Ultimate KCET Crash Course 2026

BOTANY

DPP: 1

Sexual reproduction in flowering plants

Q1 A cross-section of a mature anther typically reveals the internal arrangement of pollen-producing chambers. Which structural configuration correctly describes this organization?
(A) Two chambers, each with one pollen sac
(B) Four pollen sacs located at the corners
(C) Three pollen sacs arranged triangularly
(D) A single chamber containing pollen grains

Q2 In a developing pollen sac, several protective and nutritive layers surround the sporogenous region. Which layer plays the most significant role in nourishing developing microspores?
(A) Epidermis (B) Endothecium
(C) Middle layers (D) Tapetum

Q3 During pollen development, specialized cells undergo a reduction division to produce clusters of four haploid cells. What is the ploidy level of each cell in such a tetrad?
(A) Diploid (B) Haploid
(C) Triploid (D) Tetraploid

Q4 Mature pollen grains possess a protective outer layer composed of a highly resistant biomolecule. What is the principal component of this outer wall?
(A) Lignin (B) Sporopollenin
(C) Cellulose (D) Chitin

Q5 Mature pollen grains are commonly released at a particular cellular stage. In most flowering plants, which condition is most typical at the time of pollen release?
(A) Single cell stage
(B) Two-celled stage
(C) Three-celled stage
(D) Multinucleate stage

Q6 The ovule is attached to the placenta of the ovary by a slender stalk. What is this connecting structure called?
(A) Funicle (B) Pedicel
(C) Filament (D) Placenta

Q7 The tissue inside the ovule that contains stored nutrients and surrounds the embryo sac is known as:
(A) Endosperm (B) Nucellus
(C) Pericarp (D) Placenta

Q8 Match Column I with Column II.

Column I		**Column II**	
A.	Tapetum	1.	Pollen tube entry
B.	Germpore	2.	Nutritional support
C.	Micropyle	3.	Sporopollenin absence
D.	Exine	4.	Resistant outer wall

(A) A-2, B-3, C-1, D-4
(B) A-3, B-2, C-4, D-1
(C) A-2, B-1, C-3, D-4
(D) A-4, B-3, C-2, D-1

Q9 Statement I: Reduction division in the megaspore mother cell produces four haploid megaspores.
Statement II: Only one of these megaspores generally develops into the female gametophyte.
(A) Both statements correct and II explains I
(B) Both statements correct but II does not explain I
(C) I correct, II incorrect
(D) I incorrect, II correct

Q10 In the mature female gametophyte of most flowering plants, how many cells and nuclei are typically present?
(A) 6 cells and 6 nuclei
(B) 7 cells and 8 nuclei
(C) 8 cells and 8 nuclei
(D) 7 cells and 7 nuclei

Q11 A flowering plant bears a blossom where pollen grains from its anthers reach the receptive surface of the same blossom. Which category of pollination does this represent?
(A) Autogamy (B) Geitonogamy
(C) Xenogamy (D) Hybridisation

Q12 In certain plant species, pollen from one flower is transferred to the receptive surface of another blossom belonging to the same individual plant. Which classification correctly describes this process?
(A) Autogamy (B) Geitonogamy
(C) Xenogamy (D) Apomixis

Q13 Pollen transfer occurring between flowers of two genetically distinct individuals of the same species is termed:
(A) Autogamy
(B) Geitonogamy
(C) Xenogamy
(D) Parthenogenesis

Q14 Certain plant species produce flowers that remain closed throughout their life cycle, ensuring pollen transfer within the unopened blossom. Which type of floral condition is responsible for this phenomenon?
(A) Chasmogamy (B) Cleistogamy
(C) Dichogamy (D) Herkogamy

Q15 In several grasses, pollination occurs without involvement of animals. Which floral feature is particularly advantageous for capturing airborne pollen grains?
(A) Thick petals with bright pigments
(B) Sticky nectar glands
(C) Feathery and enlarged stigma
(D) Large ovary wall

Q16 In certain aquatic plants, pollen grains float on the water surface and are carried passively until they encounter the female structure. Which plant represents such a mechanism?
(A) Vallisneria (B) Hibiscus
(C) Sunflower (D) Pea

