INDIAN SCHOOL AL WADI AL KABIR

Class: XI	**DEPARTMENT OF SCIENCE: 2025 – 2026** **SUBJECT: BIOLOGY**	**Date : 01/12/2025**
Worksheet: 15	**UNIT- I- Diversity in the living world** **CHAPTER 3 Plant Kingdom**	**Note:** **A4 FILE FORMAT**
NAME OF THE STUDENT	**CLASS & SEC:**	**ROLL NO.**

I. MULTIPLE CHOICE QUESTIONS (1M)

1. Which among the following is a characteristic feature of the plant body in algae?
   A. Differentiated into roots, stems, and leaves
   B. Possesses vascular tissues
   C. Not differentiated into roots, stems, and leaves (thallus level organization)
   D. Always filamentous
2. The fusion of two gametes that are dissimilar in size is termed:
   A. Isogamy
   B. Oogamy
   C. Anisogamy
   D. Zoogamy
3. Plants that possess spores and an embryo but lack vascular tissues and seeds belong to which group?
   A. Rhodophyta
   B. Bryophyta
   C. Pteridophyta
   D. Phaeophyta
4. Which part of the plant body of higher gymnosperms (like conifers) is adapted to withstand xerophytic conditions?
   A. Broad, hardy leaves
   B. Superficial stomata
   C. Presence of vessels
   D. Needle-shaped leaves with thick cuticles and sunken stomata
5. Double fertilisation is a characteristic feature of which plant group?
   A. Algae
   B. Gymnosperms
   C. Angiosperms
   D. Pteridophytes

Two statements are given - one labelled as **Assertion (A)** and the other labelled as **Reason (R)**. Select the correct answer to these questions from the codes (A), (B), (C), and (D) as given below.

A. Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct

explanation of the Assertion (A).

C. Assertion (A) is true, Reason (R) is false.

D. Assertion (A) is false, Reason (R) is true.

6. **Assertion (A):** The gametophyte of a moss is more elaborate than that of a liverwort.
   Reason (R): The gametophyte of a moss has two stages: the protonema stage and the leafy stage.
7. **Assertion (A):** The female sex organ in bryophytes and pteridophytes is called an archegonium.
   Reason (R): Both bryophytes and pteridophytes are fully adapted for life on land and do not require water for fertilization.
8. **Assertion (A):** Angiosperms are the most dominant and widespread plant group in the world.
   Reason (R): Angiosperms have developed advanced features like flowers for reproduction, fruits for seed protection/dispersal, and highly efficient vascular systems.

II. <u>VERY SHORT ANSWER TYPE QUESTIONS(2M)</u>

9. Both gymnosperms and angiosperms bear seeds, so why are they classified separately?
10. What is heterospory? Briefly comment on its significance. Give two examples.
11. A. List two features that distinguish algae from bryophytes.
    B. Name two specific examples of marine brown algae (Phaeophyceae) that grow to huge sizes, and mention the stored food product typical of this group.
12. How would you distinguish monocots from dicots?

III. <u>SHORT ANSWER TYPE QUESTIONS (3M)</u>

13. A. Differentiate between the three main classes of algae (Chlorophyceae, Phaeophyceae, Rhodophyceae) based on their pigment composition.
    B. Differentiate between a sporophyte and a gametophyte generation in a plant's life cycle.
14. Describe the important characteristics of gymnosperms.
15. Give three defining features of gymnosperms that distinguish them from bryophytes and pteridophytes.

IV. <u>CASE STUDY BASED QUESTIONS (4M)</u>

16. In a remote, moist valley of the Himalayas, Dr Sharma discovers a vast expanse of lush green growth covering the forest floor. He initially identifies the organisms as mosses. Upon closer inspection, he notices that the main plant body is soft, small, and non-woody, lacking true roots. He also observes tiny, stalked structures (sporophytes) growing out from the green cushion-like body. These sporophytes appear to be dependent on the main green plant for nutrition. The area remains damp year-round, and occasional heavy rainfall causes water to flow over the ground.
    A. Identify the group of the plant kingdom to which these organisms belong, and justify your identification with two features.
    B. Why are bryophytes considered crucial for ecological succession on bare rocks or soil?

    OR

    C. Why are bryophytes often referred to as the "amphibians of the plant kingdom"?
    D. What is the ploidy (n or 2n) of the main "lush green growth" plant body, and what is the ploidy of the "tiny stalked structures" growing from it?

V. <u>LONG ANSWER TYPE QUESTIONS (5M)</u>

17. Explain the following terms with suitable examples:
    (i) protonema

(ii) antheridium
(iii) archegonium
(iv) diplontic
(v) sporophyll
(vi) isogamy

18. A. Differentiate between the following:
(i) red algae and brown algae
(ii) liverworts and moss
(iii) homosporous and heterosporous pteridophyte
B. Write a note on the economic importance of algae and gymnosperms.

