

For BioResire students



NEET Biology Material

Elite Batch

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Chlorophyceae - Green algae; Chlorophyll a & b; stored food is starch; cellulose cell wall; flagella (2-20 equal; fresh water living).

Phaeophyceae - Brown algae; Chlorophyll a & c with fucoxanthin; stored food is mannitol & laminarin; cell wall is of cellulose and algin; fresh water (rare).

Rhodophyceae - Red algae; Chlorophyll a & b, r-phycocyanin; food is Floridean starch; cell wall is of cellulose, pectin & polysulphate esters; flagella (8); found in salt water mostly.

PLANT KINGDOM

REPRODUCTION

- Reproduction may be vegetative, asexual or sexual
- Asexual by zoospores
- Sexual by isogamy, anisogamy, or oogamy

FEATURES

- Chlorophyll - bearing
- Simple & thalloid
- Aquatic (marine + fresh water)

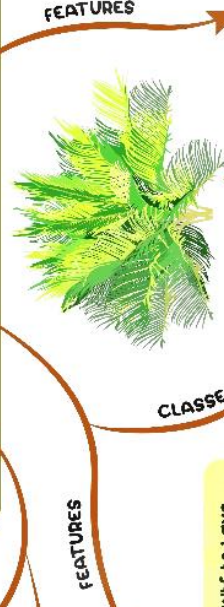
SYSTEMS OF CLASSIFICATION

- Artificial system of classification - used by Linnaeus, on the basis of cell wall
- Bentham & Hooker's Natural System of classification - based on natural characteristics
- Phylogenetic system of classification - based on evolutionary relationship. include branches like taxonomy, cytobotany & chemotaxonomy.

PLANT LIFE CYCLE

ALTERATION OF GENERATION

- Haplontic life cycle - gametophytic generation - free living photosynthetic. Zoospore is sporophytic generation (single celled). Ex. Spirogyra & many algae.
- Diplontic life cycle - gametophytic generation - only few to single celled sporophytic generation is dominant, independent & photosynthetic. Fucus & Charophytes & angiosperms are examples
- Haplo - Diplontic life cycle - brown algae. Sporophyte dominant, gametophyte white. Charophytes & algae dominant. Sporophyte. Gametophyte alternate with Sporophyte. Example - Ectocarpus and Polysiphonia



SEX ORGANS

- Liverworts - Riccia & Marchantia. Thalloid plant body; gemmae formation
- Mosses - Funaria & Sphagnum. Protoneura stage; Sporophyte of mosses more advanced than liverworts.

CLASSES

- Psilotida - Psilotum
- Lycopodiida - Selaginella
- Sphenopsida - Equisetum
- Pteropsida - Dryopteris

FEATURES

- Plants with naked seeds
- Ovary wall does not enclose ovules.
- Survive extreme environment
- Produce microspores & megaspores
- Main plant body - Sporophyte
- Male & female gametophyte not independent.
- Fungal association of Pinus (mycorrhizal)
- Has male & female cones
- Pinus & cypas

AMPHIBIANS OF PLANT KINGDOM

- Found in humid & damp area
- Body thaloid like & prostrate
- Body divided into root - like, stem like & leaf - like structures
- Bryophytes - haploid plant body

ALGAE

CLASSES OF ALGAE

- Ulothrix, Spirogyra are green algae
- Laminaria, Fucus are Brown algae
- Polysiphonia, Gracilaria are Red algae

BRYOPHYTES

TYPES

- First terrestrial plants to have xylem & Phloem.
- Found in shady places
- Main plant body - Sporophyte
- Bear true roots, stem & leaves.
- Leaves - microphylls & macrophylls
- Sporophylls arranged as cones (strobili)
- Thalloid, gametophytes are Prokhalis (sex organs) Antheridium / Archegonium

SEX ORGANS

- Multicellular sex organs
- Male sex organ - Antheridium
- Female sex organ - Archegonium
- Antheridium produces biflagellate antherozoids.
- Archegonium is flask - shaped and produces single egg.
- Sporophyte is free - living

FEATURES

- Seeds having only one cotyledon
- Muscard, Pea, Beans

FEATURES

- Angiosperms are flowering plants
- Specialised structures are flowers
- Seeds are enclosed in fruits
- Ovary - develops into fruit
- Ovules - develop into seeds
- Double - fertilization is characteristic feature of angiosperms.
- Pollination occurs by insects, birds, water and wind

PLANT KINGDOM

What are Plants

Plant kingdom classification has changed a number of times over the years. For instance, blue-green algae were once considered to be part of the plant kingdom, but today, they are classified under Kingdom Eubacteria. Similarly, lichen was once considered a plant; however, they are composite organisms. In other words, lichens are comprised of two individual organisms a fungus and a plant. Historically, organisms that could not be classified under animals were grouped under plants.

Whittaker classified the whole living organism into five kingdoms based on the complexity of cell structure (Prokaryotic and Eukaryotic), the complexity of the body (unicellular and multicellular), and mode of nutrition (autotrophs and heterotrophs).

Classification of the Plant Kingdom

All the classification systems, starting from that of Aristotle to the 20th century, can be divided into three types:

- **Artificial System:** In this system, the classification is based on few morphological characters. Theophrastus, Pliny, and Linnaeus used an artificial system of classification.
- **Natural System:** In this system, the classification is based on all the important related characters. Both external and internal. Bentham and hooker, Adanson, Candolle used a natural system of classification.
- **Phylogenetic System:** Classification based on the evolutionary relationship of plants. The use of phylogeny for classification was done by Eichler, Blessey.

Numerical Taxonomy

Taxonomy based on statistical methods with equal importance using computers.

Cytotaxonomy

Taxonomy that is based on cytology or structure of the cell (chromosome number, shape, behaviour, etc).

Chemotaxonomy

Taxonomy based on chemical constituents of plants (nature of the protein, DNA sequence, taste, smell, etc).

Eichler Classification

The classification of Plant kingdom depending on flowering. Divided into two-

Cryptogamae (non-flowering, seedless plants) and Phanerogamae (flowering, seed-bearing plants).

Based on the Plant Body Cryptogamae is divided into Thallophyta, Bryophyta, and Pteridophyta.

- **Thallophyta:** The plant body is thallus-like (undifferentiated plant body).
- **Bryophyta:** Plant body with a root-like structure, stem-like structure, vascular tissues are absent).
- **Pteridophyta:** The plant body is differentiated into true root, stem, and leaves. Vascular

Thallophytes Again Divided Into:

- Algae (pigmented thallophytes).
- Fungi (non-pigmented thallophytes).
- Lichens: Symbiotic association between algae and fungi.

Phanerogamae is Divided Into Two:

- Gymnosperms (naked seed plants)
- Angiosperma (covered seeded plants)

Angiosperms Are Again Divided Into Two:

- Monocots (bearing single cotyledon, fibrous root system, and parallel venation).
- Dicots (have two cotyledons, taproot system, and reticulate venation).

Algae

1. **Phycology:** Branch of Biology that deals with the study of algae
Phycos = Seaweed
Logos = Study
2. Fritch - Father of phycology.
3. M.O.P. Iyengar is the father of Indian phycology.

Algal members are pigmented thallophyte

Habitat

Hydrophytes: Water is their habitat. In aquatic habitat:

- Freshwater (Spirogyra) and marine (Sargassum).
- Floating- Chlamydomonas, Spirogyra
- Benthophytes - These plants remain attached to the bottom of their habitat. Example Chara (stoneworts)
- Xerophytes: Their habitat is desert.
- Mesophytes- They grow in medium habitats.
- Epiphytes- They grow on plant body (Cladophora)
- Epizoic- growing on the animal body (Trichophyllus)

- Lithophytes- They grow on rocks.
- Halophytes- They grow in salty areas.
- Moist soil-terrestrials (Fritschiella).

Plant Body

- The vegetative plant body of algae is a haploid gametophyte.
- They may be unicellular, flagellated (Chlamydomonas), or non-flagellated (Chlorella).

Multicellular:

- Coenobium- It is a colony with a fixed number of cells and also the division of labor is fixed. E.g.: Volvox.
- Aggregation-indefinite colony. E.g., Tetraspora
- Filamentous-unbranched. E.g.: Ulothrix
- Filamentous branches. E.g.: Cladophora
- Siphonous- multinucleate. E.g.: Vaucheria
- Parenchymatous. E.g.: Ulva the,
- Branched like higher plants. E.g.: Sargassum, Chara

Nutrition:

- Autotrophs - Photosynthetic (most of them)
- Parasitic forms (rare). E.g.: Cephaleuros.

Pigments:

- Chlorophyll- a, b, c, d.
- Carotenoids- carotene and xanthophyll-fucoxanthin are dominating pigments in brown algae.
- Phycobillins- phycocyanin and phycoerythrin.

Reproduction

Vegetative reproduction: Reproduction Using the Vegetative Parts.

Different Types are:

- Fission
- Fragmentation
- Budding
- Tubers
- Gemmae

Asexual Reproduction: Without the Fusion of Gametes.

Mainly by:

- Zoospores within sporangia
- Aplanospores
- Akinete
- Hypnospores

- Endospore
- Exospore
- Monospore
- Auxospore.

Palmella Stage

In this stage of asexual reproduction the spores become colonial and appear like the algae named Palmella. E.g.: Ulothrix, Chlamydomonas.

Sexual Reproduction

Homogametes: Similar gametes.

Heterogametes: Dissimilar gametes.

Isogamy: Fusion of morphologically and physiologically similar gametes. Isogamy- flagellated (Chlamydomonas) and non-flagellated (Spirogyra).

Anisogamy: Fusion of morphologically or physiologically dissimilar gametes. Morphologically dissimilar gametes' fusion occurs in Chlamydomonas. Physiologically dissimilar gametes' fusion occurs in Spirogyra.

