Dicot.

The diagram showing typical dicot embryo having various important parts. A typical dicotyledonous embryo, consist of an **embryonal** axis and two **cotylendons.** The portion of embryonal **axis** above the level of cotyledons is **epicotyle,** which terminates with **plumule** or **stem tip**. The cylindrical portion below the level of cotyledons is **hypocotyl** that terminates at its lower end in the **radicle** or **root tip** Root tip is covered with **root cap**



A typical dicot embryo

277 **(d)**

Mature endosperm with any degree of irregularity and unevenness in its surface contour is called ruminate endosperm. It is known to occur In about 32 families of angiosperms. In family-Annonaceae, the ruminate endosperm is found.

278 **(d)**

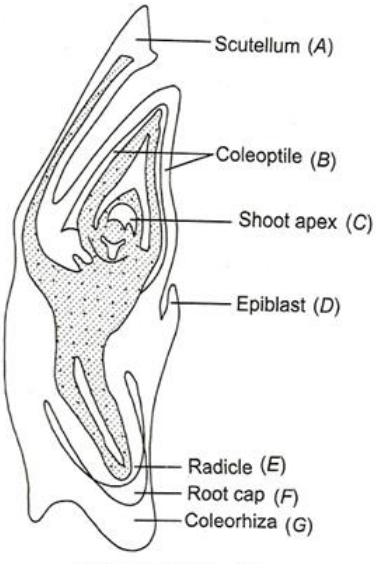
Dicot, cotyledon, epicotyle and hypocotyle are the three main parts of embryo

279 **(b)**

The embryo formation without fertilization is known as **apogamy**. Apogamy is the development of a sporophyte directly from the gametophyte without the intervention of sex organs and gametes.

280 **(b)**

Root cap coleorhiza.



LS of an embryo of grass

Embryos of monocotyledons possess only one cotyledon. In the grass family the cotyledon is called scutellum that is situated toward the one side (lateral) of the embryonal axis. At its lower end, the embryonal axis has the radical and root cap enclosed in an undifferentiated sheath called coleorhiza.

The portion of the embryonal axis above the level of attachment of scutellum is epicotyl. Epicotyl

has a shoot apex and few leaf primordial enclosed in hallow structure the coleoptile

281 **(b)**
Micropyle is a minute opening present at one end of the seed coat. It is very helpful in seed germination as sufficient water enters the seed through micropyle.
During fertilization, micropyle of the ovule provides a passage for the entry of pollen tube, but the pollen tube may enter the ovule by passing through chalaza or integuments.

282 **(b)**
Bisexual flowers which do not open at all are called **cleistogamous**. In such flowers, anthers and stigma lie close to each other. *Viola* (common pansy) has both cleitstogamous and chasmogamous flowers. Chamogamous flowers remain open with exposed anthers and stigma.

283 **(c)**
The order of endosperm types in the diagram is **helobial**, **free nuclear** and **cellular**. Helobial endosperm is formed due to formation of a large micropylar and a small chalazal chamber by mitotic division in primary endosperm mother cell.

284 **(d)**
Pollen grain is male reproductive part of angiospermic plant while embryo sac, micropyle and nucellus are female reproductive parts.

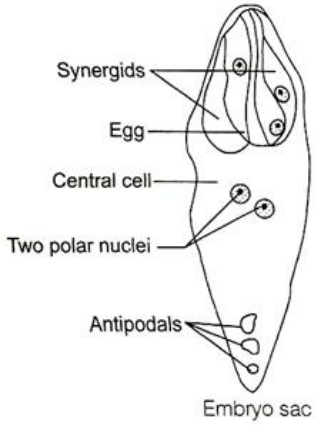
285 **(d)**
Epidermis is the outermost layer of the microsporangium, which is protective in nature. Tapetum is the innermost layer, which provide nourishment to the developing pollen grain in mirosporangium

286 **(a)**
Microsporogenesis During developmental phase of anther the cells of sporogenous tissue undergoes meiotic division to form microspore tetrad. The process of formation of microspore from pollen mother cell is called microsporogenesis. The microspores are formed and arranged in a group of four cells called microspore tetrad. Microspore develops into the pollen grain and represents the male gametophyte

287 **(c)**
Micropyle is the small aperture through, which the water goes inside at the time of germination. It also helps in the gaseous exchange

288 **(d)**
Bright coloured flowers attract the insects. These insects takes part in the pollination of these flowers, therefore, bright colouration of flowers is an adaptation for entomophily, *i.e,* pollination by insects.