Q17 Many insect-pollinated flowers exhibit bright colours and produce nectar. What is the primary evolutionary advantage of these traits?
(A) Prevent water loss
(B) Attract pollinating animals
(C) Increase pollen size
(D) Enhance ovule development

Q18 Some visitors consume nectar or pollen from flowers but do not contribute to pollination because they avoid contact with reproductive parts. Such visitors are termed:
(A) Mutualists (B) Pollinators
(C) Nectar robbers (D) Symbionts

Q19 In certain plants, pollen release occurs before the receptive surface becomes functional. Which mechanism of preventing self-pollination does this illustrate?
(A) Dichogamy (B) Cleistogamy
(C) Apomixis (D) Polyembryony

Q20 Assertion: Artificial hybridisation techniques require removal of anthers from the flower bud before pollen release.
Reason: This step prevents contamination by pollen originating from the same flower.
(A) Both correct and reason explains assertion
(B) Both correct but reason does not explain assertion
(C) Assertion correct but reason incorrect
(D) Assertion incorrect but reason correct

Q21 In flowering plants, after the pollen tube releases two male gametes inside the embryo sac, two different fusion events occur. One produces a diploid cell and the other forms a triploid nucleus. Which combination correctly identifies the fusions and their products?
(A) Egg + polar nuclei zygote; male gamete + egg endosperm
(B) Male gamete + egg zygote; male gamete + polar nuclei primary endosperm nucleus
(C) Male gamete + synergid embryo; male gamete + egg endosperm
(D) D. Egg + polar nuclei embryo; male gamete + synergid endosperm

Q22 In certain seeds, the nutritive tissue remains present even at maturity, whereas in others it is completely utilised during embryo formation. Which pair represents seeds retaining this nutritive tissue at maturity?
(A) Pea and groundnut
(B) Bean and chickpea
(C) Wheat and maize
(D) Pea and bean

Q23 In the embryo of grasses, a protective sheath encloses the emerging shoot apex and leaf primordia. Which structure performs this function?
(A) Scutellum (B) Coleoptile
(C) Coleorrhiza (D) Plumule

Q24 During seed formation, the ovule transforms into a seed while the ovary develops into a protective covering surrounding it. What is the term for this ovary-derived structure?
(A) Testa (B) Pericarp
(C) Funicle (D) Nucellus

Q25 Some fruits develop even in the absence of fertilisation, resulting in seedless edible products. Which term best describes this phenomenon?
(A) Polyembryony (B) Apomixis
(C) Parthenocarpy (D) Sporogenesis

Q26 In a few seeds remnants of the nucellus remain as an additional nutritive layer even after seed maturation. What is this residual tissue called?
(A) Endosperm (B) Perisperm
(C) Cotyledon (D) Aleurone layer

Q27 In some citrus and mango seeds multiple embryos arise within a single ovule due to proliferation of nucellar cells. What is this phenomenon called?
(A) Polyploidy
(B) Polyembryony
(C) Parthenocarpy
(D) Microsporogenesis

Q28 Match the Following

Column I		Column II	
A.	Triploid nutritive nucleus	1.	Embryo
B.	Diploid fertilisation product	2.	Primary endosperm nucleus
C.	Cotyledon of grasses	3.	Scutellum
D.	Root protective sheath in monocots	4.	Coleorrhiza

(A) A-2, B-1, C-3, D-4
(B) A-1, B-2, C-3, D-4
(C) A-2, B-3, C-1, D-4
(D) A-3, B-2, C-4, D-1

Q29 Assertion (A): Certain hybrid crop varieties can maintain desirable traits over generations if they reproduce through apomictic seed formation.
Reason (R): In apomictic reproduction embryos arise without genetic recombination.
(A) Both A and R are correct and R explains
(B) Both A and R are correct but R does not explain
(C) A correct but R incorrect
(D) A incorrect but R correct

Q30 The embryo of a dicot seed consists of two main components: cotyledons and a central axis bearing shoot and root poles. What is the name of this central axis?
(A) Hypocotyl (B) Embryonal axis
(C) Plumule (D) Radicle