Oogamy: It is the fusion of morphologically and physiologically dissimilar gametes that are small motile male gamete and large nonmotile female gamete. E.g.: Fucus, Volvox.

Exceptional Cases:

Unicellular antheridium and oogonium. E.g.: Oedogonium.

Special Reproductive Structures:

Conceptacles- E.g.: Sargassum

Globule (antheridium) and nucule (oogonium) E.g.: Chara

Conjugation

A special type of sexual reproduction called conjugation is found in spirogyra. The life cycle exhibits two phases-haploid and diploid and some of them exhibit alternation of generation. The diploid phase is alternated with the haploid phase.

Classification of Algae

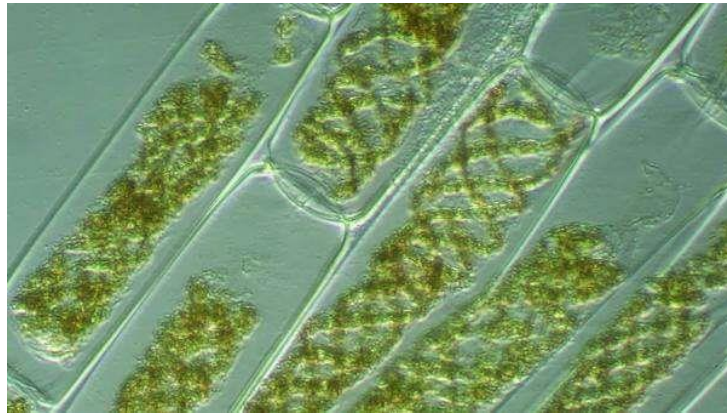
They are classified into three:

- Chlorophyceae
- Phaeophyceae
- Rhodophyceae

Chlorophyceae: In Chlorophyceae, the plant body is unicellular as in Chlamydomonas or colonial as in Volvox or filamentous as in Spirogyra.

Different Shapes for the Chloroplast:

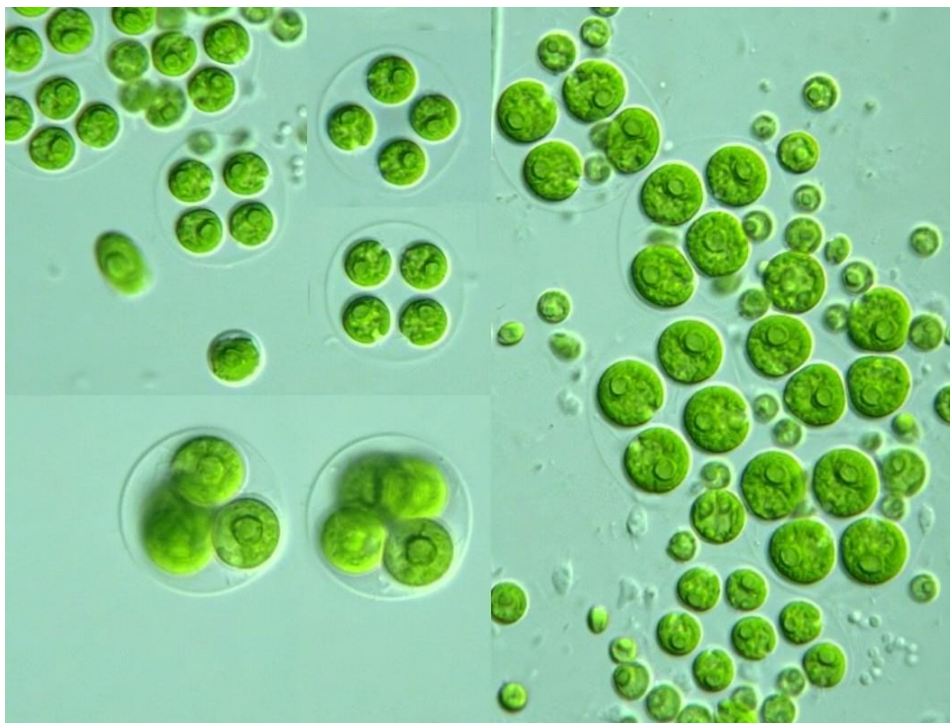
1. Ribbon shaped and spiral in Spirogyra



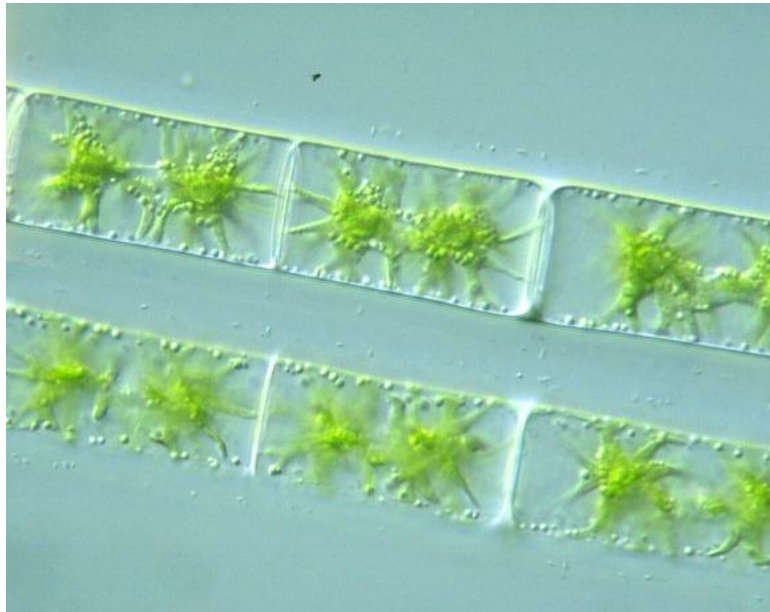
2. Girdle shaped in Ulothrix



3. Cup shaped chloroplast in Chlamydomonas.



4. Star-shaped in Zygnema.



5. Disc-shaped in Caulerpa



6. Reticulate in Oedogonium.



- Photosynthetic pigments are chlorophyll a and b.
- Food is stored in the form of starch and some are stored in the form of oil droplets.
- Pyrenoids are present, which are the storage bodies.
- The inner layer of the cell wall is made up of cellulose and the outer layer is made up of pectose.

The members reproduce:

- Vegetatively by fragmentation
- Asexually by flagellated zoospores
- Sexually by isogamy, anisogamy, and oogamy.

Common Chlorophyceae members are: Chlamydomonas, Chlorella, Volvox, Ulothrix, Ulva, Caulerpa, Chara, Acetabularia etc.

Brown Algae or Phaeophyceae

- They are marine.
- Simple branched and filamentous as in Ectocarpus, or flat ribbon-shaped in Sargassum, Laminaria, Fucus, etc.
- The giant brown algae Kelps are the largest sea plants, some are free-floating as in Sargassum and some are epiphytes on other plants like Ectocarpus.

The Plant Body has Three Parts:

- Fixing structures called a holdfast.
- The stalk-like structure called a stipe.
- The leaf-like structure is called a frond.

Rhodophyceae (Red Algae)

Red algae Rhodophyceae (red algae) include members like Porphyra, Porphyridium, Polysiphonia (multi-axial body), Batrachospermum (Frog spawn alga), Gelidium, Gracilaria, Gleopeltis, Chondrus, Corallina, Harveyella (colourless parasitic red alga). Habitat Mostly they are marine. Found in warmer oceans.

Economic Importance of Algae:

- In the food chain algae are the primary producers. The basis of the food cycles of all aquatic animals is formed by the algae.
- On earth, half of the total carbon dioxide fixation is carried out by algae through the process of photosynthesis.
- In the purification of air and water it plays a very important role.
- Some algae are edible. E.g.: Chlorella, Laminaria, Porphyra, Sargassum, Ulva, Spirulina.
- Some algae are used as fodder. E.g.: Laminaria, Sargassum, Fucus.
- It also acts as a food supplement for space travelers. E.g.: Chlorella, Spirulina.
- From red algae, algin and carrageenan are obtained which are water-holding substances or hydrocolloids.
- Agar is obtained by Gelidium and Gracilaria. It is used to grow

microorganisms.

- Used in the preparation of culture medium in tissue culture experiments.
- It has medicinal values as antibiotics are prepared from them.
- Also used as a source of minerals- Polysiphonia, Laminaria
- Has importance in biological research: Chlorella, Acetabularia.
- E.g.: Chlorella, Polysiphonia.

Common Names of Algae:

- Water silk-Spirogyra
- Sea lettuce- Ulva
- Umbrella plant-Acetabularia (Largest unicellular algae)

Bryophytes

- Simplest non-vascular land plants with undifferentiated plant bodies.
- Bryology: Study of Bryophytes.
- Hedwig: Father of bryology.
- S.R. Kashyap: Father of Indian bryology.
- The bryophytes are also called the amphibians of the plant kingdom due to their unique characteristics.
- Bryophytes grow in dense patches on moist shady places like walls, damp soil, tree trunks, etc.

Features

- Habitat: Mainly terrestrial but some are aquatic. E.g.: Riccia fluitans
- Epiphyllous E.g.: Radula
- Plant body Thallus and Prostate. E.g.: Riccia, Anthoceros, Marchantia or Erect. E.g.- Moss.
- Root-like structures called rhizoids help in fixing them in the soil.
- The body of the plant is differentiated into stem-like and leaf-like structures.
- Vascular tissues are absent.
- Vegetative reproduction occurs by fragmentation, budding, tubers, etc.
- Asexual reproduction occurs by Gemmae- asexual buds in liverworts.
- Sexual reproduction occurs. The vegetative plant body acts as the gametophyte and all the members are homosporous.
- Multicellular sex organs are present that are found in clusters.
- The club-shaped antheridium is the male reproductive organ and it produces biflagellate antherozoids which are motile too.
- The flask-shaped archegonium is the female reproductive organ and it produces the egg.
- To form the zygote the antherozoid fuses with the egg.
- The sporophyte is not free-living and it derives nutrients from the photosynthetic gametophyte.
- After meiosis, the haploid spores are formed in the sporophyte and the

spore germinates to form the gametophyte.