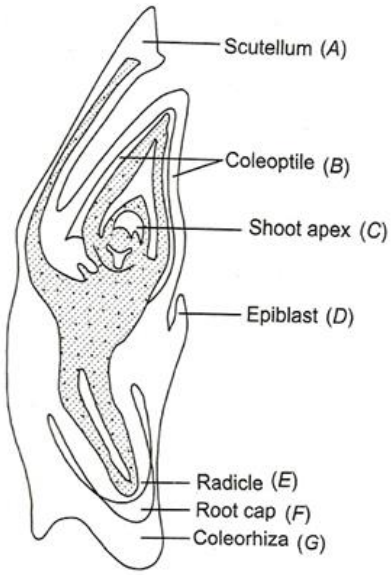
289 **(d)**
Development of Female Gametophyte
(i) Megaspore mother cell undergoes the reductional/meiotic division that give rise to four megaspores
(ii) Three of them die (in majority of plants) only one remains viable. This method of embryo sac formation is called monosporic development
(iii) The nucleus of the functional megaspore divides mitotically to form two nuclei, which move to the opposite poles forming two nucleate embryo sac
(iv) Two more sequential mitotic nuclear divisions results in the formation of four nucleate and later 8 nucleate stages of embryo sac
(v) After the 8 nucleate stage cell walls are laid down leading to the organization of typical female gametophyte



290 **(b)**
The root cell of flowering plant is diploid ($2n=24$), while the gamete is haploid, therefore, the number of chromosomes will be **12** in the gamete.

291 **(c)**
The plant part containing strong root system is called stock while the plant part containing better flower, fruit yield is called scion. The chromosome number remains same in root cells but reduced to half in egg cell.

292 **(a)**
A, E.



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The portion of the embryonal axis above the level of attachment of scutellum is epicotyl. Epicotyl has a shoot apex and few leaf primordial enclosed in hallow structure the coleoptile

293 **(b)**

Coconut endosperm is unique because of its early liquid syncytial stages, which forms a hard matured kernel at later stages of fruit development.

294 **(b)**

Microsporogenesis

Microspore mother cell and pollen mother cell are the same term and form male gametes (pollens) by the process called microsporogenesis

295 **(c)**

During development zygote, divides into large basal cell, called the suspensor cell and the other termed as 'terminal cell' or 'pro-embryo'. The pro-embryo cell after division develops into 'epibasal' at terminal and 'hypobasal' near suspensor. The 'epibasal cells' or apical octant develops into cotyledons and 'embryo plumule' the 'hypobasal cell' produce the 'hypocotyl'.

296 **(b)**

In angiosperms, endosperm is the triploid ($3n$).

297 **(c)**

Egg cell – haploid, formed by meiosis.

Zygote – Diploid formed by union of male female gametes. Endosperm – triploid, it is a union of male gamete (vegetative), which is haploid and central cell, which is diploid together make triploid structure

298 **(c)**

Ovule is the integumented indehiscent megasporangium, which develops as a small outgrowth from the tissue of placenta. It attached to placenta by a stalk called **funiculus**.

299 **(b)**

Seeds without fertilisation

Although seeds. In general are the product of fertilization, a few flower plants such as some species of Asteraceae and grasses, have evolved special mechanism to produced seed without fertilization called **apomixes**

300 **(d)**

Seed represent the present generation and have the plant of next generation within.

301 **(a)**

All statement are correct. In gymnosperm the triple fusion is rare so their endosperm is haploid and in angiosperm endosperm is formed prior to zygote and triploid

302 **(b)**

Geitonogamy (Gk : $geiton$ = neighbour; $gamein$ = to marry) involves the transfer of pollen grains from a male flower to the stigma of another female flower originating on the same plant.