Answer Key

Q1	B
Q2	D
Q3	B
Q4	B
Q5	B
Q6	A
Q7	B
Q8	A
Q9	B
Q10	B
Q11	A
Q12	B
Q13	C
Q14	B
Q15	C
Q16	A
Q17	B
Q18	C
Q19	A
Q20	A
Q21	B
Q22	C
Q23	B
Q24	B
Q25	C
Q26	B
Q27	B
Q28	A
Q29	A
Q30	B

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

Key Answer: B

Key Concept: Anther structure

Explanation:

1. A typical angiosperm anther is bilobed in structure.
2. Each lobe contains two pollen sacs.
3. Thus, the entire anther possesses four pollen sacs.
4. These chambers arise from specialized tissues that generate microspores
5. This four-chambered arrangement ensures production of numerous pollen grains.

Video Solution:

Q2 Text Solution:

Key Answer: D

Key Concept: Tapetal nutrition

Explanation:

1. The tapetum forms the innermost layer of the pollen sac wall.
2. It contains dense cytoplasm and often multiple nuclei.
3. These cells supply nutrients and enzymes to developing pollen grains.
4. Tapetal activity supports wall formation and maturation of pollen.
5. Without this nutritive layer, proper pollen development cannot occur.

Video Solution:

Q3 Text Solution:

Key Answer: B

Key Concept: Meiosis

Explanation:

1. Pollen mother cells undergo reduction division.
2. This process halves the chromosome number.
3. The resulting four cells form a tetrad of microspores.
4. Each microspore possesses a single set of chromosomes.
5. Therefore, each cell in the tetrad is haploid.

Video Solution:

Q4 Text Solution:

Key Answer: B

Key Concept: Sporopollenin wall

Explanation:

1. The outer wall of pollen grains is known as the exine.
2. This layer is composed of sporopollenin.
3. Sporopollenin is extremely resistant to chemical and physical damage.
4. It withstands high temperature, acids, and enzymatic degradation.
5. Because of this durability, pollen grains can persist as fossils.

Video Solution:

Q5 Text Solution:

Key Answer: B

Key Concept: Pollen maturity

Explanation:

1. A mature pollen grain usually contains a vegetative cell and a generative cell.
2. The vegetative cell is larger and stores nutrients.
3. The generative cell later divides to form male gametes.
4. In the majority of species, pollen grains are shed when these two cells are present.
5. Some species release pollen only after formation of two gametes.

Video Solution:

Q6 Text Solution:

Key Answer: A

Key Concept: Ovule attachment

Explanation:

1. Each ovule must remain connected to the ovary wall.
2. This connection is achieved through a narrow stalk.
3. The stalk facilitates nutrient transport from the plant.
4. The point where it meets the ovule body forms a distinct junction.
5. This attachment stalk is termed the funicle.

Video Solution:

Q7 Text Solution:

Key Answer: B

Key Concept: Ovular tissue

Explanation:

1. The ovule encloses a mass of parenchymatous cells.
2. These cells accumulate reserve materials.
3. The developing female gametophyte is embedded within this tissue.
4. It supports and nourishes the developing embryo sac.
5. This nutritive tissue is termed the nucellus.

Video Solution:

Q8 Text Solution:

Key Answer: A

Key Concept: Reproductive structures

Explanation:

1. Tapetum functions as the nutritive tissue of developing pollen.
2. Germ pores are openings where sporopollenin is absent.
3. The micropyle provides a passage for the pollen tube.
4. Exine represents the highly resistant outer wall of pollen.
5. Hence the correct correspondence is A-2, B-3, C-1, D-4.

Video Solution:

Q9 Text Solution:

Key Answer: B

Key Concept: Megaspore selection

Explanation:

1. Meiosis produces four haploid megaspores.
2. In most species only one remains functional.
3. The remaining three degenerate during development.
4. The functional megaspore forms the embryo sac.
5. The second statement is correct but does not explain meiosis.