- Alternation of generation is present where the haploid phase alters with the diploid phase.
- Both the phases are multicellular.
- The gametophyte is the dominant photosynthetic free-living stage.
- The sporophyte is short-lived and it highly depends on the gametophyte.
- For fertilization, water is very much essential.

Classification of Bryophytes: It has three classes.

- Hapticospida (liverworts).
- Anthocerotopsida (Hornworts).
- Bryopsida. (Moss).

Hepaticopsida or Liverworts

A class of lower green plants called liverworts that belong to the division Bryophyta. The class Hepaticopsida, also called Marchantiopsida, comprises the liverworts, which are nonvascular land plants. Although there is a great diversity of external form, most of the gametophytes (gamete-producing plants) are dorsoventrally differentiated.

Bryopsida (Moss)

- They are higher bryophytes.
- The gametophyte consists of two stages-protonema and the leafy stage.
- Protonema is green filamentous, branched, creeping structures that directly develop from the spore on germination, and they also bear branched rhizoids and lateral buds.
- The leafy stage is developed as a lateral bud from the secondary protonema.
- The plant body consists of root-like, stem-like, and leaf-like structures. Eg: Funaria.
- Rhizoids are multicellular and branched also.
- The leafy stages bear the sex organs.
- Vegetative reproduction occurs by the process of fragmentation and budding in the secondary protonema.

Economic Importance:

- They are used as food by herbaceous animals.
- Sphagnum (Moss) occurs in the form of peat and is used as fuel.
- Because of its water holding capacity, the mosses are also used for the trans-shipment of living material.
- Mosses also prevent soil erosion.
- They are the first colonizers on barren rocks along with lichens.
- For the growth of the higher plants or succession, they decompose rocks

for making substrate.

Pteridophytes

- They are the first terrestrial plant to bear vascular tissue such as xylem and phloem. So they are also called vascular cryptogams.
- Commonly known as a botanical snake.
- The plant body is differentiated into true root, stem, wind-needle-like, and leaf.
- The plant body is the sporophytic generation.
- The stem is rhizomatous and they regenerate when aerial parts are destroyed.
- Leaves may be small known as microphyll as in Selaginella or large known as macrophyll as in ferns.

Pteridophytes are further classified into four classes:

- Psilopsida (Psilotum)
- Lycopsida (Selaginella)
- Sphenopsida (Equisetum)
- Pteropsida (Pteris).

Economic Importance:

- **Some members are Medicinal:** Dryopter is Helps in Soil binding & Used as Ornamental plants.
- **Edible plants:** Marcellia Used in Crop rotation- Azolla & Helps in Symbiotic nitrogen fixation.
- Play an important role in the succession of plants on bare rocks or soil.
- Sphagnum is used to keep seedlings in gardens and also in keeping cut plant parts moist during transportation and propagation.

Common Names:

- Creeping pine/ Club moss- Lycopodium
- Spike moss (Resurrection plant- Selaginella)
- Water fern- Azolla (smallest pteridophyte)
- Walking fern (Maiden Hall fern)- Adiantum
- Adder's tongue fern- Ophioglossum
- Fossil pteridophyte- Cooksonia
- Leafless Pteridophyte- Psilotum
- Horsetail- Equisetum

Gymnosperm

The word "Gymnosperm" comes from the Greek words "gymnos"(naked) and "sperma"(seed), hence known as "Naked seeds." Gymnosperms are the seed-producing plants, but unlike angiosperms, they produce seeds without fruits. These

plants develop on the surface of scales or leaves, or at the end of stalks forming a cone-like structure.

Gymnosperms belong to kingdom 'Plantae' and sub-kingdom 'Embryophyta'. The fossil evidence suggested that they originated during the Paleozoic era, about 390 million years ago.

Basically, gymnosperms are plants in which the ovules are not enclosed within the ovary wall, unlike the angiosperms. It remains exposed before and after fertilisation and before developing into a seed. The stem of gymnosperms can be branched or unbranched. The thick cuticle, needle-like leaves, and sunken stomata reduce the rate of water loss in these plants.

The family of gymnosperms consist of conifers, the cycads, the gnetophytes and the species of Gynkgophyta division and Ginkgo biloba.

Let us have an overview of the characteristics, examples, classification and examples of gymnosperms.

Angiosperm

A plant of a large group that comprises those that have flowers and produce seeds enclosed within a carpel, including herbaceous plants, shrubs, grasses, and most trees. Compare with gymnosperm.

Alternation of generations:

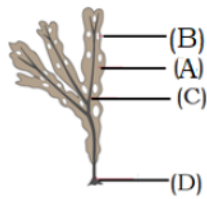
- The diploid sporophyte has a structure called a sporangium.
- The sporangium undergoes meiosis and forms haploid spores.
- The spore develops into a gametophyte which is haploid in nature.
- The gametophyte has the reproductive organs which undergo mitosis to form haploid gametes.
- The gametes fertilize to form a haploid zygote which matures into a mature sporophyte. This cycle keeps repeating.

Monocot

In this type of angiosperms, only one cotyledon is present. Also, leaves are parallel-veined, and vascular bundles are scattered. The root system is adventitious. Examples: Wheat, Maize, Rice etc.

Dicot

There are two seed leaves present in dicot angiosperms. Vascular bundles are in a ring and veins are branched. Also, tap roots are present. Examples: Potato, Pea, Banyan etc.



- A) Laminaria A = leaf B = air bladder C = stripe D = holdfast
 B) *Fucus* A = frond B = air bladder C = stripe D = Hold fast
 C) *Fucus* A = air bladder B = frond, C = midrib D = holdfast
 D) *Laminaria* A = leaf C = midrib D = petiole

13. Algae are useful to man in - (Pg32, M)
 A) Fixation of almost half of total CO₂ on earth
 B) Primary producer
 C) Increase level of oxygen
 D) All of these
14. Hydrocolloids are produced by - (Pg32, M)
 A) Brown algae (algin), carrageen(red algae), Agar(brown algae)
 B) Brown algae (algin), Red algae (carrageen)
 C) Brown algae (algin, agar), Red algae (carrageen)
 D) None of these
15. Choose correct statement - (Pg32, E)
 A) *Chlorella*, a multicellular alga rich in protein
 B) *Chlorella* & *Spirulina* are astronaut food because of their high carbohydrate, vitamin mineral but less protein
 C) The product obtained by *Gracilaria* are used to grow microbes
 D) *Laminaria*, *Sargassum* a member of Rhodophyceae are among 70 species of marine algae used as food

Paragraph – 3.1.1 Chlorophyceae

16. Chlorophyceae are commonly called as- (Pg32, E)
 A) Green algae
 B) Blue - green algae
 C) Brown algae
 D) Red algae
17. Major pigment of *Chlamydomonas* - (Pg32, E)
 A) Chlorophyll a, b
 B) Chlorophyll a, c
 C) Chlorophyll a, d
 D) Fucoxanthin, phycoerythrin
18. Choose incorrect statement about green alga- (Pg32, E)
 A) The chlorophyll localised in definite chloroplast
 B) *Spirogyra* have spiral chloroplast
 C) Most member have one or more storage bodies i.e. pyrenoid localised in chloroplast
 D) The cell wall is made of outer layer that is of cellulose and inner layer of pectose
19. Reproduction in green algae is/are - (Pg32, E)
 A) Isogamous
 B) Anisogamous
 C) Oogamous
 D) All of these
20. *Chara* is (Pg32, E)
 A) Common stonewort
 B) Marine green algae
 C) Unisexual algae
 D) None of these
21. Flagellation in green algae is - (Pg32, E)
 A) 2 - 8, equal, apical
 B) 2, unequal, lateral
 C) 2 - 8, unequal, lateral
 D) Absent

Paragraph – 3.1.2 Phaeophyceae

22. Phaeophyceae is commonly named as - (Pg32, E)
 A) Green alga
 B) Brown alga
 C) Red algae
 D) None
23. Choose the correct statement from following - (Pg32, M)
 A) *Ectocarpus* is filamentous forms while kelps is profusely branched from
 B) Kelps may reach a height of average 100cm
 C) The plant body of brown algae is attached to substratum by stripe
 D) Leaf - like photosynthetic organ of brown algae is stripe

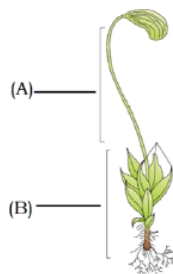
24. Major pigment found in *Fucus* is/are (Pg32, E)
 A) Chlorophyll a, c B) Chlorophyll a, d
 C) Chlorophyll a, b D) Fucoxanthin and phycoerythrin
25. The color of brown algae depend upon (Pg32, E)
 A) Amount of xanthophyll B) Fucoxanthin present in them
 C) Phycoerythrin and fucoxanthin ratio D) A & B both
26. Choose the correct about cell of brown algae - (Pg32, E)
 A) Cellulosic cell wall cover outside by align
 B) Cellulosic cell wall with pectin and polysulphate esters
 C) They have two flagella, equal sized and laterally inserted
 D) A and C both
27. *Dictyota* is member of - (Pg33, E)
 A) Same member of Ectocarpus, Gelidium, fucus
 B) Same member those having Caminaria or mannitol as stored food
 C) Same member of Laminaria, Porphyra, fucus
 D) Same member those having phycoerythrin as accessory pigment
28. Gametes of *Sargassum* are- (Pg 33, E)
 A) Pyriform B) Cup - shaped C) Ribbon - shaped D) Discoid