303 **(a)**

After fertilization, the outer integument forms tests.

304 **(d)**

Water pollinated plants are very less and limited to 30 genera and mostly are cotyledons. It is rare in flowering plants

305 **(c)**

*Salvia, Calotropi s*and $Rafflesia$ all are insect pollinating flowers.

306 **(a)**

Pollen grain stored at $-196°C$ which is the temperature of liquid nitrogen. In that temperature the sperm can also be stored. Such stored pollen can be used as pollen banks, similar to seed bank in crop breeding experiment

307 **(d)**

The total number of nuclei involved in double fertilization in angiosperms are **five.**

308 **(c)**

The typical embryo sac (*polygonum* type) is 7-celled, 8-nucleate (two synergids, one egg, three antipodal and one central cell). The synergids are also known as helpers. They help in distribution of nutrients in embryo sac with the help of filiform apparatus and also help in attracting pollen tube towards egg.

309 **(c)**

Filiform apparatus are the special thickening of synergid cells for guiding the pollen tube and male gametes, so that the fusion takes place property

310 **(a)**

The outermost cell later of the endosperm $(3n)$ of seed is called aleurone layer. Since, the cells of aleurone layer are triploid, the number of chromosomes would be $= 63$, as root tip cells $(2n)$ has 42 chromosomes.

311 **(b)**

Filiform apparatus is finger-like projection of the cell membrane of synergids or helper cells at the micropylar end of the ovule. Filiform apparatus is rich in polysaccharides and chemottracts pollen tube towards egg.

312 **(b)**

A somatic cell ($e.g.$, cell of leaf) contains diploid number of chromosomes. In angiosperms, the endosperm is formed by triple fusion, $i.e.$, fusion of two polar nuclei and second male gamete. Therefore, it is triploid $(3n)$. Hence, the chromosome number in endosperm will be $=24$.

313 **(b)**

When the somatic cells are cultured and the culture is made stationary, each cell starts differentiating into an independent embryo showing all the stages of embryo development. These embryos are called **embryoids**, which can give rise to a complete plant.

314 **(b)**

Because wind pollinated and water pollinated plants do not need any biotic agency for pollination so no need for fragrance. Nector and colourfulness. Generally, wind-pollinated plant are big in size due to producing more pollen and have exposed stigma for easily capturing pollens

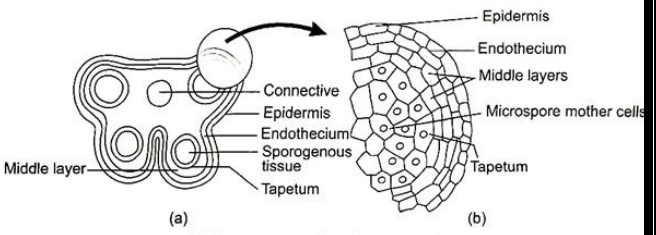
316 **(d)**

A- Connective tissues, B- Epidermis, C-Endothecium, D-Sporogenous tissue, E- Tapetum, F- Middle layer

Microsporangium is mainly surrounded by four layers/wall, $i.e.$, Epidermis, endothecium, middle layer and tapetuem

(i) Epidermis endothecium and middle layer help in protection and dehiscence of anther from pollen

(ii) Tapetum nourishes the developing pollen grains



(a) Transverse section of a young other
(b) Enlarged view one micro sporangium showing wall layers

317 **(a)**

A- Nucellus, B-MMC, C-Nucellus, D-Megaspore diad

Development of Female Gametophyte

1. Megaspore mother cell undergoes the reductional/meiotic division that give rise to four megaspores
2. Three of them die (in majority of plants) only one remains viable. This method of embryo sac formation is called monosporic development
3. The nucleus of the functional megaspore divides mitotically to form two nuclei, which move to the opposite poles forming two nucleate embryo sac
4. Two more sequential mitotic nuclear divisions results in the formation of four nucleate and later 8 nucleate stages of embryo sac
5. After the 8 nucleate stage cell walls are laid down leading to the organization of typical female gametophyte

