

Plant Kingdom — NEET MCQs with Solutions

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Q1. The cell wall of most algae is chiefly composed of:

- (A) Chitin
- (B) Peptidoglycan
- (C) Suberin
- (D) Cellulose

Q2. Which condition correctly represents anisogamy in algae as per NCERT?

- (A) Fusion of two morphologically similar non-motile gametes
- (B) Fusion of two motile but morphologically dissimilar gametes
- (C) Fusion of a large non-motile egg with a small motile antherozoid
- (D) Fusion of gametes without prior meiosis

Q3. Which of the following features most clearly distinguishes algae from bryophytes according to NCERT?

- (A) Algae lack chlorophyll while bryophytes possess it
- (B) Algae are always unicellular while bryophytes are always multicellular
- (C) Embryo is not formed in algae after fertilization, while bryophytes form a retained embryo
- (D) Algae possess archegonia while bryophytes do not

Q4. Which of the following is a unicellular member of Chlorophyceae?

- (A) Spirogyra
- (B) Ulothrix
- (C) Chlamydomonas
- (D) Ulva

Q5. Pyrenoids, present in the chloroplasts of Chlorophyceae, are primarily associated with:

- (A) Lipid droplet accumulation
- (B) Protein synthesis for flagella assembly
- (C) Starch synthesis and storage
- (D) DNA replication during cell division

Q6. The life cycle pattern exhibited by most members of Chlorophyceae is:

- (A) Diplontic — dominant diploid sporophyte, meiosis produces haploid spores
- (B) Haplontic — dominant haploid gametophyte, zygote is the only diploid stage
- (C) Haplodiplontic — sporophyte and gametophyte both multicellular
- (D) Triphasic — three alternating generations

Q7. The characteristic pigment combination of Phaeophyceae is:

- (A) Chlorophyll a, chlorophyll c, and fucoxanthin
- (B) Chlorophyll a, chlorophyll b, and carotenoids
- (C) Chlorophyll a, phycoerythrin, and phycocyanin
- (D) Chlorophyll b, chlorophyll d, and fucoxanthin

Q8. Which of the following shows the highest level of thallus differentiation among Phaeophyceae?

- (A) Laminaria — differentiated into holdfast, stipe, and frond; massive thallus
- (B) Ectocarpus — simple branched filamentous thallus
- (C) Dictyota — flat ribbon-like thallus with dichotomous branching
- (D) Sargassum — floating thallus without holdfast

Q9. Which of the following is the most complete and accurate set of distinguishing features of Phaeophyceae?

- (A) Chlorophyll a + b, starch, cellulose + pectin wall, freshwater habitat
- (B) Phycoerythrin, floridean starch, cellulose wall, red colour, marine habitat
- (C) Chlorophyll a + c, fucoxanthin, laminarin + mannitol, cellulose + algin wall, heterokont flagella, predominantly marine
- (D) Chlorophyll a + c, phycocyanin, floridean starch, cellulose wall, isokont flagella

Q10. Which of the following is a correctly identified marine red alga?

- (A) Spirogyra — filamentous green alga
- (B) Ectocarpus — filamentous brown alga
- (C) Chlamydomonas — unicellular green alga
- (D) Polysiphonia — marine red alga (Rhodophyceae)

Q11. Porphyra is cited in NCERT as a red alga used as food. In which context is it specifically mentioned?

- (A) Consumed as edible seaweed (nori) particularly in Asian countries
- (B) Used as laboratory culture medium instead of agar
- (C) Source of iodine supplement replacing Laminaria
- (D) Grown in space research as single-cell protein source

Q12. In the triphasic life cycle of Rhodophyceae, the carposporophyte is an additional generation. It is correctly described as:

- (A) A free-living haploid phase that produces carpospores by mitosis
- (B) A diploid phase that develops directly from the zygote and remains attached to (parasitic on) the female gametophyte
- (C) A diploid free-living phase equivalent to the tetrasporophyte
- (D) A haploid phase producing tetraspores by meiosis

Q13. The female sex organ in bryophytes that encloses and protects the egg cell is the:

- (A) Antheridium
- (B) Sporangium
- (C) Archegonium
- (D) Protonema

Q14. Water for fertilisation is required by both bryophytes and pteridophytes. Which of the following features is shared by both groups?

- (A) Dominant gametophyte generation
- (B) Free-living diploid sporophyte as the dominant phase
- (C) Flagellated male gametes requiring water for fertilisation
- (D) Formation of seeds for dispersal

Q15. In mosses, the spore germinates to produce a filamentous, branched, algal-like juvenile stage before the adult gametophyte develops. This stage is called the:

- (A) Prothallus
- (B) Archegoniophore
- (C) Protonema
- (D) Sporogonium

Q16. The independent, free-living gametophyte of pteridophytes is a small, heart-shaped, photosynthetic thallus commonly called the:

- (A) Capsule — the spore-producing structure of the sporophyte
- (B) Seta — the stalk connecting foot to capsule in bryophytes
- (C) Sporophyll — the spore-bearing leaf of the sporophyte
- (D) Prothallus — the inconspicuous but independent haploid gametophyte

Q17. Homospory in pteridophytes refers to the production of:

- (A) Two morphologically distinct spore types — microspores and megaspores
- (B) Spores only during the gametophyte phase by mitosis
- (C) Morphologically identical spores of one type only, all giving rise to bisexual prothalli
- (D) Spores that directly develop into seeds without forming a gametophyte

Q18. In pteridophytes, meiosis occurs inside the sporangium producing haploid spores. Which structure in the sporangium directly undergoes meiosis?

- (A) Archespore cells that line the sporangium wall for protection
- (B) Spore mother cells (sporocytes) — diploid cells that divide meiotically to produce tetrads of haploid spores
- (C) Tapetal cells that nourish the developing spores after meiosis
- (D) Elater cells that assist in mechanical spore dispersal

Q19. Pollination in most gymnosperms is brought about by:

- (A) Water currents carrying pollen to archegonia
- (B) Insects attracted to colourful strobili
- (C) Birds transferring pollen between cones
- (D) Wind, which passively carries winged or light pollen grains

Q20. In gymnosperms, pollen grains are transferred directly to:

- (A) The antheridium of the male cone
- (B) The micropyle of the ovule, not to a stigma
- (C) The ovary wall surrounding the ovule
- (D) The stigmatic surface of the carpel

Q21. Which combination of characters is exclusively found in dicots and absent in monocots?

- (A) Fibrous root, parallel venation, trimerous flowers
- (B) Scattered vascular bundles without cambium, single cotyledon, parallel venation
- (C) Tap root system, reticulate venation, pentamerous or tetramerous flowers, two cotyledons, vascular bundles with cambium
- (D) Single cotyledon, open vascular bundles, parallel venation

Q22. Double fertilisation in angiosperms was first discovered by:

- (A) Charles Darwin, while studying self-incompatibility in *Primula*
- (B) Gregor Mendel, during his experiments on *Pisum sativum*
- (C) Sergei Nawaschin (1898), while studying *Lilium* and *Fritillaria*
- (D) Wilhelm Hofmeister, while describing alternation of generations

Q23. Which of the following correctly identifies the life cycle pattern of angiosperms?

- (A) Haplontic
- (B) Haplo-diplontic with dominant gametophyte
- (C) Diplontic with dominant gametophyte
- (D) Diplontic with dominant sporophyte

Q24. Which sequence correctly represents the events in a diplontic life cycle?

- (A) Spore → Gametophyte → Zygote → Sporophyte
- (B) Sporophyte → Gametes → Zygote → Sporophyte
- (C) Sporophyte → Spore → Gametophyte → Zygote
- (D) Gametophyte → Zygote → Sporophyte → Spore

Answer key and explanations

Q1. Answer: (D) Cellulose

NCERT states algal cell walls are mainly cellulosic. Chitin is the fungal cell wall component; peptidoglycan is bacterial; suberin is found in cork cells — all strong distractors.

Q2. Answer: (B) Fusion of two motile but morphologically dissimilar gametes

NCERT defines anisogamy as fusion of gametes that are motile but morphologically dissimilar in size. Option C describes oogamy — the top distractor — where the female gamete is specifically non-motile.

Q3. Answer: (C) Embryo is not formed in algae after fertilization, while bryophytes form a retained embryo

Bryophytes are defined as embryophytes — they retain the embryo within the archegonium after fertilization. Algae do not form an embryo at all. Option D is the trap: archegonia are a bryophyte feature, not an algal one — the student may confuse which group has them.

Q4. Answer: (C) Chlamydomonas

Chlamydomonas is a unicellular, flagellated green alga cited in NCERT. Spirogyra and Ulothrix are filamentous; Ulva is a multicellular sheet-like thallus.

Q5. Answer: (C) Starch synthesis and storage

NCERT states pyrenoids are proteinaceous bodies in chloroplasts that are centres of starch synthesis. They are surrounded by starch granules. Option B is the trap — pyrenoids are proteinaceous but not involved in flagella assembly.

Q6. Answer: (B) Haplontic — dominant haploid gametophyte, zygote is the only diploid stage

In most green algae the dominant free-living plant body is haploid (gametophyte). The zygote is the only diploid stage and undergoes meiosis on germination — this is the haplontic pattern. Option C (haplodiplontic) describes bryophytes and is the main trap.

Q7. Answer: (A) Chlorophyll a, chlorophyll c, and fucoxanthin

NCERT states Phaeophyceae possess chlorophyll a, chlorophyll c, and fucoxanthin (with other carotenoids). Chlorophyll b is the Chlorophyceae marker; phycoerythrin belongs to Rhodophyceae — both are designed traps.

Q8. Answer: (A) Laminaria — differentiated into holdfast, stipe, and frond; massive thallus

Laminaria (and Kelp) represents the most complex thallus organisation among Phaeophyceae — differentiated into holdfast, stipe, and frond with internal tissue differentiation. Ectocarpus is the simplest (filamentous). Sargassum does have a holdfast when attached — Option D contains a factual trap.

Q9. Answer: (C) Chlorophyll a + c, fucoxanthin, laminarin + mannitol, cellulose + algin wall, heterokont flagella, predominantly marine

Option C integrates all NCERT-stated Phaeophyceae features: pigments (chl a, c + fucoxanthin), reserve food (laminarin + mannitol), cell wall (cellulose + algin), flagella (heterokont), and habitat (marine). Options A and B describe Chlorophyceae and Rhodophyceae respectively. Option D mixes Rhodophyceae storage (floridean starch) with Phaeophyceae pigments — an ELITE-level hybrid trap.

Q10. Answer: (D) Polysiphonia — marine red alga (Rhodophyceae)

NCERT lists Polysiphonia as a marine red alga (Rhodophyceae). All three wrong options are correctly identified as members of other algal classes — cross-division identification traps requiring the student to know both the correct answer and the distractors' classifications.

Q11. Answer: (A) Consumed as edible seaweed (nori) particularly in Asian countries

NCERT mentions Porphyra (along with Laminaria and Sargassum) as algae used as food by coastal populations. Porphyra (nori) is specifically consumed in Asian countries. Iodine extraction and space research are Phaeophyceae/Chlorophyceae uses — cross-class economic traps.

Q12. Answer: (B) A diploid phase that develops directly from the zygote and remains attached to (parasitic on) the female gametophyte

The carposporophyte develops from the zygote (diploid, 2n) and remains attached to and dependent on the female gametophyte — it is not free-living. It produces diploid carpospores by mitosis, which germinate into the free-living tetrasporophyte. Option C is the trap — students confuse carposporophyte with tetrasporophyte.

Q13. Answer: (C) Archegonium

The archegonium is the flask-shaped female sex organ in bryophytes containing the egg cell. The antheridium is the male sex organ producing antherozoids. Both are multicellular and jacketed with sterile cells — distinguishing bryophytes from algae.

Q14. Answer: (C) Flagellated male gametes requiring water for fertilisation

Both bryophytes and pteridophytes have flagellated antherozoids that require water for fertilisation. They diverge in dominance (gametophyte in bryophytes; sporophyte in pteridophytes) and sporophyte independence. Neither group forms seeds.

Q15. Answer: (C) Protonema

In mosses, spore germination produces the protonema — a creeping, filamentous, chlorophyllous structure resembling green algae. Buds on the protonema develop into leafy gametophores. Prothallus is the equivalent stage in pteridophytes; sporogonium is the entire sporophyte body.

Q16. Answer: (D) Prothallus — the inconspicuous but independent haploid gametophyte

The prothallus is the pteridophyte gametophyte — typically heart-shaped, green, photosynthetic, and free-living. Despite being inconspicuous, it is fully independent and bears both antheridia and archegonia. This independence of the gametophyte distinguishes pteridophytes from bryophytes where the sporophyte depends on the gametophyte.

Q17. Answer: (C) Morphologically identical spores of one type only, all giving rise to bisexual prothalli

Homosporous pteridophytes (e.g., *Dryopteris*, *Adiantum*) produce a single type of spore — all morphologically identical. Each spore germinates into a bisexual prothallus bearing both antheridia and archegonia. This contrasts with heterospory where two distinct spore types produce unisexual gametophytes.

Q18. Answer: (B) Spore mother cells (sporocytes) — diploid cells that divide meiotically to produce tetrads of haploid spores

Inside the pteridophyte sporangium, diploid spore mother cells ($2n$) — also called sporocytes — undergo meiosis to produce tetrads of haploid spores (n). The tapetum is the nutritive layer surrounding them. Each haploid spore then germinates to produce the prothallus (gametophyte).

Q19. Answer: (D) Wind, which passively carries winged or light pollen grains

Gymnosperms are predominantly anemophilous (wind-pollinated). Their pollen grains are often winged (e.g., *Pinus*) or light and powdery to facilitate wind dispersal. They lack the colourful flowers, nectar, and scent that attract insect or animal pollinators. Water pollination is characteristic of aquatic angiosperms, not gymnosperms.

Q20. Answer: (B) The micropyle of the ovule, not to a stigma

Gymnosperms lack a stigma and ovary entirely. Pollen is carried by wind directly to the micropyle of the ovule, where it is captured by the pollination drop. This direct pollen-to-ovule transfer distinguishes gymnosperms from angiosperms, where pollen lands on a stigma and must grow through the style.

Q21. Answer: (C) Tap root system, reticulate venation, pentamerous or tetramerous flowers, two cotyledons, vascular bundles with cambium

Dicots: tap root system, reticulate (net-like) venation, floral parts in 4s or 5s (tetra/pentamerous), two cotyledons, vascular bundles arranged in a ring with cambium (allowing secondary growth). Options A and D describe monocot characters. Option B mixes monocot vascular bundle arrangement with dicot features.

Q22. Answer: (C) Sergei Nawaschin (1898), while studying *Lilium* and *Fritillaria*

Double fertilisation was discovered by the Russian botanist Sergei Nawaschin in 1898, working with *Lilium* (lily) and *Fritillaria*. This discovery was a landmark in plant reproductive biology — it revealed that both male gametes from a pollen grain participate in fertilisation. Darwin studied pollination mechanisms. Mendel studied inheritance. Hofmeister described alternation of generations.

Q23. Answer: (D) Diplontic with dominant sporophyte

Angiosperms are diplontic — the sporophyte (the flowering plant) is the dominant phase; the gametophyte is reduced to a few cells within the flower (pollen grain = male gametophyte; embryo sac = female gametophyte). Option C is a well-designed trap combining the correct cycle type with wrong dominance.

Q24. Answer: (B) Sporophyte → Gametes → Zygote → Sporophyte

In a diplontic cycle, the dominant sporophyte produces gametes (via meiosis), which fuse to form a zygote, which develops back into a sporophyte — there is no free-living multicellular gametophyte stage. Option C describes the haplo-diplontic sequence and is the most tempting wrong answer.

Plant groups at a glance

Group	Key features and examples
Chlorophyceae (green algae)	Chlorophyll a, b; starch; cellulose wall; 2-8 equal apical flagella — Chlamydomonas, Volvox, Ulothrix, Spirogyra, Chara
Phaeophyceae (brown algae)	Chlorophyll a, c and fucoxanthin; laminarin and mannitol; cellulose + algin wall; 2 unequal lateral flagella — Ectocarpus, Dictyota, Laminaria, Sargassum, Fucus
Rhodophyceae (red algae)	Chlorophyll a, d and phycoerythrin; floridean starch; no flagella — Polysiphonia, Porphyra, Gracilaria, Gelidium
Algal products	Agar from Gelidium and Gracilaria; algin from brown algae; carrageen from red algae; Chlorella as food supplement, even by space travellers
Liverworts (Marchantia)	Thalloid body; asexual reproduction by gemmae
Mosses (Funaria, Polytrichum, Sphagnum)	Protonema stage; Sphagnum gives peat
Pteridophytes	First terrestrial plants with xylem and phloem — Selaginella and Salvinia are heterosporous; Equisetum, Dryopteris, Adiantum
Gymnosperms	Naked ovules; Cycas coralloid roots with cyanobacteria; Pinus roots with mycorrhiza; Sequoia is among the tallest trees
Angiosperms	Ovules enclosed in ovary; double fertilisation; triploid primary endosperm nucleus — Wolffia is the smallest, Eucalyptus among the tallest
Haplontic life cycle	Volvox, Spirogyra, some Chlamydomonas
Diplontic life cycle	All seed plants; Fucus among algae
Haplo-diplontic life cycle	Bryophytes, pteridophytes; Ectocarpus, Polysiphonia, kelps