Video Solution:

Q10 Text Solution:

Key Answer: B

Key Concept: Embryo sac structure

Explanation:

1. The embryo sac forms through three mitotic divisions of the functional megaspore nucleus.
2. This results in eight nuclei within the sac.
3. Cell walls then organize these nuclei into cellular structures.
4. The final arrangement consists of seven cells including egg apparatus, antipodals, and central cell.
5. Therefore the mature female gametophyte contains seven cells and eight nuclei.

Video Solution:

Q11 **Text Solution:**

Key Answer: A

Key Concept: Self pollination

Explanation:

1. In this mechanism, pollen originates and reaches the receptive surface within the same flower.
2. No external plant participates in the transfer.
3. Successful transfer requires synchrony of pollen release and stigma receptivity.
4. Close proximity of anther and stigma facilitates the process.
5. This condition is termed autogamy.

Video Solution:

Q12 **Text Solution:**

Key Answer: B

Key Concept: Same plant transfer

Explanation:

1. In this case pollen moves between two different flowers.
2. However, both flowers belong to the same plant.
3. Pollinating agents are usually involved in the transfer.
4. Genetically it resembles self-pollination because the genetic source remains identical.
5. Such transfer is described as geitonogamy.

Video Solution:

Q13 Text Solution:

Key Answer: C

Key Concept: Genetic recombination

Explanation:

1. This process involves two separate plants of the same species.
2. Pollen originates from one individual and reaches the stigma of another.
3. Genetic material from different plants combines.
4. It enhances variability in the offspring.
5. This mechanism is referred to as xenogamy.

Video Solution:

Q14 Text Solution:

Key Answer: B

Key Concept: Closed flowers

Explanation:

1. These blossoms never open to the external environment.
2. The anther and stigma remain in close proximity.
3. Pollen is released directly onto the receptive surface.
4. Cross-pollination is prevented because outside pollen cannot enter.
5. Such flowers are known as cleistogamous flowers.

Video Solution:

Q15 Text Solution:

Key Answer: C

Key Concept: Wind pollination

Explanation:

1. Wind-mediated pollen transfer relies on random air currents.
2. To capture airborne pollen efficiently, receptive surfaces must be large.
3. Branched or feathery stigmas increase the trapping surface area.
4. This adaptation enhances the chances of pollen interception.
5. Therefore, a feathery stigma is characteristic of wind-pollinated plants.

Video Solution:

Q16 Text Solution:

Key Answer: A

Key Concept: Hydrophily

Explanation:

1. Some aquatic plants rely on water currents for pollen transport.
2. In these species, male flowers release pollen onto the water surface.
3. Currents carry the pollen until it contacts the female flower.
4. The female structure often reaches the surface using a long stalk.
5. Vallisneria exemplifies this mechanism.

Video Solution:

Q17 Text Solution:

Key Answer: B

Key Concept: Pollinator attraction

Explanation:

1. Animals act as carriers for pollen grains between flowers.
2. Flowers must attract these organisms effectively.
3. Bright colours and fragrances serve as visual and chemical signals.
4. Nectar acts as a reward encouraging repeated visits.
5. These adaptations improve pollination success.

Video Solution:

Q18 Text Solution:

Key Answer: C

Key Concept: Resource exploitation

Explanation:

1. Not all flower visitors participate in pollen transfer.
2. Some organisms remove floral rewards without aiding reproduction.
3. They bypass the reproductive structures.
4. Consequently no pollen transfer occurs.
5. Such visitors are called nectar or pollen robbers.

Video Solution:

Q19 Text Solution:

Key Answer: A

Key Concept: Temporal separation

Explanation:

1. Male and female functions occur at different times.
2. Either pollen is released earlier or stigma becomes receptive later.
3. This temporal difference prevents self-fertilisation.
4. Cross-pollination becomes more likely.
5. This adaptation is termed dichogamy.

Video Solution:

Q20 Text Solution:

Key Answer: A

Key Concept: Controlled pollination

Explanation:

1. In crop improvement, breeders must control pollen sources.
2. Removal of anthers prevents self-pollination.
3. This step ensures only selected pollen is used.
4. The procedure is carried out before anthers release pollen.
5. Therefore the reason correctly explains the assertion.