Paragraph – 3.1.3 Rhodophyceae

29. Rhodopyceae is called red algae because of - (Pg33, E)
 A) Predominance of red pigment
 B) Abundance if d - phycoerythrin
 C) A & B both D) None of these
30. The stored food in *Polysiphonia* is ___A___ which is very similar to ___B___ and ___C___ in structure (Pg33, E)
 A) A = floridean starch B = amylopectin C = glycogen
 B) A = floridean starch B = chitin C = glycogen
 C) A = mannitol B = floridean starch C = amylopectin
 D) None of these
31. Member of Rhodophyceae reproduce by- (Pg33, E)
 A) Non - motile asexual spore and motile sexual gametes
 B) motile asexual spore and motile sexual gametes
 C) Non - motile asexual spore and non - motile sexual gametes
 D) motile asexual spore and non - motile sexual gametes
32. *Porphyra* show - (Pg34, E)
 A) Isogamous B) Anisogamous C) Oogamous D) All of these

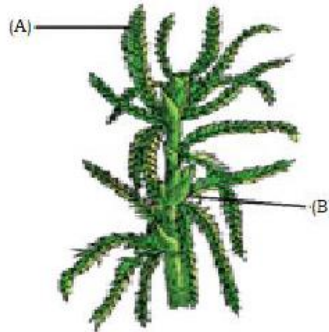
Paragraph – 3.2 Bryophyta

33. Bryophyta include - (Pg34, E)
 A) Hornwort B) Liverwort C) Mosses D) All of these
34. Identify given plant diagram and label its parts: (Pg34, E)



- A) *Funaria*, A = gametophyte B = sporophyte
 B) *Sphagnum*, A = gametophyte B = sporophyte
 C) *Funaria*, A = sporophyte B = gametophyte
 D) *Sphagnum*, A = sporophyte B = gametophyte

35. Bryophytes are – (Pg35, E)
 A) Amphibians of plant kingdom
 B) Reptilians of plant kingdom
 C) First vascular bundles containing plant
 D) A & C both
36. The body organization of bryophytes have (Pg35, E)
 A) Unicellular or multicellular rhizoid
 B) Less differentiation than algae
 C) They have true root stem and leaves
 D) A & C both
37. The main plant body of bryophyte is ___A___ that produce ___B___ (Pg35, E)
 A) A = diploid B = gametes
 B) A = haploid B = gametes
 C) A = haploid B = spores
 D) A = diploid B = spores
38. Choose the correct statement
 A) Sex organs in bryophytes are unicellular and jacketed
 B) Male sex organ is antheridium that produce flagellate (four flagella) antherozoids
 C) Female sex organ is archegonium i.e. flask - shaped and produce single egg
 D) Water is required for travelling of egg from archegonium to antheridium
39. In bryophyta, meiosis occur – (Pg35, E)
 A) During development of gametes
 B) Immediately after zygote formation
 C) After sometime of zygote formation
 D) In gameophytic stage
40. Identify the given diagram and label (Pg34,E)



- A) *Sphagnum*, a liverwort A = archegonia branch B = antheridial branch
 B) *Sphagnum*, a moss A = archegonia branch B = antheridial branch
 C) *Funaria*, a moss A = antheridial branch B = archegonia branch
 D) *Sphagnum*, a liverwort A = antheridial branch B = archegonia branch
41. Choose the correct statement with regard to bryophyta (Pg35, E)
 A) Sporophyte is free - living but attached to photosynthetic gametophyte derives nourishment from it
 B) Sporophyte is not free - living but attached to photosynthetic gametophyte and derives nourishment from it
 C) Gametophyte is not free - living but attached to photosynthetic sporophyte and derives nourishment from it
 D) Gametophyte is free living but attached to photosynthetic sporophyte and derives nourishment from it
42. First organism to colonize rock are – (Pg35, E)
 A) Mosses
 B) Lichen
 C) Liverwort
 D) A & B both
43. For trans - shipment of living material which of following is more suitable to use (Pg35, E)
 A) *Marchantia*
 B) *Funaria*
 C) *Sphagnum*
 D) Riccia
44. Which of the following is obtained from *Sphagnum* as coal: (Pg35, E)
 A) Bituminous
 B) Peat
 C) Lignite
 D) Anthracite

Paragraph – 3.2.1 Liverwort

45. Choose the correct statement : (Pg35, E)
 A) The thalloid plant body of liverwort is dorsiventrally appressed closely to substrate
 B) The leafy members have tiny true leaf in two rows on the stem like structure

- C) The leafy membrane have tiny leaf like appendage in four rows on the stem like structure
 D) The thalloid plant body of liverwort is isobilaterally appressed closely to substrate
46. Asexual reproduction in bryophytes is not take place by - (Pg35, E)
 A) Fragmentation B) Gemmae
 C) Budding in secondary protonema D) Oogamous
47. Gemmae are - (Pg35, E)
 A) Green, unicellular, asexual bud, develop in small receptacles i.e. gemma cup
 B) Green, multicellular, asexual bud develop in small receptacles i.e. gemma cup
 C) Non - green unicellular, asexual bud, develop in small receptacles i.e. gemma cup
 D) Green, multicellular, sexual bud develop in small receptacles i.e. gemma cup
48. In *Marchantia* (Pg35, E)
 A) Male and Female sex organs are produced on same thalli
 B) Male and female sex organs are produced on different thalli
 C) Gametophytes is differentiated into foot seta and capsule
 D) Spores geminates to form free - living sporophyte

Paragraph – 3.2.2

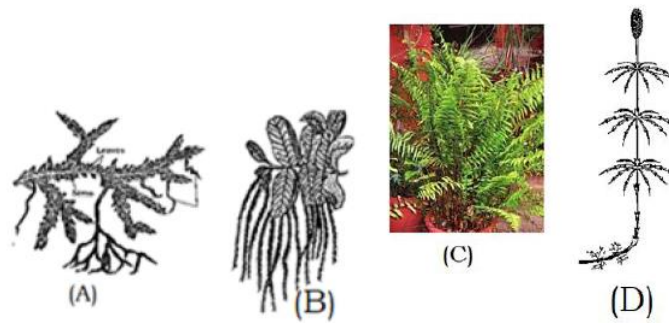
Mosses:

49. The predominant stage of life cycle of a moss is- (Pg36, E)
 A) Gametophytes B) Sporophytes
 C) Protonema stage D) Frothallus stage
50. The gametophyte of moss is divided into- (Pg36, E)
 A) Two stage, first protonema stage which develops directly from gamete.
 B) Two stage, second leafy stage which develop from secondary protonema as a lateral bud.
 C) Two stage, first leafy stage and second protonema stage
 D) Two stage, first protenema stage which develops directly from spore and second leafy stage which develop from spore germination as terminal bud.
51. Protonema stage is - (Pg36, E)
 A) Creeping, green unbranched and frequently filamentous stage
 B) Prostate, green, branched and frequently filamentous stage
 C) Creeping, green, branched and frequently filamentous stage
 D) Prostate, non - green, unbranched and frequently stage
52. Choose the correct statement about leafy stage of mosses (Pg36, E)
 A) They consist, upright, slender axes bearing spirally arranged leaves.
 B) They are attached to soil through multicellular and branched rhizoid
 C) This stage bear sex organ D) All of these
53. In sexual reproduction which of following is not seen in mosses (Pg36, E)
 A) Sex organ are produced at apex of leafy stage
 B) After fertilization zygote develop into sporophyte
 C) Development of embryo D) All of these
54. The sporophyte of mosses - (Pg36, E)
 I) Is more elaborate than that is liverwort
 II) Consisting of foot, seta and capsule
 III) Spores present in capsule
 IV) Spore produce after meiosis
 V) Elaborate mechanism of spore dispersal
 VI) Presence of peristomic teeth.
 A) All are correct B) I), II), III) only
 C) IV), V), VI) only D) I), III), V) only
55. Choose incorrect matched (Pg36, M)
- | | |
|-------------------|------------------------|
| Column - A | Column - B |
| A) Hornwort | i) <i>Marchantia</i> |
| B) Bryopsida | ii) <i>Polytrichum</i> |
| C) Liverwort | iii) <i>Marchantia</i> |
| D) Mosses | iv) <i>Sphagnum</i> |