Answer Key

<table>
<tr><th>Q. No.</th><th>Answer</th></tr>
<tr><td>I.</td><td>MULTIPLE CHOICE QUESTIONS (1M)</td></tr>
<tr><td>1</td><td>C. Not differentiated into roots, stems, and leaves (thallus level organization)</td></tr>
<tr><td>2</td><td>C. Anisogamy</td></tr>
<tr><td>3</td><td>B. Bryophyta</td></tr>
<tr><td>4</td><td>D. Needle-shaped leaves with thick cuticles and sunken stomata</td></tr>
<tr><td>5</td><td>C. Angiosperms</td></tr>
<tr><td></td><td>ASSERTION & REASONING</td></tr>
<tr><td>6</td><td>A. Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of the Assertion (A).</td></tr>
<tr><td>7</td><td>C. Assertion (A) is true, Reason (R) is false.</td></tr>
<tr><td>8</td><td>A. Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of the Assertion (A).</td></tr>
<tr><td>II</td><td>VERY SHORT ANSWER TYPE QUESTIONS(2M)</td></tr>
<tr><td>9</td><td>
<table>
<tr><td>Feature</td><td>Gymnosperms</td><td>Angiosperms</td></tr>
<tr><td>Ovule Location</td><td>Ovules are exposed ("naked").</td><td>Ovules are enclosed within an ovary.</td></tr>
<tr><td>Fruit Formation</td><td>Do not form true fruits.</td><td>Form true fruits (mature ovaries).</td></tr>
<tr><td>Reproduction</td><td>Lack flowers; use cones for reproduction.</td><td>Reproduce via flowers, which are specialised structures.</td></tr>
<tr><td>Fertilisation</td><td>Single fertilisation event.</td><td>The double fertilisation event is unique to this group.</td></tr>
</table>
</td></tr>
<tr><td>10</td><td>The phenomenon of producing two different types of spores in the same plant is called heterospory.
The importance of heterospory is as follows:
(i) Heterospory causes the growth of seeds in gymnosperms and angiosperms.
(ii) It is required in the differentiation of male and female gametophytes. Examples: Salvinia, Selaginella</td></tr>
<tr><td>11</td><td>A. Algae are primarily aquatic, while bryophytes are terrestrial (though they require water for reproduction).
Algae have a simple thallus structure, not differentiated into true roots, stems, or leaves;</td></tr>
</table>

bryophytes, on the other hand, exhibit some differentiation in the plant body, often with root-like rhizoids.
B. Examples of large marine brown algae are *Kelps* and *Fucus* (or *Laminaria*, *Sargassum*). The food in brown algae is typically stored as complex carbohydrates, primarily laminarin or mannitol.

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Monocots	**Dicots**
Have a single cotyledon seed..	Seeds having two cotyledons
Flowers are trimerous	Flowers are tetramerous or pentamerous.
Venation in leaves is parallel.	Have reticulate venations in leaves
The vascular bundle is scattered.	Vascular bundles are organised in a ring.
Absence of vascular cambium	Presence of vascular cambium
Adventitious roots replace primary roots. and are short-lived	Primary roots occur in a few cases. The primary root is long-lived.

III **SHORT ANSWER TYPE QUESTIONS (3M)**

13 A. The three classes are differentiated primarily by their dominant pigments:

- Chlorophyceae (Green Algae): Dominated by chlorophyll *a* and *b*, which masks other pigments.
- Phaeophyceae (Brown Algae): Dominated by chlorophyll *a*, *c*, and the xanthophyll pigment fucoxanthin, which gives them their brown color.
- Rhodophyceae (Red Algae): Dominated by chlorophyll *a*, *d*, and the red pigment phycoerythrin, which provides their characteristic red color.

B. Gametophyte: This is the haploid (n) stage that produces gametes (sex cells) through mitosis.
Sporophyte: This is the diploid (2n) stage that produces spores through meiosis.

14 The main characteristics of gymnosperms are as follows:
(i) In Gymnosperm, the ovules are not enclosed by the ovary. They are exposed before and after fertilization
(ii) The seeds are naked
(iii) Gymnosperms include medium-sized trees or tall trees and shrubs
(iv) Taproots make up the roots.
(v) Simple and complex leaves
(vi) The plant body is a sporophyte and is divided into roots, stems, and leaves.
(vii) They are referred to be heterosporous since they generate two types of spores.
(viii) Syphonogamy fertilisation occurs without the use of external water.

15 **Presence of Seeds:** Unlike bryophytes and pteridophytes, which reproduce using spores, gymnosperms are the first group of plants to produce seeds. This was a critical evolutionary adaptation for reproduction on land.
Absence of an Ovary Wall (Naked Ovules): The ovules in gymnosperms are not enclosed within an ovary wall and remain exposed. This is fundamentally different from all other groups and distinguishes them clearly from angiosperms, which bear enclosed ovules (leading to fruits).
Independence from Water for Fertilization: While bryophytes and pteridophytes require a film of water for their male gametes to swim to the female sex organ, gymnosperms use wind-dispersed pollen and a pollen tube mechanism. This allowed them to colonize drier terrestrial habitats more effectively.

<table>
<tr><td>IV</td><td>CASE STUDY BASED QUESTIONS (4M)</td></tr>
<tr><td>16.A</td><td>They belong to the Group: Bryophytes.
Justification:
The plant body lacks true roots, stems, and leaves (non-vascular).
The sporophyte is dependent on the main plant body (gametophyte) for nutrition.</td></tr>
<tr><td>B</td><td>They decompose the rock material and organic matter, creating soil suitable for the growth of higher plants. They also help prevent soil erosion by forming dense mats on the ground.</td></tr>
<tr><td>C</td><td>Bryophytes are called amphibians of the plant kingdom because, although they live on land, they are dependent on water for sexual reproduction, specifically for the transfer of their flagellated male gametes.</td></tr>
<tr><td>D</td><td>The main "lush green growth" plant body (gametophyte) is haploid (n).
The "tiny stalked structures" (sporophyte) growing from it are diploid (2n).</td></tr>
<tr><td>V</td><td>LONG ANSWER TYPE QUESTIONS (5M)</td></tr>
<tr><td>17</td><td>i) The haploid stage of the bryophyte life cycle, known as the protonema, is a thread-like chain of cells. In mosses, for instance, the protonema grows straight from the spore.
ii) Antheridium: This is the male sex organ that produces male gametes in pteridophytes and bryophytes. For instance, antheridia are present in the reproductive stages of several fungi and algae.
iii) The archegonium is the female sex organ found in bryophytes, pteridophytes, and gymnosperms. It is characteristically flask-shaped and produces a single egg.
iv) Diplontic: This life cycle produces haploid gametes with a dominating diploid free-living phase. E.g., Sargassum.
v) A sporophyll is a specialized leaf that bears sporangia (spore sacs). In groups like gymnosperms and some pteridophytes, these leaves aggregate to form structures called cones or strobili.
vi) Isogamy: This type of sexual reproduction occurs when two gametes fuse. The gametes may be flagellated and of comparable size, or they may be non-flagellated (non-motile) but of similar size. This type of reproduction is known as isogamy.</td></tr>
<tr><td>18.A</td><td>(i) Red Algae and Brown Algae
<table>
<tr><td>Feature</td><td>Red Algae (Rhodophyceae)</td><td>Brown Algae (Phaeophyceae)</td></tr>
<tr><td>Major Pigments</td><td>Chlorophyll a, d, and phycoerythrin</td><td>Chlorophyll a, c, and fucoxanthin</td></tr>
<tr><td>Stored Food</td><td>Floridean starch</td><td>Laminarin or mannitol</td></tr>
<tr><td>Flagellar Number and Position</td><td>Absent</td><td>Two unequal and laterally attached</td></tr>
<tr><td>Cell Wall Constituents</td><td>Cellulose, pectin, and poly-sulphate esters</td><td>Cellulose and algin</td></tr>
</table>
(ii) Liverworts and Mosses
<table>
<tr><td>Feature</td><td>Liverworts</td><td>Mosses</td></tr>
<tr><td>Plant Body</td><td>Thalloid (e.g., Marchantia), dorsiventral</td><td>Possess upright, slender axes bearing spirally arranged leaves</td></tr>
<tr><td>Rhizoids</td><td>Unicellular</td><td>Multicellular</td></tr>
</table></td></tr>
</table>

Protonema Stage	Absent	A prominent, creeping, green, branched filamentous stage is present
Asexual Reproduction	By fragmentation of thalli or gemmae formation	By fragmentation and budding in the secondary protonema

(iii) Homosporous and Heterosporous Pteridophytes

Feature	Homosporous Pteridophytes	Heterosporous Pteridophytes
Spore Production	Produce only one kind of spore	Produce two kinds of spores: microspores and megaspores
Gametophyte	Usually bisexual (produces both male and female sex organs)	Unisexual (microspores give rise to male gametophytes; megaspores give rise to female gametophytes)
Seed Habit Precursor	No	Precursor to seed habit, as the female gametophyte is retained on the parent sporophyte

B. **Importance of Gymnosperms**

(i) Gymnosperms are utilised as plants for decoration. Some are utilised for bonsai and are found in formal gardens.
(ii) Their fibres are utilised to make paper pulp.
(iii) Conifer resin is the source of turpentine and resins.
(iv) Gymnosperms such as junipers, pines, hemlock, fir, spruces, and arborvitae are used to extract useful oils.
(v) Gymnosperm seeds are utilised to make baked goods and other food products.

Importance of Algae

(i) Algae fix carbon dioxide with the help of photosynthesis
(ii) They increase the level of dissolved oxygen in their immediate environment
(iii) They produce rich compounds that serve as food for aquatic animals
(iv) Marine algae are used as food. For example, Laminaria and Sargassum
(v) Certain algae are used as hydrocolloids
(vi) Agar is used in growing microorganisms and in the preparation of jellies
(vii) Chlorella is used as food by space travellers.

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