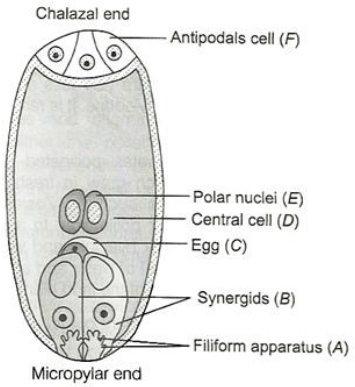
318 **(b)**

Endosperm in angiosperms develops as a fusion product of secondary nucleus with male gamete. Secondary nucleus is diploid structure formed by fusion of haploid chalazal polar nucleus and haploid micropylar polar nucleus. Zygote is formed by fusion of male gamete with egg.

319 **(b)**

False.

Mature embryo sac



A diagrammatic representation of the mature embryo sac

False In the embryo sac the cells, which are present at the chalazal end are called antipodal cells. At the micropylar end the synergid and egg cells are present.

320 **(a)**

True.

Pollen grain are generally 25-50 µm in diameter.

Pollen grains have two main layers

(i) **Outer Layer** It is also called **exine**. It is made up of **sporopollenin.** It is hard and protective in nature. Due to sporopollenin pollen can with stand extreme temperatures.

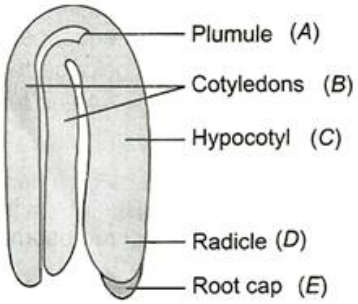
(ii) **Inner layer** It is also called **intine.** It is made up of cellulose and pectin. It is very thin as compared to the outer layer

321 **(a)**

Viability of datepalm is 2000 yr

322 **(d)**

The diagram showing typical dicot embryo having various important parts. A typical dicotyledonous embryo, consist of an **embryonal** axis and two **cotylendons.** The portion of embryonal **axis** above the level of cotyledons is **epicotyle,** which terminates with **plumule** or **stem tip**. The cylindrical portion below the level of cotyledons is **hypocotyl** that terminates at its lower end in the **radicle** or **root tip** Root tip is covered with **root cap**



A typical dicot embryo

323 **(a)**

Lower end of embryonal axis in monocot.

Embryos of monocotyledons possess only one cotyledon. In the grass family the cotyledon is called scutellum that is situated toward the one side (lateral) of the embryonal axis. At its lower end, the embryonal axis has the radical and root cap enclosed in an undifferentiated sheath called coleorhiza.

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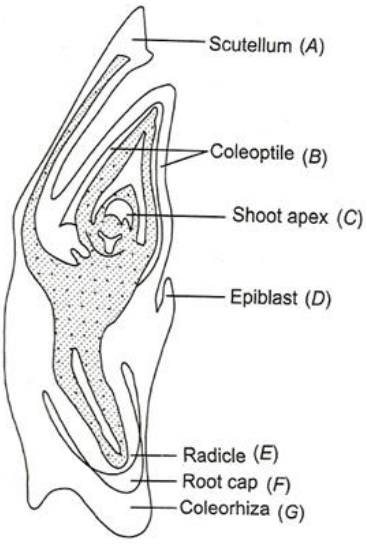
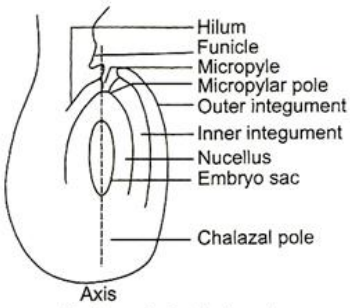


LS of an embryo of grass

324 **(a)**

Megasporangium The ovule is a small structure attached to the placenta by means of stalk called funicle. The body of the ovule fuses with **funicle** in the region called **hilum**.

Thus, hilum represents the junction between ovule and funicle. Each ovule has one or two protective envelope called integuments. These integuments encircle the ovule except the tip, where a small opening called micropyle is organised. Opposed to the micropylar end is the chalaza representing basal part of the ovule



Diagrammatic view of a typical anatropous ovule

325 **(a)**

Sugarcane is cultivated through **stem cutting**.

326 **(a)**

True. So that at the time of germination the pollen tube can emerge out from germ pore

327 **(c)**

As the seed matures, its water content is reduced and seed becomes relatively dry (10-15% moisture by mass). The general metabolic activity of the embryo slows down. The embryo may enter a state of inactivity called dormancy. When favourable condition are available (adequate moisture, oxygen, suitable temperature) seeds germinate

330 **(c)**

Sporopollenin is the most resistant known biological material, found in the exine of pollen grains. It is resistant to chemical and microbial decomposition. Due to it, the pollen grains are well preserved during fossilization.

331 **(d)**

In gametophytic apomixis, embryo sac develops form the microspore mother cell by cirumvention of meiosis or directly from a cell in the nucellus. Embryo is formed By the unfertilised egg, *i*. *e*., called **parthenogenesis**.

332 **(b)**

The innermost wall layer of microporangium is the **tapetum.** Cells of tapetum possess dense cytoplasm and generally have more than one nucleus. Tapetum nourishes the developing pollen grains.

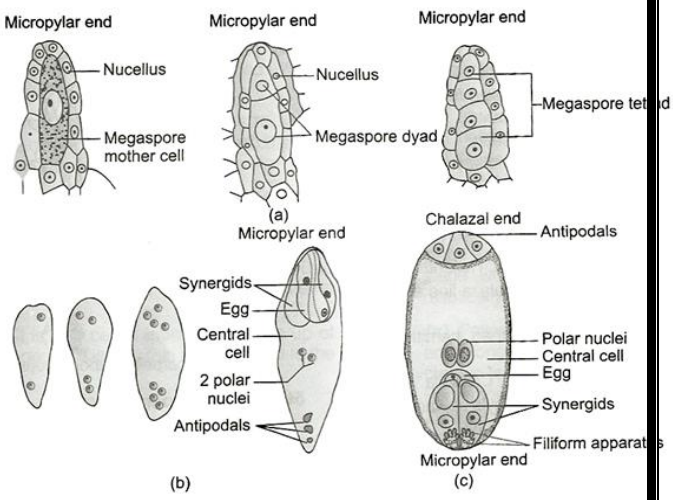
The body of the ovule fuses with funicle (stalk of ovule) in the region called **hilum.** Thus, hilum represents the junction between ovule and funicle.

The primary endosperm nucleus is triploid ($3n$) as it is the product of triple fusion

In majority of aquatic plants such as water hyacinth and water lily, the flower emerge above the level of water and are pollinated by insects or wind as in most of the land plants.

333 **(a)**

Nucellus Integuments encloses a mass of cells called nucellus. Cells of the nucellus have abundant reserve food materials. Located in the nucellus is the embryo sac or female gametophyte. An ovule generally has single embryo sac formed from a megaspore through reductional (meiotic) division



(a) Parts of the ovule showing a large megaspore mother cell, a dyad and a tetrad of megaspore (b) 2, 4 and 8-nucleate stages of embryo sac and a nature embryo sac (c) A diagrammatic representation of the mature embryo sac

334 **(c)**

Exine is chiefly made up of sporopollenin. Exine is discontinous or ruptured only by nexine at some places (where sporopollenin absent), these are called pores, through which pollen tubes come out during germination on stigma.

335 **(c)**

Endosperm union of male gametes and female polar nuclei, which is diploid in nature.

In question the genotype of endosperm in ZZA means ZZ belongs to female and A belongs to male gametes, so genotype of male plant is = AA and female plant is = ZZ

336 **(a)**

In hemianatropous type, the ovule becomes curved and nucellus and embryo sac lies at right angles to the funicle, *e.g.,* Ranunculaceae, while in campylotropous, the micropyle is directed forwards chalaza. Chalaza lies at right angle to funicle, *e.g.,* Leguminosae.

