



Sharp Test Series — Sample Paper

Chapter Test

QUESTION PAPER CODE
SMPLTHY-2026-000115

MODEL ANSWERS & MARKING SCHEME

Total Questions 14	Subjects Biology	Maximum Marks 30	Time 1 Hour 30 Minutes
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For examiners

The model answer and the marking points for every question are given below. Award the same marks for a different but correct method — the marking points say what to check, not the exact words.

SECTION A — Multiple Choice Questions

[5]

Attempt **all** questions. Each question carries 1 mark.

Q.1 Genetically varied offspring are generated by _____.

[1]

Answer: (D) xenogamy

Xenogamy is cross-pollination between different plants, introducing genetic variation in the offspring.

Q.2 When pollen tube enters through micropyle, it is known as

[1]

Answer: (C) porogamy

Entry of the pollen tube through the micropyle is called porogamy.

Q.3 In flowering plant, a mature gametophyte is derived from a pollen mother cell by

[1]

Answer: (C) 1 meiosis and 2 mitosis

PMC undergoes 1 meiosis to form 4 haploid microspores. Each microspore divides by mitosis (1st) into vegetative and generative cells; the generative cell divides by mitosis (2nd) into two male gametes, giving the mature male gametophyte.

Q.4 In Ceratophyllum, pollination is

[1]

Answer: (A) hydrophilous

Ceratophyllum is pollinated under water, hence hydrophilous (hypohydrophily).

Q.5 Within the ovule, the female gametophyte is the

[1]

Answer: (D) embryo sac

The embryo sac is the mature female gametophyte inside the ovule.

SECTION B — Short Answer Questions

[8]

Attempt **all** questions. Each question carries 2 marks.

Q.6 Distinguish between zoospores and conidia on any two points.

[2]

Zoospores: (i) motile — they bear flagella; (ii) thin-walled or naked; (iii) formed inside a zoosporangium (endogenously); (iv) produced in aquatic forms and need water to swim; e.g. *Chlamydomonas*, *Ulothrix*.

Conidia: (i) non-motile — no flagella; (ii) have a definite, often thick, wall; (iii) formed singly or in chains at the tips of special hyphae called conidiophores (exogenously); (iv) produced by terrestrial forms and dispersed by wind; e.g. *Penicillium*, *Aspergillus*.

Marking scheme: Any two correct points of difference — 1 each

Q.7 Distinguish between asexual and sexual reproduction on any two points.

[2]

Asexual reproduction: (i) a single parent is involved; (ii) no gametes are formed and there is no fertilization; (iii) only mitotic divisions take place; (iv) the offspring are genetically identical to the parent (clones), so there is no variation; (v) it is rapid.

Sexual reproduction: (i) usually two parents (or two sexes) are involved; (ii) haploid gametes are formed and fuse (fertilization); (iii) meiosis occurs during gamete formation, followed by fertilization; (iv) the offspring show genetic variation; (v) it is comparatively slow.

Marking scheme: Any two correct points of difference — 1 each

Q.8 Distinguish between chasmogamous and cleistogamous flowers. Name a plant that bears both.

[2]

Chasmogamous flowers open at maturity, exposing their anthers and stigma; they can be self-pollinated or cross-pollinated.

Cleistogamous flowers never open; the anthers and the stigma lie close together inside the closed flower, so only self-pollination (autogamy) is possible and seed set is assured even without pollinators.

Commelina benghalensis bears both kinds of flowers (so do *Viola* and *Oxalis*).

Marking scheme: Correct distinction — chasmogamous open, cleistogamous closed with assured autogamy — 1; a plant bearing both (*Commelina* / *Viola* / *Oxalis*) — 1

Q.9 State any four points of significance of seed and fruit formation to flowering plants.

[2]

1. The seed coat protects the embryo, and the seed can remain dormant, so the plant survives unfavourable conditions.

2. The food stored in the endosperm or cotyledons nourishes the seedling until it becomes self-sufficient.

3. Seeds (and fruits) are dispersed to new habitats, which helps the species to spread and colonise new areas.

4. Being products of sexual reproduction, seeds carry new genetic combinations (variation) that help in adaptation.

5. The fruit protects the developing seeds and often helps in their dispersal (e.g. by animals that eat fleshy fruits).

Marking scheme: Any four correct points — $\frac{1}{2}$ each

SECTION C — Short Answer Questions

[9]

Attempt **all** questions. Each question carries 3 marks.

Q.10 State what each of the following develops into after fertilization: (a) ovary, (b) ovary wall, (c) ovule, (d) integuments, (e) zygote, (f) primary endosperm nucleus. **[3]**

(a) Ovary → fruit.

(b) Ovary wall → pericarp (fruit wall).

(c) Ovule → seed.

(d) Integuments → seed coat (the outer integument forms the testa and the inner forms the tegmen).

(e) Zygote → embryo.

(f) Primary endosperm nucleus → endosperm.

Marking scheme: Each correct fate — $\frac{1}{2} \times 6$

Q.11 Draw a neat, labelled diagram of a mature (7-celled, 8-nucleate) embryo sac. **[3]**

Diagram: an oval embryo sac. At the micropylar end is the egg apparatus — one egg cell flanked by two synergids, the synergids showing the filiform apparatus at their micropylar tips. At the chalazal end are three antipodal cells. The large central cell occupies the middle and contains two polar nuclei (which may have fused to form the secondary nucleus).

Labels expected (any four for the marks): micropylar end, egg cell, synergids, filiform apparatus, central cell, polar nuclei, antipodal cells, chalazal end.

Marking scheme: Correct outline showing three cells at each end and two polar nuclei in the centre — 1; any four correct labels — $\frac{1}{2}$ each (2)

Q.12 The root-tip cells of a flowering plant have 16 chromosomes ($2n = 16$). State the ploidy and the number of chromosomes in (a) the generative cell of a pollen grain, (b) a cell of the endosperm, (c) a cell of the seed coat. **[3]**

Here $2n = 16$, so $n = 8$.

(a) Generative cell — formed by mitosis in the haploid microspore (pollen grain): haploid (n), 8 chromosomes.

(b) Endosperm cell — formed from the primary endosperm nucleus produced by triple fusion: triploid ($3n$), $3 \times 8 = 24$ chromosomes.

(c) Seed-coat cell — formed from the integuments, which are tissue of the diploid mother plant: diploid ($2n$), 16 chromosomes.

Marking scheme: (a) ploidy n — $\frac{1}{2}$; 8 chromosomes — $\frac{1}{2}$; (b) ploidy $3n$ — $\frac{1}{2}$; 24 chromosomes — $\frac{1}{2}$; (c) ploidy $2n$ — $\frac{1}{2}$; 16 chromosomes — $\frac{1}{2}$

SECTION D — Long Answer Questions

[8]

Attempt **all** questions. Each question carries 4 marks.

- Q.13** What are outbreeding devices? Explain dichogamy and unisexuality as outbreeding devices, and state which kind of unisexual plant prevents geitonogamy as well as autogamy. [4]

Outbreeding devices are the floral mechanisms that discourage self-pollination and encourage cross-pollination. Flowering plants need them because continued self-pollination leads to inbreeding depression (loss of vigour and fertility).

Dichogamy: in a bisexual flower, the anthers and the stigma mature at different times, so the pollen of a flower cannot pollinate its own stigma. It is of two kinds — protandry, where the anthers mature first (e.g. sunflower, *Salvia*), and protogyny, where the stigma becomes receptive first (e.g. *Plantago*, *Aristolochia*).

Unisexuality: the flowers are unisexual, so self-pollination within a flower (autogamy) is impossible. In monoecious plants (e.g. maize, castor, cucurbits) male and female flowers are borne on the same plant; autogamy is prevented, but pollen can still pass to a female flower of the same plant, so geitonogamy is possible.

Dioecious plants, which bear male and female flowers on separate plants (e.g. papaya, date palm), prevent both autogamy and geitonogamy, because a female plant can receive pollen only from another plant.

Marking scheme: Meaning of outbreeding devices (discourage self-pollination, promote cross-pollination) — 1; dichogamy — anthers and stigma mature at different times, protandry and protogyny — 1; monoecy — unisexual flowers on the same plant, prevents autogamy but not geitonogamy — 1; dioecy prevents both autogamy and geitonogamy — 1

- Q.14** A single microspore mother cell in an anther ultimately gives rise to eight male gametes. Explain step by step how this happens, naming the type of cell division at each step. [4]

Step 1 — meiosis (microsporogenesis): the microspore mother cell (pollen mother cell) is diploid ($2n$). It divides by meiosis to form a tetrad of four haploid (n) microspores, which separate as the anther matures and develop into four pollen grains.

Step 2 — first mitosis: in each microspore the nucleus divides mitotically, and an unequal division forms two cells — a large vegetative (tube) cell and a small generative cell, which floats in the cytoplasm of the vegetative cell. The pollen grain is now two-celled; in most angiosperms it is shed at this stage.

Step 3 — second mitosis: the generative cell divides mitotically to form two male gametes. In some species this happens inside the pollen grain before it is shed (three-celled pollen); in others it happens in the pollen tube after germination. The vegetative cell forms no gametes; it grows out as the pollen tube that carries the male gametes.

Count: 1 microspore mother cell $\rightarrow$ 4 microspores (pollen grains); each pollen grain gives 2 male gametes, so $4 \times 2 = 8$ male gametes.

Marking scheme: Meiosis of the diploid microspore mother cell giving a tetrad of four haploid microspores — 1; mitosis in each microspore forming a vegetative cell and a generative cell — 1; mitosis of the generative cell forming two male gametes, in the pollen grain or in the pollen tube — 1; count $4 \times 2 = 8$ male gametes — 1