Video Solution:

Q21 Text Solution:

Key Answer: B

Key Concept: Double fertilisation

Explanation:

1. One male gamete fuses with the egg cell nucleus producing a diploid zygote.
2. The second male gamete fuses with two polar nuclei in the central cell.
3. This triple fusion forms a triploid primary endosperm nucleus.
4. Both events occur in the same embryo sac.
5. The occurrence of these two fusion events together constitutes double fertilisation, characteristic of flowering plants.

Video Solution:

Q22 Text Solution:

Key Answer: C

Key Concept: Albuminous seeds

Explanation:

1. In some seeds the nutritive tissue persists even after embryo formation.
2. These are termed albuminous seeds.
3. Examples include cereal grains such as wheat and maize.
4. In contrast, seeds like pea and groundnut consume this tissue completely during development.
5. Such seeds lacking residual nutritive tissue are called non-albuminous seeds.

Video Solution:

Q23 **Text Solution:**

Key Answer: B

Key Concept: Coleoptile sheath

Explanation:

1. Grass embryos possess a single cotyledon known as scutellum.
2. The shoot apex and young leaves require protection during germination.
3. A hollow foliar structure encloses this shoot region.
4. This protective covering is termed the coleoptile.
5. It safeguards the emerging shoot while it pushes through the soil surface.

Video Solution:

Q24 **Text Solution:**

Key Answer: B

Key Concept: Fruit wall

Explanation:

1. Following fertilisation, the ovary enlarges and develops into a fruit.
2. The wall of this fruit originates from the ovary wall.
3. This protective outer covering is termed the pericarp.
4. It encloses one or more seeds derived from ovules.
5. The pericarp may be fleshy or dry depending on species.

Video Solution:

Q25 Text Solution:

Key Answer: C

Key Concept: Seedless fruit

Explanation:

1. In certain plants, fruit formation occurs without fertilisation.
2. This leads to development of fruits lacking seeds.
3. Such fruits are termed parthenocarpic fruits.
4. The process may occur naturally or be induced using plant growth regulators.
5. Banana is a common example produced through this mechanism.

Video Solution:

Q26 Text Solution:

Key Answer: B

Key Concept: Persistent nucellus

Explanation:

1. During ovule development the nucellus surrounds the embryo sac.
2. In some plants a portion of nucellar tissue persists even in mature seeds.
3. This remnant tissue is called perisperm.
4. It acts as an additional nutritive reserve.
5. Seeds of black pepper and beet commonly show this feature.

Video Solution:

Q27 Text Solution:

Key Answer: B

Key Concept: Multiple embryos

Explanation:

1. Occasionally more than one embryo develops within a single seed.
2. These embryos may originate from nucellar tissues surrounding the embryo sac.
3. The additional embryos grow alongside the zygotic embryo.
4. This results in several embryos within one ovule.
5. Such a condition is termed polyembryony.

Video Solution:

Q28 **Text Solution:**

Key Answer: A

Key Concept: Embryo structures

Explanation:

1. The triploid nutritive nucleus produced after triple fusion is the primary endosperm nucleus.
2. The diploid cell formed after fusion of gametes becomes the embryo.
3. In grasses the single cotyledon is called the scutellum.
4. The radicle is enclosed by a protective sheath called coleorrhiza.
5. These specialised structures are typical of monocot embryo organisation

Video Solution:

Q29 **Text Solution:**

Key Answer: A

Key Concept: Hybrid stability

Explanation:

1. Hybrid crops usually segregate genetically in subsequent generations.
2. Apomictic reproduction bypasses fertilisation and meiosis.
3. As a result offspring are genetically identical to the parent.
4. This maintains hybrid characteristics across generations.
5. Therefore the reason explains why apomixis preserves hybrid traits.

Video Solution:

Q30 Text Solution:

Key Answer: B

Key Concept: Embryonal axis

Explanation:

1. The embryo includes storage structures called cotyledons.
2. Between them lies a central longitudinal structure.
3. This structure bears the shoot apex and root apex.
4. It differentiates into epicotyl and hypocotyl regions.
5. The entire structure is referred to as the embryonal axis.

Video Solution: