Chapter 3 (PLANT KINGDOM)

Multiple Choice Questions

Q1. Cyanobacteria are classified under

(a) Protista (b) Plantae (c) Monera (d) Algae

Ans: (c) Cyanobacteria are classified under Kingdom Monera.

• Protista— unicellular eukaryotes

• Plantae, all members of Kingdom Plantae are eukaryotic chloroplast 'chlorophyll containing organisms commonly called plants. These are autotrophic/holophytic.

Q2. Fusion of two motile gametes which are dissimilar in size is termed as

(a) Oogamy (b) Isogamy (c) Anisogamy (d) Zoogamy

Ans: (c) Fusion of two motile gametes which are dissimilar in size is termed as anisogamy.

Q3. Holdfast, stipe and frond constitute the plant body in case of

(a) Rhodophyceae (b) Chlorophyceae

(c) Phaeophyceae (d) All of the above

Ans: (c) The plant body of phaeophyceae is usually attached to the substratum by a holdfast, and has a stalk, the stipe and leaf like photosynthetic organ—the frond.

Q4. A plant shows thallus level of organization. It shows rhizoids and is haploid. It needs water to complete its life cycle because the male gametes are motile. It may belong to

(a) Pteridophytes (b) Gymnosperms

(c) Monocots (d) Bryophytes

Ans: (d) A plant shows thallus level of organization. It shows rhizoids and is haploid. It needs water to complete its life cycle because the male gametes are motile. It may belong to bryophytes.

Q5. A prothallus is ' '

(a) A structure in pteridophytes formed before the thallus develops

(b) A sporophytic free living structure formed in pteridophytes

(c) A gametophyte free living structure formed in pteridophytes

(d) A primitive structure formed after fertilization in pteridophytes

Ans. (c) In pteridophytes, meiosis or R/D occurs at the time of spore formation. The spores germinate to give rise to inconspicuous, small but multicellular, free-living, mostly photosynthetic thalloid gametophytes called prothallus. Prothallus tepresents the gametophytic phase in pteridophytes.

Q6. Plants of this group are diploid and well adapted to extreme conditions. They grow bearing sporophylls in compact structures called cones. The group in reference is

(a) Monocots (b) Dicots

(c) Pteridophytes (d) Gymnosperms

Ans: (d) Plants of this group are diploid and well adapted to extreme conditions. They grow bearing sporophylls in compact structures called cones. The group in reference is gymnosperms.

Q7. The embryo sac of an Angiosperm is made up of

(a) 8 cells .(b) 7 cells and 8 nuclei

(c) 8 nuclei (d) 7 cells and 7 nuclei

Ans: (b) The embryo sac of an Angiosperm is made up of 7 cells and 8 nuclei.

Q8. If the diploid number of a flowering plant is 36, what would be the chromosome number in its endosperm?

(a) 36 (b) 18 (c) 54 ' (d) 72

Ans: (c) Diploid number (2«) of a flowering plant is 36.

The chromosome number in its endosperm 3n = 54.

Q9. Protonema is

(a) Haploid and is found in mosses

(b) Diploid and is found in liverworts

(c) Diploid and is found in pteridophytes

(d) Haploid and is found in pteridophytes

Ans: (a) The predominant stage of the life cycle of a moss is the gametophyte which consists of two stages. The first stage is the protonema stage (juvenile stage) and the second stage is the leafy stage. Moss protonema resembles to multicellular green algae in structure. Moss plant develops from protonema.

Q10. The giant Redwood tree (Sequoia sempervirens) is a/ an .

(a) Angiosperm (b) Free fern

(c) Pterdophyte **(d) Gymnosperm**

Ans: (d) One of the gymnosperms, the giant redwood tree Sequoia is one of the tallest tree species.

Very Short Answer Type Questions

Q1. Food is stored as Floridean starch in Rhodophyceae. Mannitol is the reserve food material of which group of algae?

Ans: Mannitol is the reserve food material of brown algae or phaeophyceae.

Q2. Give an example of plants with

a. Haplontic life cycle

b. Diplontic life cycle

c. Haplo-diplontic **life cycle**

Ans: a. Haplontic life cycle—Volvox, Spirogyra and some species of Chlamydomonas

b. Diplontic life cycle—AH seed-bearing plants, i.e. (gymnosperms and angiosperms)

c. Haplo-diplontic life cycle—Bryophyfes and Pteridophytes

Q3. The plant body in higher plants is well differentiated and well developed. Roots are the organs used for the purpose of absorption. What is the equivalent of roots in the less developed lower plants?
Ans: In lower plants like algae, holdfast is present and in bryophytes, rhizoids are present instead of roots.

Q4. Most algal genera show haplontic life style**. Name an alga which is**
a. Haplo-diplontic
b. Diplontic
Ans: a. Haplo-diplontic—Ectocarpus, Polysiphonia and Kelps b. Diplontic—Fucus

Q5. In Bryophytes male and female sex organs are called _____ and _____
Ans: In Bryophytes male sex organ is called antheridium and female sex organ is called archegonium.

Short Answer Type Questions

Q1. Why are bryophytes called the amphibians of the plant kingdom?
Ans: Bryophytes are also called amphibians of the plant kingdom because these . plants can live in soil but are dependent on water for sexual reproduction.

Q2. The male and female reproductive organs of several pteridophytes and gymnosperms are comparable to floral structures of angiosperms. Make an attempt to compare the various reproductive parts of pteridophytes and gymnosperms with reproductive structures of angiosperms

Ans.

	Reproductive parts of pteridophytes and gymnosperms	Reproductive structures of angiosperms
(0	Strobili/cone	Flower
(ii)	Microsporophyll	Stamen
(iii)	Megasporophyll	Pistil/Carpel
(iv)	Microsporangium	Anther
(v)	Megasporangium	Ovule

Q3. Heterospory, i.e. formation of two types of spores—microspores and megaspores is a characteristic feature in the life cycle of a few members of pteridophytes and all spermatophytes. Do you think heterospory has some evolutionary significance in plant kingdom?
Ans: In majority of the pteridophytes all the spores are of similar kinds, such plants are called hom'osporous. Genera like Selaginella, Salvirtia, Marsilea and Azolla which produce two kinds of spores, macro (large) and micro (small) spores are known as heterosporous. The megaspores and microspores germinate and give rise to female and male gametophytes, respectively.
The female gametophytes in these plants are retained on the parent sporophytes for variable

periods. The development of the zygotes into young embryos take place within the female gametophytes. This event is a precursor to the seed habit considered an important step in evolution.

Q4. How far does Selaginella one of the few living members of lycopodiales **(pteridophytes) fall short of seed habit?**
Ans: Selaginella produce two kinds of spores, macro (large) and micro (small) spores. The megaspores and microspores germinate and give rise to female and male gametophytes, respectively. But Selaginella falls short of seed habit due to lack of integument around the megasporangium.

Q5. Each plant or group of plants has some phylogenetic significance in relation to evolution: Cycas, one of the few living members of gymnosperms is called as the 'relic of past'. Can you establish a phylogenetic relationship of Cycas with any other group of plants that justifies the above statement?
Ans: Cycas, one of the few living members of gymnosperms is called as the 'relic of past' because it shows many characteristics which are similar to pteridophytes, like, flagellated antherozoids, circinate ptyxis, megasporophyll is leaf like, presence of archegonia, etc.

Q6. The heterosporous pteridophytes show certain characteristics, which are precursor **to the seed habit in gymnosperms. Explain.**
Ans: In majority of the pteridophytes all the spores are of similar kinds, such plants are called homosporous. Genera like Selaginella, Salvinia, Marsilea and Azolla which produce two kinds of spores, macro (large) and micro (small) spores, are known as heterosporous. The megaspores and microspores germinate and give rise to female and male gametophytes, respectively.
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Q7. Comment on the life cycle and nature of a fern prothallus.
Ans: The diploid sporophyte is represented by a dominant, independent, photosynthetic, vascular plant body. It alternates with multicellular, saprophytic/autotrophic, independent but short-lived haploid gametophyte . called prothallus. Such a pattern is known as haplo-diplontic life cycle. All
pteridophytes exhibit this pattern.
These gametophytes require cool, damp, shady places to grow. Because of this specific restricted requirement and the need of water for fertilisation, the spread of living pteridophytes is limited and restricted to narrow geographical regions. The gametophytes (prothallus) bear male and female sex organs ' called antheridia and archegonia, respectively. Water is required for transfer of antherozoids—the male gametes released from the antheridia, to the mouth of archegonium. Fusion of male gamete … with the egg present in the archegonium result in the fonnation of zygote.
• Zygote thereafter produces a multicellular well-differentiated sporophyte which is the dominant phase of the pteridophytes.

Q8. How arc the male and female gametophytes of pteridophytes and gymnosperms different from each other?
Ans: Male and female gametophytes of pteridophytes are free living while in gymnosperms male and female gametophyte do not have free-living * existence. They remain within the sporangia retained on sporophytes

Pteridophytes	Gymnosperms

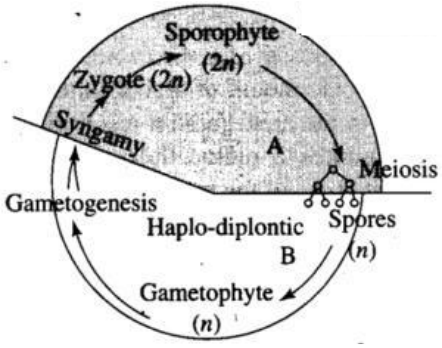
(0	Flagellated male gamete	(a)	Non-flagellated male gamete
(ii)	Water is essential for fertilisation	(b)	Water is not essential
(iii)	Pollen tubes are not formed	(c)	Pollen tubes are formed
(iv)	Archegonia with neck canal cells	(d)	Neck canal cells are absent

Q9. In which plant will you look for mycorrhiza and coralloid **roots?** Also **explain** w'hat **these terms mean.**
Ans: Roots in some genera have fungal association in the form of mycorrhiza (Finns), while in some others (Cvms) small specialised roots called coralloid roots are associated with N2-fixing cyanobacteria

Long Answer Type Questions

Q1. Gametophyte **is a dominant phase in the life cycle of a bryophyte. Explain.**
Ans: The main plant body of the biyophyte is haploid. It produces gametes, hence is called a gametophyte. The sex organs in bryophytes are multicellular.
The male sex organ is called antheridium. They produce biflagellate antherozoids or biciliated sperms. The female sex organ called archegonium is flask-shaped and produces a single egg. The antherozoids are released into water where they come in contact with archegonium. An antherozoid fuses with the egg to produce the zygote. Zygote do not undergo reduction division immediately. They produce a multicellular body called a sporophyte.

Q2. With the help of a schematic diagram, describe the haplo–diptontic **life cycle pattern of a plant group.**
Ans: In a sexually reproducing plant there is an alternation of generation between a haploid and a diploid phase of plant bodies. The haploid plant body is termed gametophyte while the diploid plant body is called sporophyte. The gametophyte produces gametes by mitosis while the haploid spores are produced by sporophyte following meiosis (reduction division). Two gamete fuse together to produce a zygote which develops into the diploid sporophyte.



In a haplodiplontic life cycle pattern, such as in bryophyta or pteridophyta both the phases of life are multicellular. However, in bryophytes, the gametophytes are small, photosynthetic, independent and represent dominant phase. The partly or totally dependent sporophyte is physically attached to the gametophyte. The (n) spores dispersed by sporophyte germinate into individual gametophytic plants. However, in pteridophytes the 2n (diploid) phase is dominant, well organized, independent while the n phase though also free-living and independent is short lived and photosynthetic. In both of these groups of plants the mobile male gametes, antherozoid produced by sex organ antheridium, travel to archegonium (bearing an egg cell) via the medium of water. Egg cell is non-motile hence the reproduction is oogamous.

Q3. Lichen is usually cited as an example of'symbiosis' in plants where an algal and a fungal species live together for their mutual benefit. Which of the following will happen if algal and fungal partners are separated from each other?

a. Both will survive and grow normally and independent from each other.

b. Both will die.

c. Algal **component will survive while the fungal component will die.**

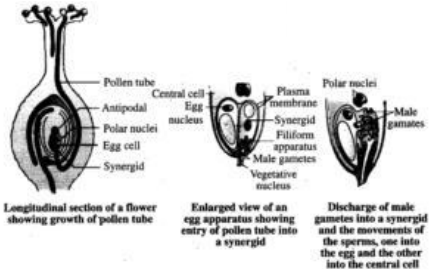
d. Fungal **component will survive while** algal **partner will die.**

Based on your answer how do you justify this association as symbiosis.

Ans: Lichen is usually cited as an example of symbiosis in biology where in a fungal and an algal species live together for mutual benefit. The algal component synthesizes the food through photosynthesis which is utilized by the fungal species for its survival. The fungal component in return provides shelter and waste products that are consumed by algal species. Experiments though have shown that algal component can grow independently when separated from fungal species. But same is not true with the fungal component which dies when separated from algal component. This association is, therefore, a typical case of master-slave relationship where fungus (master) has trapped the algal components (slave) for its own survival while giving nothing in return to it. Some authors consider this association as controlled parasitism or helotism due to the fact that sometimes the fungus sends its haustoria into the algal cells to derive nourishment.

Q4. Explain why sexual reproduction in angiosperms is said to take place through double fertilization and triple fusion. Also **draw a** labelled **diagram of embryo sac to explain the phenomena.**

Ans: After entering one of the synergids, the pollen tube release the two male gametes into the cytoplasm of the synergid.



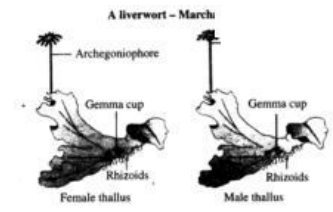
Q5. Draw labelled **diagrams of**

a. Female and male thallus **of a liverwort.**

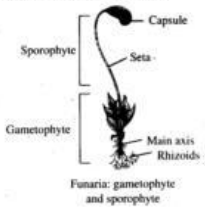
b. Gametophyte and sporophyte of Funaria.

c. Alternation of generation in Angiosperm.

Ans: a. Female and male thallus of a liverwort.



b. Gametophyte and sporophyte of *Funaria*.



c. Alternation of generation in Angiosperm.