337 **(a)**

Two polar nuclei are located in **embryo sac**, which participate in triple fusion.

338 **(c)**

Bilobed or dithecous are the same terms used in angiospermic anther lobes

339 **(d)**

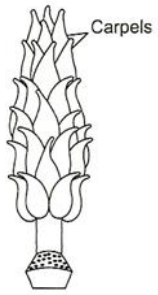
In *Poinsettia and Euphorbia*, inflorescence is cyathium, in which involucre fuse to form a cup surrounding a large achlamydous, pedicellate, tricarpellary, syncarpous female flower. Numerous centrifugally arranged male flowers

surround the female flower.numerous centrifugally arranged male flowers surround the female flower.

In *Casuarina*,cylindrical phylloclades are found which are modified aerial stems. Flowers are unisexual which develop acropetally and pollen tube enters the ovule through chalazal tissues, *i. e*., chalazogamy.

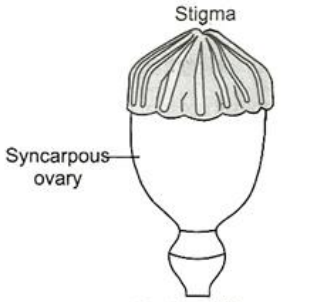
340 **(d)**

Diagram showing multicarpellary apocarpous condition



Multicarpellary apocarpous pistil in *Michelia*

The gynoecium represents the female reproductive part of the flower. The gynoecium may consist of single pistil (monocarpelllary) or may have more than one pistil (multicarpellary) When there are more than one pistil fused together than the pistil is called multicarpellary syncarpous pistil when the pistils are not in fused condition than this type of ovary is called multicarpellary apocarpous pistil



Multicarpellary syncarpous ovary in *Papaver*

341 **(a)**

True. Because huge pollen mass and feathery structure is the mark of wind pollinated pollen. These features are found in grass pollens

342 **(b)**

In water hyacinth and lily the pollination agency is not water rather it is insect. Although, they are aquatic plants. It is not necessary that all aquatic plants are pollinated by water

343 **(b)**

Apogamy was first reported by **Farlow** (1874). It can be defined as the development of a sporophyte directly from the gametophyte without the intervention of sex organs and gametes.

344 **(d)**

Each theca contains two microsporangia so total four microsporangia present in angiospermic anther

345 **(d)**

The fusion of male and female gametes is called **fertilization**, while the mode of formation of new individuals from specialized or non-specialized parts of the parent without meiosis or fusion of gametes is called the asexual reproduction.

Apogamy is a type of asexual reproduction, in which sporophyte is directly formed from a gametophyte without involving the formation and fusion of gmetes.

Funicle is the stalk of ovule. The point of attachment to the body of ovule with the funiculus is known as **hilum**.

A **raphe** or **longitudinal ridge** is formed by the fusion of funiculus with the body of ovule.

346 **(b)**

In embryo sac of angiosperm, egg apparatus occurs towards micropylar pole and generally organises by two synergids and one egg cell. Egg cell has a large vacuole at its upper and a prominent nucleus near its lower end. Synergids show a filiform apparatus attached to their upper wall. It is known to attract and guide the pollen tube. Each of the synergids has a vacuole at its lower end and the nucleus at its upper end.

347 **(b)**

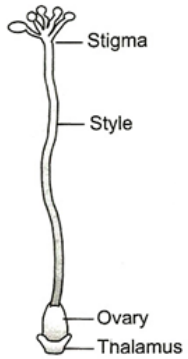
Pollen tube enters through the synergid cell, guiding by filiform apparatus present in synergid cell. Synergid cells are present at the micropylar end of the ovule

348 **(c)**

Water hyacinth is aquatic plant but it is not pollinated by water. It is pollinated by insect

349 **(b)**

Fertilization is the process in which the fusion of male and female gametes takes place. This process takes place in the ovary



Part of pistil

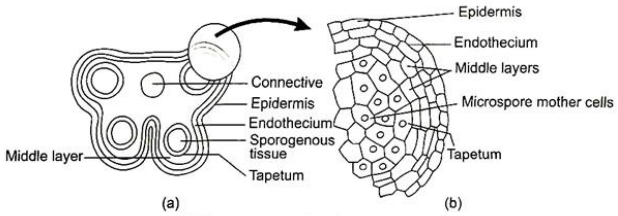
350 **(b)**

Nutrition.

Microsporangium is mainly surrounded by four layers/wall, *i*. *e*., Epidermis, endothecium, middle layer and tapetuem.

(i) Epidermis endothecium and middle layer help in protection and dehiscence of anther from pollen

(ii) Tapetum nourishes the developing pollen grain



(a) Transverse section of a young other
(b) Enlarged view one micro sporangium showing wall layers

351 **(c)**

Synergid have haploid number of chromosomes, so ans. is 21

352 **(a)**

Autogamy is a type of **self-pollination**. which occurs between anther and stigma of same flower. **Cleistogamous flowers**, remain closed so that only **self pollination occurs**. Examples include *Commelina*, groundnut, balsam, *Viola, Oxalis*.

353 **(d)**

Stigma, ovule, embryo sac and placenta they all are associated gynoecium.

A-Stigma - Landing ground for pollen grains

B-Style - Passage for pollen tube

C-Ovary - Embryos sac/fruit

D-Ovules – Formation of seed

E-Thalamus – Receptakle for ovary

354 **(d)**

The innermost layer of microsporangium (central mass of sporogenous tissue) is tapetum, which is nutritive in function, whereas outer most layer endothecium is protective and sporogenous tissue after meiosis give rise to microspore mother cell.

355 **(a)**

True. Because for releasing the pollens there are grooves, which separates the two theca and form line of dehiscence

357 **(b)**

Boron (B) is an essential micro-element or trace element, which is required for pollen germination, good growth of pollen tube and fertilization.

358 **(c)**

In angiosperms, the functional megaspore undergoes mitotic division and form 8 haploid nuclei. Out of which three micropylar cell (nuclei with cell wall) form egg apparatus, three chalazal cells from antipodal cells and the two central nuclei (polar nuclei) from central cell. These two polar nuclei fuse and form diploid secondary nucleus just before their fertilization by second male gamete. But prior to the entry of pollen tube, central cell generally contains two haploid polar nuclei.

359 **(a)**

Air is a mixture of various gases in different amounts, when air blows up it is known as **wind**. Pollination with the help of wind is known as **anemophily**. Pollination with the help of insects is known as **anemophily**, while pollination with the help of birds is known as **ornithophily.**

360 **(c)**

Occurrence of more than one embryo in a seed is referred as polyembryony.

Occurrence of more than one embryo in a seed is reffered as **Polyembryony.** In many citrus and mango varieties some of the nucellar cells surrounding the embryo sac start dividing, protrude into embryo sac and develop into the embryos. In such species, each ovule contains many embryos (nucellar polyembryony)

361 **(d)**

Polyembryony is the formation of more than one embryo so it is the type of embryogenesis

362 **(d)**

Development of Female Gametophyte

1. Megaspore mother cell undergoes the reductional/meiotic division that give rise to four megaspores
2. Three of them die (in majority of plants) only one remains viable. This method of embryo sac formation is called monosporic development
3. The nucleus of the functional megaspore divides mitotically to form two nuclei,

which move to the opposite poles forming two nucleate embryo sac

4. Two more sequential mitotic nuclear divisions results in the formation of four nucleate and later 8 nucleate stages of embryo sac
5. After the 8 nucleate stage cell walls are laid down leading to the organization of typical female gametophyte

363 **(a)**

10000 years.

Viability means ability to grow. This is a certain time period in which plant seed have ability to germinate. Lupine have the viability period about 10,000 years

364 **(a)**

Remnents of nucellus.

Sometimes the nucellus does not completely consumed so it persist. It is found in many plant like black pepper and beet. This nucellus is called perisperm

365 **(a)**

Cross pollination is the transfer of pollen grains from a flower to the stigma of another flower. Cross pollination require the production of a large number of pollen grains and a pollinating agent such as wind (anemophily), water (hydrophily), insect(entomophily), etc.