Paragraph – 3.3

Pteridophytes

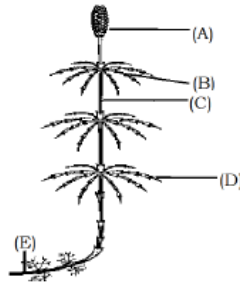
56. Pteridophytes includes - (Pg36, E)
A) Horsetail B) Ferns C) Polytrichum D) A & B both
57. First terrestrial vascular plant is - (Pg36, E)
A) Algae B) Bryophyta (liverwort & hornwort)
C) Pteridophyta D) Bryophyta (Mosses)
58. Choose the correct statement from following (Pg36, E)
A) The plant body is differentiated into true root, only true prostrate stem as in Selaginella and true leaf
B) The leaves of pteridophytes are small as in Selaginella or macrophyll in ferns.
C) Pteridophytes possess xylem, phloem
D) All of these
59. In pteridophyta - (Pg36, E)
A) The main plant body is a sporophyte
B) The main plant body is a gametophyte
C) The main plant body is a gametophyte on which sporophytic phase is partially dependent
D) A & C
60. Choose the correct with regard to reproduction in pteridophyte (Pg36, E)
A) Sporophyte bear sporangia that are subtended by sporophyll
B) Gametophyte bear sporangia that are subtended by sporophyll
C) Sporophyll compact to form strobili as in fern
D) The sporangia produce spores by mitosis in spore mother cell
61. Gametophyte of pteridophyte is - (Pg36, E)
A) Small but multicellular, free living, mostly photosynthetic, differentiated into root, stem and leaf
B) Small inconspicuous but multicellular dependent mostly photosynthetic thalloid body
C) Small but multicellular, free living mostly photosynthetic thalloid structure
D) Small inconspicuous but multicellular free - living mostly non - photosynthetic thalloid body
62. Water needed for fertilization in - (Pg36, E)
A) Eucalyptus B) Bryophytes C) Pteridophytes D) B & C both
63. Sex organ bear on - (Pg36, E)
A) Sporophytes B) Gametophyte
C) On both gametophytes & sporophyte D) None
64. Heterosporous pteridophytes is/are- (Pg36, E)
A) Selaginella B) Salvinia C) Psilotum D) A & B both
65. Pteridophytes with all similar kind of spores is in (Pg36, E)
A) Terror of Kashmir B) Psilotum
C) Selaginella D) A & B both
66. Seed habit reported for first time is (Pg36, E)
A) Blue - green algae B) Pteridophyte
C) Angiosperm D) Bryophyta
67. Pteridophyte classification into - (Pg36, E)
A) 4 classes B) 4 orders C) 4 families D) All of these
68. *Adiantum* is member with - (Pg36, E)
A) *Pteris* B) *Equisetum* C) *Lycopodium* D) *Selaginella*
69. Match the following: (Pg36, M)
- | | |
|--|--|
| Column - I
i) Sphenopsida
ii) Lycopsidea
iii) Psilopsida
iv) Pteropsida
A) A - iv, B - ii, C - iii, D - I
C) A - ii, B - iii, C - i, D - iv | Column - II
A) <i>Dryopteris</i>
B) <i>Selaginella</i>
C) <i>Psilotum</i>
D) <i>Equisetum</i>
B) A - iii, B - ii, C - iv, D - i
D) A - i, B - iv, C - ii, D - iii |
|--|--|
70. Identify following pteridophytes - (Pg37, E)



- A) A = Salvinia, B = horsetail, C = fern, D = Selaginella
 B) A = Selaginella, B = Salvinia, C = fern, D = horsetail
 C) A = Equisetum, B = fern, C = Selaginella, D = horsetail
 D) A = Selaginella, B = Salvia, C = Dryopteris, D = Equisetum

71. Label A, B, C, D, E in following diagram:

(Pg37, E)



- A) A = strobilus, B = rhizome, B) A = cone, C = Node, D = internode
 C) A = strobilus, B = rhizome, C = node, D = internode, E = branch
 D) None of these

Paragraph - 3.4 Gymnosperm:

72. Gymnosperms are plants in which - (Pg38, E)
 A) Ovules are enclosed by any ovary wall both before and after fertilization
 B) Ovules are not enclosed by any ovary wall both before and after fertilization
 C) Ovules are enclosed by any ovary wall before fertilization but not after fertilization
 D) Ovules are not enclosed by any ovary wall before fertilization but after fertilization
73. Tallest tree species belongs to - (Pg38, E)
 A) Angiosperm B) Gymnosperm C) Pteridophyte D) Algae
74. Fungi show symbiotic association with gymnosperm in form of - (Pg38, E)
 A) Mycorrhiza in *Pinus* B) Mycorrhiza in *cycas*
 C) Coralloid rest in *Pinus* D) Coralloid rest in *cycas*
75. The stem of - (Pg38, E)
 A) *Cycas* is unbranched B) *Pinus* is branched
 C) *Cedrus* is branched D) All of these
76. Needle-like leaves, thick cuticle, sunken stomata are character of - (Pg38, E)
 A) *Cycas* B) *Pinus* C) *Gnetum* D) *Ginkgo*
77. Gymnosperms are - (Pg38, E)
 A) Heterosporous, haploid microspores and haploid megaspore
 B) Homosporous, both spores are haploid
 C) Heterosporous, both spores (microspores & megaspores) are diploid
 D) None of these
78. Choose the correct statement - (Pg38, E)
 A) The male and female cones borne on same plant as in *Cycas*
 B) The male and female cones borne on different plant as in *Cycas*
 C) The male and female cones borne on same plant as in *Pinus*
 D) Both A & C
79. Choose the correct about female cone of gymnosperm: (Pg38, E)
 A) The nucleus is protected by bitegmic structure
 B) The megaspore mother cell divides mitotically to form four megaspores

- C) One of four megaspores, enclosed within the megasporangium which develop into a multicellular female gametophyte that bear one archegonia
 D) Ovule is unitegmic
80. Statement-I : The cones bearing megasporophyll with ovules are female cone
 Statement-II : The strobili bearing microsporangia are called male cone (Pg38, E)
 A) Both stated statement are correct
 B) Both stated statement are incorrect
 C) Statement-I is correct while statement- II is incorrect
 D) Statement-I is incorrect while statement-II is correct
81. Identify given plant diagram and choose correct response (Pg39, E)



- A) *Ginkgo*, a living fossil
 B) *Cycas*, a living fossil
 C) *Taxus*
 D) *Gnetum*
82. What is difference between bryophytic and gymnospermous & gametophytes (Pg39, M)
 A) Bryophytic gametophytes is independent free-living structure while gametophytes of gymnosperm is dependent
 B) Gametophyte of gymnosperm remain within the sporangia retained on sporophytes
 C) Both A & B
 D) None of these
83. Choose the correct set about given figure: (Pg39, E)



- i) Pinnate leaves
 ii) Palmate leaf
 iii) Branched stem
 iv) Branching is same as in Cedrus
 v) Unbranched
 vi) Bear male cone and female cone on same plant
 vii) Bear male cone & female cone on different plant
 viii) It is living fossil along with Ginkgo
- A) i, iii, vi, viii
 B) i, v, vii, viii
 C) ii, v, vi
 D) i, iv, vii, viii
84. *Anthoceros* thallus and coralloid root of *Cycas* are (Pg39, E)
 A) Similar in morphological structure
 B) Performing N₂-fixing
 C) Presence of vascular bundle
 D) B & C
85. Gametophytes is parasitic over sporophytes is (Pg39, E)
 A) Cycadales
 B) Coniferales
 C) Monocot
 D) All of these
86. The endosperm of gymnosperm represent (Pg39, E)
 A) Female gametophyte
 B) Triploid structure
 C) Diploid structure
 D) A & C
87. Read the following statements and choose the incorrect response with respect to gymnospermous reproduction (Pg39, E)
 A) Pollen grains are carried by air currents
 B) Pollen tube carries the male gametes to archegonia
 C) Following fertilization, zygote develop but embryo stage is lacking
 D) Ovule develops into seed
88. All the given structure of *Pinus* and *Cycas* are haploid, except (Pg39, E)
 A) Pollen grain
 B) Egg
 C) Nucellus
 D) Endosperm

89. Gymnosperm is example of - (Pg39, E)
 A) Vascular, embryophyte with ovule enclosed in ovary
 B) Vascular, non-embryophyte
 C) Non-vascular, non-embryophyte
 D) Vascular, embryophyte
90. Vascular archegoniates with diplontic lifecycle are - (Pg39, E)
 A) Bryophytes B) Gymnosperm C) Pteridophytes D) B & C

Paragraph - 3.5
Angiosperm:

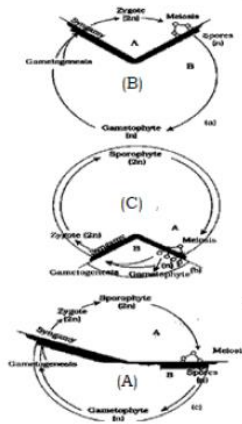
91. Tallest and smallest plant species belonging to angiosperm is - (Pg40, E)
 A) Sequoia and Wolffia B) Eucalyptus and Wolffia
 C) Sequoia and duck-weed D) None of these
92. Dicotyledons and monocotyledons are two _____ of angiosperm (Pg40, E)
 A) Family B) Class C) Order D) Division
93. How many of following is correct about dicotyledons and monocotyledons respectively
 Seed with two cotyledons, trimerous, pentamerous, parallel veination Seed with one cotyledons, tetramerous, reticulate veination (Pg40, E)
 A) 4, 3 B) 3, 4 C) 2, 5 D) 5, 2
94. A group of plant flower with having three members in each whorl is placed is- (Pg40, E)
 A) Monocot B) Dicot C) Tetramerous D) Both B & C
95. Choose the correct statement (Pg40, M)
 A) Embryo sac develop from one functional megaspore(diploid) which result from mitosis and degeneration of megaspore mother cell
 B) Embryo sac of consist of one egg apparatus, three antipodal cell and two polar nuclei
 C) Polar nuclei, antipodal cells, egg are diploid structure of embryo sac of angiosperm
 D) Secondary nuclei is haploid
96. Secondary nuclei result from fusion is (Pg40, E)
 A) Polar nuclei and 1st male gamete
 B) Polar nuclei and 2nd male gamete
 C) Both nuclei of polar nuclei
 D) Egg apparatus and polar nuclei
97. Choose the correct sequence (Pg40, M)
 A) Gamete formation → pollination → fertilization → embryo → new plant
 B) Gamete formation → transfer of gamete → fertilization → pollination → embryo → new plant
 C) Pollination → gametogenesis → fertilization → embryo → new plant
 D) None of these
98. Microspore of angiosperm represent- (Pg40, E)
 A) Sporophytic phase B) Gametophytic phase
 C) Both A & B D) Female gamete
99. Pollen tube in angiosperm discharge- (Pg40, E)
 A) One male gamete is embryo sac
 B) Two male gamete is embryo sac
 C) Three male gamete is embryo sac
 D) More than one option is correct
100. Syngamy is- (Pg41, E)
 A) Fusion of egg and 1st male gamete
 B) Fusion of egg and 2nd male gamete
 C) Fusion of polar nuclei & 1st male gamete
 D) Both B & C
101. Zygote is result of- (Pg 41, E)
 A) Syngamy B) Double fertilization
 C) Triple fusion D) Both A & C
102. Fusion of 2nd male gamete with diploid secondary nucleus result in formation of- (Pg41, E)
 A) PEN B) Embryo C) Both A & B D) Sporophyte

103. Double fertilization is- (Pg 41, E)
 A) Fusion of two nuclei of polar nuclei
 B) Fusion of male gamete with egg
 C) Fusion of male gamete with secondary nuclei
 D) Both B & C
104. PEN provide- (Pg 41, E)
 A) Protection of embryo
 B) Nourishment to embryo
 C) Anchorage to embryo
 D) None of these
105. Which of following structure degenerate after fertilization- (Pg 41, E)
 A) Synergid
 B) Antipodal cell
 C) A & B
 D) Embryo
106. Angiosperm differ with gymnosperm- (Pg 41, E)
 A) In presence of true root, stem & leaf
 B) Seed enclosed in fruit
 C) Ovary enclosed in ovule
 D) Both B & C
107. Ovule develop into _____ and ovaries develop into _____ of angiosperm (Pg 41, E)
 A) Seed, fruit
 B) Fruit, seed
 C) Fruit, fruit
 D) Seed, seed
108. Pistil is- (Pg 41, E)
 A) Female sex organ of flower
 B) Male sex organ of flower
 C) Non-reproductive organ of flower
 D) Divided into two part that are anther and filament.

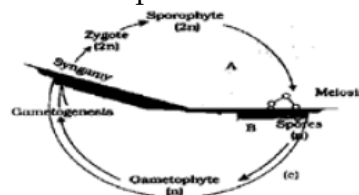
Paragraph - 3.5
Angiosperm:

109. Kelp, Polysiphonia, *Ectocarpus*, Fucus, Wolffian, Volvox
 How many of following are show haplontic, haplodiplontic and diplontic life cycle respectively (Pg42, E)
 A) 1, 3, 2
 B) 3, 1, 2
 C) 1, 2, 3
 D) 2, 3, 1
110. Mitosis is observed in- (Pg42, E)
 A) Haploid plant cell
 B) Diploid plant cell
 C) Both A & B
 D) Only vegetative cell
111. Choose correct statement about haplontic life cycle- (Pg42, E)
 i) Sporophytic generation is represented by single cell zygote
 ii) Free-living sporophyte
 iii) Sporophyte is parasite on gametophyte
 iv) Gametophyte arise from gametes after mitotical division
 v) Example are Spirogyra and some species of Chlamydomonas
 vi) Gametophyte arise from meiosis occur in spore-
 A) i, ii, v, vi
 B) i, iii, v, vi
 C) iii, iv, v
 D) i, iii, iv
112. *Eucalyptus* show- (Pg42, E)
 A) Diploid dominant sporophyte that is photosynthetic and independent phase
 B) Gametophyte is represent by few diploid cell
 C) Dominant phase is gametophyte
 D) All of these
113. Gymnosperms are- (Pg42, E)
 A) Haplontic
 B) Diplontic
 C) Haplo-diplontic
 D) Diplo-haplontic
114. Bryophytes and Pteridophyte exhibit- (Pg42, E)
 A) Multicellular sporophyte
 B) Multicellular gametophyte
 C) Unicellular sporophyte
 D) A & B both
115. Bryophytes and pteridophytes differ in their - (Pg42, E)
 A) Stage of meiosis
 B) Dominant phases
 C) Stage of syngamy
 D) Stage of gametogenesis
116. In bryophytes - (Pg42, E)
 A) Sporophyte totally or partially dependent on the gametophyte for its anchorage and nutrition
 B) Gametophyte totally or partially dependent on the sporophyte for its anchorage and nutrition
 C) A dominant, independent, photosynthetic, thalloid haploid Sporophyte alternate with gametophyte

- D) A & C both
117. Choose the correct response with respect to pteridophyte lifecycle (Pg42, E)
 A) Diploid gametophyte alternate with sporophyte
 B) Sporophyte and gametophyte are independent
 C) Sporophyte show saprophytic D) Meiosis occur in gametophyte
118. The sporophyll of gymnosperms arranged ____ on axis to form cones (Pg42, E)
 A) Spirally B) Alternately C) Decussate D) Superposed
119. Identify life cycle pattern (Pg42, E)



- A) A = haplontic, B =haplo - diplontic, C = diplontic
 B) A = haplontic, B = diplontic, C = haplo - diplontic
 C) A = haplo - diplontic, B =haplontic, C = diplontic
 D) A = as in *Volvox* and angiosperm, B = as in *Ectocarpus*, C = as in gymnosperm
120. Bryophyte attached to substratum by - (Pg42, E)
 A) Holdfast B) Rhizoid C) Root D) A & C
121. Brown algae focus attached to substratum by - (Pg42, E)
 A) Holdfast B) Stipe C) Frond D) Rhizoid
122. The plant body of liverwort is ___A___ whereas mosses have ___B___ bearing ___C___ arranged leaves (Pg42, E)
 A) A = dorsiventral, B = upright, slender axes, C = alternately
 B) A = isobilateral, B = upright, slender axes, C = spirally
 C) A = dorsiventral, B = isobilateral axes, C = alternately
 D) A = dorsiventral, B = upright, slender axes, C = spirally
123. Embryophytes doesn't includes (Pg42, E)
 A) Algae, Bryophytes
 B) Bryophyte, Pteridophytes
 C) Gymnosperm, angiosperm
 D) Algae only
124. Double fertilization does not occur in - (Pg42, E)
 A) Pteridophyte, some gymnosperm,
 B) Monocot, dicot
 C) Dicot, some gymnosperm
 D) Bryophytes, pteridophyte, some gymnosperm & monocot
125. Identify following life cycle pattern and that pattern shown in (Pg42, E)



- A) Haplontic life cycle eg: *Volvox*
 B) Haplodiplontic lifecycle eg: *Ectocarpus*, *Psilotum*
 C) Haplodiplontic lifecycle eg: *Fucus*, *Marchantia*
 D) Diplontic lifecycle eg: Bryophytes, Pteridophytes

NEET PREVIOUS YEARS QUESTIONS

1. Which of the following statement is **correct**? [2018]
 (a) Ovules are not enclosed by ovary wall in gymnosperms.
 (b) *Selaginella* is heterosporous, while *Salvinia* is homosporous.
 (c) Stems are usually unbranched in both *Cycas* and *Cedrus*.
 (d) Horsetails are gymnosperms.
2. Winged pollen grains are present in _____. [2018]
 (a) Mustard (b) *Cycas* (c) *Pinus* (d) Mango
3. Which one is **incorrectly** matched? [2018]
 (a) Uniflagellate gametes – *Polysiphonia* (b) Biflagellate zoospores – Brown algae
 (c) Unicellular organism – *Chlorella* (d) Gemma cups – *Marchantia*
4. Double fertilisation is exhibited by _____. [2017]
 (a) algae (b) fungi (c) angiosperms (d) gymnosperms
5. Select the mismatch. [2017]
 (a) *Cycas* – Dioecious (b) *Salvinia* – Heterosporous
 (c) *Equisetum* – Homosporous (d) *Pinus* – Dioecious
6. Life cycle of *Ectocarpus* and *Fucus* respectively are: [2017]
 (a) Diplontic, Haplodiplontic (b) Haplodiplontic, Diplontic
 (c) Haplodiplontic, Haplontic (d) Haplontic, Diplontic
7. Zygotic meiosis is characteristic of _____. [2017]
 (a) *Fucus* (b) *Funaria* (c) *Chlamydomonas* (d) *Marchantia*
8. An example of colonial alga is _____. [2017]
 (a) *Volvox* (b) *Ulothrix* (c) *Spirogyra* (d) *Chlorella*
9. Select the **correct** statement. [2016]
 (a) Gymnosperms are both homosporous and heterosporous.
 (b) *Salvinia*, *Ginkgo* and *Pinus* all are gymnosperms.
 (c) *Sequoia* is one of the tallest trees.
 (d) The leaves of gymnosperms are not well adapted to extremes of climate.
10. In bryophytes and pteridophytes, transport of male gametes requires _____. [2016]
 (a) Wind (b) Insects (c) Birds (d) Water
11. In angiosperms, microsporogenesis and megasporogenesis [2015]
 (a) form gametes without further divisions. (b) involve meiosis.
 (c) occur in ovule. (d) occur in anther.
12. Male gametophyte in angiosperms produces [2015]
 (a) single sperm and vegetative cell. (b) single sperm and two vegetative cells.
 (c) three sperms. (d) two sperms and a vegetative cell.
13. Read the following five statements (A to E) and select the option with all **correct** statements. [2015]
 (A) Mosses and lichens are the first organisms to colonise a bare rock.
 (B) *Selaginella* is a homosporous pteridophyte.
 (C) Coralloid roots in *Cycas* have VAM.
 (D) Main plant body in bryophytes is gametophytic, whereas in pteridophytes it is sporophytic.
 (E) In gymnosperms, male and female gametophytes are present within sporangia located on sporophyte.
 (a) (B), (C) and (D) (b) (A), (D) and (E) (c) (B), (C) and (E) (d) (A), (C) and (D)
14. In which of the following gametophyte is not independent free living? [2015]
 (a) *Marchantia* (b) *Pteris* (c) *Pinus* (d) *Funaria*
15. Which one is **incorrect** statement? [2015]
 (a) *Mucor* has biflagellate zoospores.
 (b) Haploid endosperm is typical feature of gymnosperms.

- (c) Brown algae have chlorophyll *a* and *c* and fucoxanthin.
 (d) Archaeogonia are found in bryophyta, pteridophyta and gymnosperms.

16. Which one of the following statements is **incorrect**? [2015]
 (a) Agar - agar is obtained from *Gelidium* and *Gracilaria*.
 (b) *Chlorella* and *Spirulina* are used as space food.
 (c) Mannitol is stored food in rhodophyceae.
 (d) Algin and carrageenan are products of algae.
17. Male gametes are flagellated in _____. [2015]
 (a) *Anabaena* (b) *Ectocarpus* (c) *Spirogyra* (d) *Polysiphonia*
18. Which of the following is responsible for peat formation? [2014]
 (a) *Marchantia* (b) *Riccia* (c) *Funaria* (d) *Sphagnum*
19. Which one of the following is **incorrect** about *Chara*? [2014]
 (a) Upper oogonium and lower round antheridium.
 (b) Globule and nucule present on the same plant.
 (c) Upper antheridium and lower oogonium.
 (d) Globule is male reproductive structure.
20. An alga which can be employed as food for human being is _____. [2014]
 (a) *Ulothrix* (b) *Chlorella* (c) *Spirogyra* (d) *Polysiphonia*
21. Which one of the following shows isogamy with non-flagellated gametes? [2014]
 (a) *Sargassum* (b) *Ectocarpus* (c) *Ulothrix* (d) *Spirogyra*
22. From evolutionary point of view, retention of the female gametophyte with developing young embryo on the parent sporophyte for some time, is first observed in (NEET-2019)
 (1) Liverworts (2) Mosses (3) Pteridophytes (4) Gymnosperms
23. Phloem in gymnosperms lacks : (NEET-2019)
 (1) Albuminous cells and sieve cells (2) Sieve tubes only
 (3) Companion cells only (4) Both sieve tubes and companion cells
24. Phycoerythrin is the major pigment in : (NEET-2020 COVID)
 (1) Red algae (2) Blue green algae (3) Green algae (4) Brown algae
25. Which of the following statements is incorrect about gymnosperms? (NEET-2020 COVID)
 (1) They are heterosporous
 (2) Male and female gametophytes are free living
 (3) Most of them have narrow leaves with thick cuticle
 (4) Their seeds are not covered
26. Male and female gametophytes do not have an independent free living existence in (NEET-2020 COVID)
 (1) Pteridophytes (2) Algae (3) Angiosperms (4) Bryophytes
27. Floridean starch has structure similar to : (NEET-2020)
 1) Laminarin and cellulose 2) Starch and cellulose
 3) Amylopectin and glycogen 4) Mannitol and algin
28. Strobili or cones are found in : (NEET-2020)
 1) Equisetum 2) *Salvinia* 3) *Pteris* 4) *Marchantia*
29. Which of the following pairs is of unicellular algae? (NEET-2020)
 1) *Chlorella* and *Spirulina* 2) *Laminaria* and *Sargassum*
 3) *Gelidium* and *Gracilaria* 4) *Anabaena* and *Volvox*
30. Genera like *Selaginella* and *Salvinia* produce two kinds of spores. Such plants are known as [NEET-2021]
 (1) Heterosorus (2) Homosporous (3) Heterosporous (4) Homosorus
31. Gemmae are present in [NEET-2021]
 1) Pteridophytes 2) Some Gymnosperms 3) Some Liverworts 4) Mosses
32. Which of the following plants in monoecious ? [NEET-2021]
 1) *Chara* 2) *Marchantia polymorpha* 3) *Cycas circinalis* 4) *Carica papaya*
33. Which of the following algae contains mannitol as reserve food material? [NEET-2021]

- 1) Gracilaria 2. Volvox 3) Ulothrix 4) Ectocarpus
34. Which of the following algae produce carrageen? [NEET-2021]
 1) Brown algae 2) Red algae 3) Blue-green algae 4) Green algae
35. Which of the following is incorrectly matched? [NEET-2022]
 1) Ectocarpus – Fucoxanthin 2) Ulothrix – Mannitol
 3) Porphyra – Floridian starch 4) Volvox – Starch
36. Hydrocolloid carrageen is obtained from [NEET-2022]

- 1) Chlorophyceae and Phaeophyceae
 2) Phaeophyceae and Rhodophyceae
 3) Rhodophyceae only
 4) Phaeophyceae only

37. Match the plant with the kind of life cycle it exhibits: [NEET-2022]

List – I

a) Spirogyra

b) Fern

c) Funaria

d) Cycas

List – II

i) Dominant diploid sporophyte vascular plant, with highly reduced male or female gametophyte

ii) Dominant haploid free-living gametophyte

iii) Dominant diploid sporophyte alternating with reduced gametophyte called prothallus

iv) Dominant haploid leafy gametophyte alternating with partially dependent multicellular sporophyte.

Choose the correct answer from the options given below:

1) (a) – (iv), (b) – (i), (c) – (ii), (d) – (iii)

2) (a) – (ii), (b) – (iii), (c) – (iv), (d) – (i)

3) (a) – (iii), (b) – (iv), (c) – (i), (d) – (ii)

4) (a) – (ii), (b) – (iv), (c) – (i), (d) – (iii)

38. Match List I with List II

	List-I		List-II
(a).	Rhizopus	I.	Mushroom
(b).	Ustilago	II.	Smut fungus
(c).	Puccinia	III.	Bread mould
(d).	Agaricus	IV.	Rust fungus

Choose the correct answer from the options given below:

(a). A-III, B-II, C-IV, D-I

(b). A-I, B-III, C-II, D-IV

(c) A-III, B-II, C-I, D-IV

(d) A-IV, B-III, C-II, D-I

39. Which one of the following is not a criterion for classification of fungi? [NEET 2024]

(a). Morphology of mycelium

- (b). Mode of nutrition
- (c). Mode of spore formation
- (d). Fruiting body

[NEET 2024]

40. Read the following statements and choose the set of correct statements: In the members of Phaeophyceae:

- (A). Asexual reproduction occurs usually by biflagellate zoospores.
- (B). Sexual reproduction is by oogamous method only.
- (C). Stored food is in the form of carbohydrates which is either mannitol or laminarin.
- (D). The major pigments found are chlorophyll a, c and carotenoids and xanthophyll.
- (E). Vegetative cells have a cellulosic wall, usually covered on the outside by gelatinous coating of algin.

Choose the correct answer from the options given below:

- (a). A, B, C and D only
- (b). B, C, D and E only
- (c) A, C, D and E only
- (d) A, B, C and E only

[NEET 2024]

41. Which classes of algae possess pigment fucoxanthin and pigment phycoerythrin, respectively?

- (a). Phaeophyceae and Chlorophyceae
- (b). Phaeophyceae and Rhodophyceae
- (c). Chlorophyceae and Rhodophyceae
- (d). Rhodophyceae and Phaeophyceae

[NEET 2023 Manipur]

42. Given below are the stages in the life cycle of pteridophytes. Arrange the following stages in the correct sequence.

- A. Prothallus stage
- B. Meiosis in spore mother cells
- C. Fertilisation
- D. Formation of archegonia and antheridia in gametophyte.
- E. Transfer of antherozoids to the archegonia in presence of water.

Choose the correct answer from the options given below:

- (a) B, A, D, E, C
- (b) B, A, E, C, D
- (c) D, E, C, A, B
- (d) E, D, C, B, A

[NEET 2025]

43. The correct sequence of events in the life cycle of bryophytes is

- A. Fusion of antherozoid with egg.
- B. Attachment of gametophyte to substratum.
- C. Reduction division to produce haploid spores.
- D. Formation of sporophyte.
- E. Release of antherozoids into water.

Choose the correct answer from the option given below:

- (a) D, E, A, C, B
- (b) B, E, A, C, D
- (c) B, E, A, D, C
- (d) D, E, A, B, C

[NEET 2025]

44. How many meiotic and mitotic divisions need to occur for the development of a mature female gametophyte from the

megaspore mother cell in an angiosperm plant?

- (a) 2 Meiosis and 3 Mitosis
- (b) 1 Meiosis and 2 Mitosis
- (c) 1 Meiosis and 3 Mitosis
- (d) No Meiosis and 2 Mitosis

[NEET 2025]

45. Which one of the following is the characteristic feature of gymnosperms?

- (a) Seeds are enclosed in fruits.
- (b) Seeds are naked.
- (c) Seeds are absent.
- (d) Gymnosperms have flowers for reproduction.

[NEET 2025]

46. Match List-I with List-II.

List-I		List-II	
A.	Pteridophyte	I.	Salvia
B.	Bryophyte	II.	Ginkgo
C.	Angiosperm	III.	Polytrichum
D.	Gymnosperm	IV.	Salvinia

Choose the option with all correct matches.

- (a) A-III, B-IV, C-II, D-I
- (b) A-IV, B-III, C-I, D-II
- (c) A-III, B-IV, C-I, D-II
- (d) A-IV, B-III, C-II, D-I

[NEET 2025]

47. . In bryophytes, the gemmae help in which one of the following?