366 **(c)**

Bisexual flowers which remain always closed are called **cleistogamous** and such condition of flowers is called **Cleistogamy**. In such flowers, the anthers and stigma lie close to each other. When anthers dehisces in the flowers buds, pollen grains come in contact with stigma to affect pollination. Thus, cleistogamous flowers are invariably autogamous.

367 **(d)**

Female plant – Tetraploid in nature

Male plant – Diploid

So, endosperm would be = tetraploid + haploid = pentaploid

368 **(d)**

During entry of pollen tube within the ovule, synergid cell become disintegrate and provide path for entry of pollen tube within the chamber of embryo sac.

369 **(d)**

Milky water of tender coconut is called **liquid endosperm**.

370 **(c)**

The ovule in which the funicle, chalaza and micropyle lie on the vertical place is called **orthotropous** (Gk. *Orthos* = straight; *tope* = turned). In this type, the body of ovule is straight. Hilum and chalaza occur nearly. It is also called **atropous** or **erect** ovule, e.g., piperaceae, polygoniaceae, Urticaceae, etc. It is the most primitive and simplest type of ovule in angiosperms.

371 **(b)**

With the development of seed, the tissue of ovary wall is also stimulated to grow. It produces pericarp.

372 **(a)**

Pollination with the help of water is called **hydrophily**. Plants, which occur below the water level are called **sub-merged plants**. When pollination occurs in these plants, it is called **hypohydrophily**, *e. g.*, *Zostera*, *Najas*, etc.

373 **(a)**

Tapetum is the innermost layer of another wall and is generally comprised only a single layer of nutritive cells. It also forms Ubisch bodies which help in the formation of exine of pollen grains.

374 **(a)**

In angiosperms, endosperm is triploid (formed by the fusion of one male gamete (n) and secondary nucleus ($2n$) is diploid.

375 **(b)**

Insect pollinated flowers are light sticky, colourful with characteristic smell and produce nectar. The pollination by insects is termed as entomophily. The terms like myrmeophily, cantharophily are used for pollination by ants and beetles, respectively.

376 **(c)**

A-**Orthotropous** It is also called atropous. It is erect no bending is there, *e. g.*, *Polygonum*

B-**Anatropous** Completely inverted, *e. g., Helianthus*

C-**Hemitropous** The micropyle and chalaza line at 90° to funicle, *e. g.*, *Ranunculus*

D-**Campylotropous** more curvature than hemitropous, *e. g.*, *Capparis, mustard*

E-**Amphitropous** Horse shoe like, *e. g.*, *Capsella*

F-**Circinotropous** Ovule straight micropyle upward due to unilateral growth of funicle it become inverted, *e. g.*,*Opuntia*

377 **(a)**

In angiosperm, male gametophyte consists of a tube cell and **generative cell**. The generative cell divides to form two male gametes.

378 **(a)**
In embryo sac-synergids, egg cells, antipodal cells all are haploid because they are formed by mitotic division in haploid megaspore cell

379 **(c)**
Exine of pollen grain is made up of **sporopollenin.**

380 **(d)**
A- Meiosis, B- Microsporogenesis, C- Microspore tetrad, D- Pollen grains

381 **(c)**
The period in which the pollen grains remain viable is highly variable. It depends on the temperature and humidity. In some cereals such as rice and wheat, the pollen grains loose viability with in 30 minutes of their release and in some members of Rosaceae, Leguminosae and Solanaceae, they maintain variability for months

382 **(a)**
60% of angiosperms shed their pollens at two celled stage and in rest 40% the pollens are shed at three celled stage which is formed by division in generative cell mitotically

383 **(a)**
The inner most layer is tapetum. Tapetum nourishes the developing pollens

384 **(c)**
Male gametophyte of angiosperms is composed of one tube cell and one generative cell. This generative cell divides to form two male gametes. So, angiospermic male gametophyte is **three-celled**.

385 **(a)**
In most water pollinated plants, the pollen grains are long and ribbon-like and are protected from wetting by mucilagenous covering.