- (a) Sexual reproduction
- (b) Asexual reproduction
- (c) Nutrient absorption
- (d) Gaseous exchange

[NEET 2025]

NCERT LINE BY LINE QUESTIONS – ANSWERS

1) A	2) C	3) D	4) D	5) A	6) D	7) B	8) B	9) B	10) D
11) B	12) B	13) D	14) B	15) C	16) A	17) A	18) D	19) D	20) A
21) A	22) B	23) A	24) A	25) D	26) A	27) B	28) A	29) A	30) A
31) C	32) C	33) D	34) C	35) A	36) A	37) B	38) C	39) C	40) B
41) B	42) D	43) C	44) B	45) A	46) D	47) B	48) B	49) A	50) B
51) C	52) D	53) C	54) A	55) A	56) D	57) C	58) D	59) A	60) A
61) C	62) D	63) B	64) D	65) D	66) B	67) A	68) A	69) A	70) B

71) D	72) B	73) B	74) A	75) D	76) B	77) A	78) B	79) D	80) A
81) A	82) C	83) B	84) B	85) D	86) D	87) C	88) C	89) D	90) B
91) B	92) B	93) A	94) A	95) B	96) C	97) A	98) B	99) B	100) A
101) A	102) A	103) D	104) B	105) C	106) B	107) A	108) A	109) A	110) C
111) B	112) A	113) B	114) D	115) B	116) A	117) B	118) A	119) C	120) B
121) A	122) D	123) A	124) A	125) B					

NEET PREVIOUS YEARS QUESTIONS-ANSWERS

- 1 (a) 2 (c) 3 (a) 4 (c) 5 (d) 6 (b) 7 (c) 8 (a) 9 (c) 10 (d)
 11 (b) 12 (d) 13 (b) 14 (c) 15 (a) 16 (c) 17 (b) 18 (d) 19 (c) 20 (b)
 21 (d) 22 (3) 23 (4) 24 (1) 25 (2) 26 (3) 27 (3) 28 (1) 29 (1) 30 (3)
 31 (3) 32 (1) 33 (4) 34 (2) 35 (2) 36 (3) 37 (2) 38(a) 39(b) 40(c) 41(b) 42(a) 43(c)
 44(c) 45(b) 46(b) 47(b)

NEET PREVIOUS YEARS QUESTIONS-EXPLANATIONS

- (a) The gymnosperms are a group of seed-producing plants. The name is based on the unenclosed condition of their seeds (called ovules in their unfertilised state).
- (c) Winged pollen grains are present in *Pinus*. Each pollen grain has two wing-like structures which enables it to float in air, as an adaptation for dispersal by the wind.
- (a) *Polysiphonia* is a genus of red algae, where asexual spores and gametes are non-motile or non-flagellated.
- (c) Double fertilisation is a unique feature exhibited only by angiosperms. It involves both syngamy and triple fusion.
- (d) *Pinus* is a monoecious plant comprising of both male and female cones on same plant.
- (b) *Ectocarpus* exhibits haplodiplontic life cycle while *Fucus* has diplontic life cycle.
- (c) *Chlamydomonas* has haplontic life cycle hence, shows zygotic meiosis.
- (a) *Volvox* is motile colonial fresh water green alga. It forms spherical colonies.
- (c) *Sequoia sempervivans* is one of the tallest trees.
- (d) Bryophytes neither have pollen nor flowers and rely on water to carry the male gametes (sperm) to the female gametes (eggs). The antherozoids (male gametes of pteridophytes) are armed with hair-like or whip-like cilia or flagellae and are able to swim through water; they do not travel great distances and are only released when free water is available.
- (b) In meiosis, the number of chromosomes are reduced by half producing haploid daughter cells. In both processes microsporogenesis and megasporogenesis, the microspore mother cell and the megaspore mother cell undergoes meiosis to produce haploid microspore and megaspore respectively.
- (d) Two sperms and a vegetative cell are produced by male gametophyte in angiosperms. Male gametophyte or pollen grain contain one generative cell, which further divides mitotically to form two sperms. Whereas, a vegetative produces an elongated pollen tube to deliver the sperm in embryo sac.
- (b) *Selaginella* is a heterosporous pteridophyte containing micro & megaspores. In *Cycas*, coralloid root has the cyanobacteria - *Anabaena*.
- (c) *Pinus* belongs to gymnosperms in which male and female gametophytes do not have an independent Free living existence. They remain within the sporangia which are of two types — microsporangia and megasporangia.
- (a) The spores are non motile in *Mucor*.
- (c) Mannitol or laminarin is the stored food in phaeophyceae (brown algae).
- (b) Male gametes are flagellated in *Ectocarpus* (phaeophyceae). They possess heterokont, lateral flagella.
- (d) *Sphagnum*, a moss, provides peat that has long been used as fuel. It has the capacity to retain water for long periods and as such used to cover the plant roots during transportation.
- (c) *Chara* is a green alga found attached to bottoms of shallow water of ponds, pools and lakes. Male sex organ is called antheridium. Female sex organ is called oogonium. Oogonium is borne at the top of the four celled filament.

20. (b) *Chlorella* and *Spirulina* are unicellular algae, rich in proteins and are used as food supplements by Space travellers.
21. (d) In *Spirogyra*, sexual reproduction occurs through conjugation. Gametes are non-flagellated Morphologically similar but physiologically different (isogamy with physiological anisogamy).
27. Floridean starch is reserve food material of red algae, it is similar to the structure of amylopectin and glycogen
28. Equisetum is pteridophyte in which sporophylls are organised in form of strobili or cones
29. Chlorella and Spirulina are algae used as single cell proteins
30. Plants like Selaginella and Salvinia produce two kinds of spore i.e., microspores and macrospores. They are known as heterosporous. Most of the pteridophytes produce single type of spores and are called homosporous Sorus are brownish or yellowish cluster of spore producing structures located on the lower surface of fern leaves.
31. Some Liverworts
32. Chara
33. Ectocarpus is pheophyceae member which stores Mannitol
34. Carrageen is present in the cell walls of red algae
35. *Ulothrix* – is green alga and stored food is starch
36. Rhodophyceae
37. Spirogyra is a green algae, haplontic life cycle.
- Fern is a pteridophyte – Life cycle shows dominant diploid sporophyte, alternating with reduced free living gametophytic stage. So its Haplo-diplontic life cycle
- Funaria – belongs to Bryophyta. Its a moss plant. Exhibits haplodiplontic lifecycle. The free living haploid gametophyte bears the sporophytic plant body.
- Cycas – Gymnosperms.
- Gymnosperms exhibit dominant diploid saprophytic plant body, with highly reduced male/female gametophyte.

38. Ans. (a)

Explanation

Rhizopus is a bread mould fungus. Ustilago is a smut fungi. Puccinia is known as rust fungi. Agaricus is commonly called mushroom.

39. Ans. (b)

Explanation

The morphology of the mycelium, mode of spore formation and fruiting bodies form the basis for the division of the kingdom fungi into various classes.

40. Ans. (c)

Explanation

In members of Phaeophyceae sexual reproduction is by oogamous, isogamous or anisogamous methods. Therefore correct set of statements are A, C, D and E.

41. Ans. (b)

Explanation

Option B: Phaeophyceae and Rhodophyceae

Explanation:

Phaeophyceae, commonly known as brown algae, owe their characteristic brown or olive color to the pigment fucoxanthin. This is a type of xanthophyll, a class of oxygen-containing carotenoid pigments, that masks the green color of chlorophyll.

Rhodophyceae, commonly known as red algae, are predominantly colored by the pigment r-phycoerythrin. This pigment reflects red light and absorbs blue light, which allows red algae to live at greater depths than many other types of algae because blue light penetrates water deeper than light of longer wavelengths.

These pigments, along with chlorophylls, give these algae their distinctive colors and allow them to perform photosynthesis by capturing light energy at specific wavelengths.

42. Ans. (a)

Explanation

In pteridophytes, the main plant body is a sporophyte which is differentiated into true root, stem and leaves. The sporophytes bear sporangia that are subtended by leaf-like appendages called sporophylls. The sporangia produce spores by meiosis in spore mother cells. The spores germinate to give rise to inconspicuous, small but multicellular, free-living, mostly photosynthetic thalloid gametophytes called prothallus. The gametophytes 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 formation of zygote. Zygote thereafter produces a multicellular well differentiated sporophyte which is the dominant phase of the pteridophytes

43. Ans. (c)

Explanation

The correct sequence of events in the life cycle of bryophytes is:

- B: Attachment of gametophyte to substratum
- E: Release of antherozoids into water
- A: Fusion of antherozoid with egg
- D: Formation of sporophyte
- C: Reduction division to produce haploid spores

This sequence reflects the alternation of generations in bryophytes, where the dominant gametophyte generation gives rise to the sporophyte after fertilization.

44. Ans. (c)

Explanation

Megasporogenesis : The process of formation of megaspores from the megaspore mother cell is called megasporogenesis. Ovules generally differentiate a single megaspore mother cell (MMC) in the micropylar region of the nucellus. It is a large cell containing dense cytoplasm and a prominent nucleus. The MMC undergoes meiotic division. In a majority of flowering plants, one of the megaspores is functional while the other three degenerate. Only the functional megaspore develops into the female gametophyte (embryo sac). The nucleus of the functional megaspore divides mitotically to form two nuclei which move to the opposite poles, forming the 2 -nucleate embryo sac. Two more sequential mitotic nuclear divisions result in the formation of the 4 -nucleate and later the 8nucleate stages of the embryo sac.

45. Ans. (b)

Explanation

The gymnosperms (gymnos : naked, sperma : seeds) are plants in which the ovules are not enclosed by any ovary wall and remain exposed, both before and after fertilisation. The seeds that develop post-fertilisation, are not covered, i.e., are naked.

46. Ans. (b)

Explanation

Salvia is an angiosperm. Ginkgo is a gymnosperm. Polytrichum is a moss (bryophyte). Salvinia is a pteridophyte.

47. Ans. (b)

Explanation

Asexual reproduction in liverworts takes place by fragmentation of thalli, or by the formation of specialised structures called gemmae (sing. gemma). Gemmae are green, multicellular, asexual buds, which develop in small receptacles called gemma cups located on the thalli. The gemmae become detached from the parent body and germinate to form new individuals.

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