

YAKEEN NEET 2.0

2026

Plant Kingdom

Botany

Lecture – 02

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Topics to be covered

1

Algae + Life cycle
Part-02

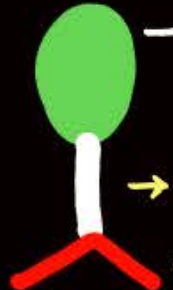

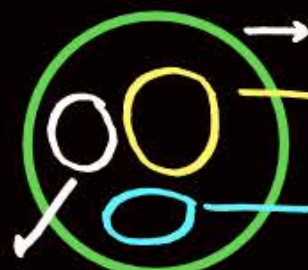
2

Bryophyte

3

4

Brown algae

- ★  → Frond/leaf like (Photosynthesis)
→ Stipe/stalk
→ Holdfast (attachment)
- ★  → Algin (hydrocolloid)
→ Cell wall (cellulose)
- ★  → Cell membrane
→ vacuole
→ chloroplast
Nucleus
Protoplast (cell without cell wall)
- ★ Vegetative: fragmentation

★ Asexual Repⁿ: Zoospore



★ Sexual: Iso, aniso, oogamous.

★ gametes: pear, pyriform, Biflagellate, Lateral end.

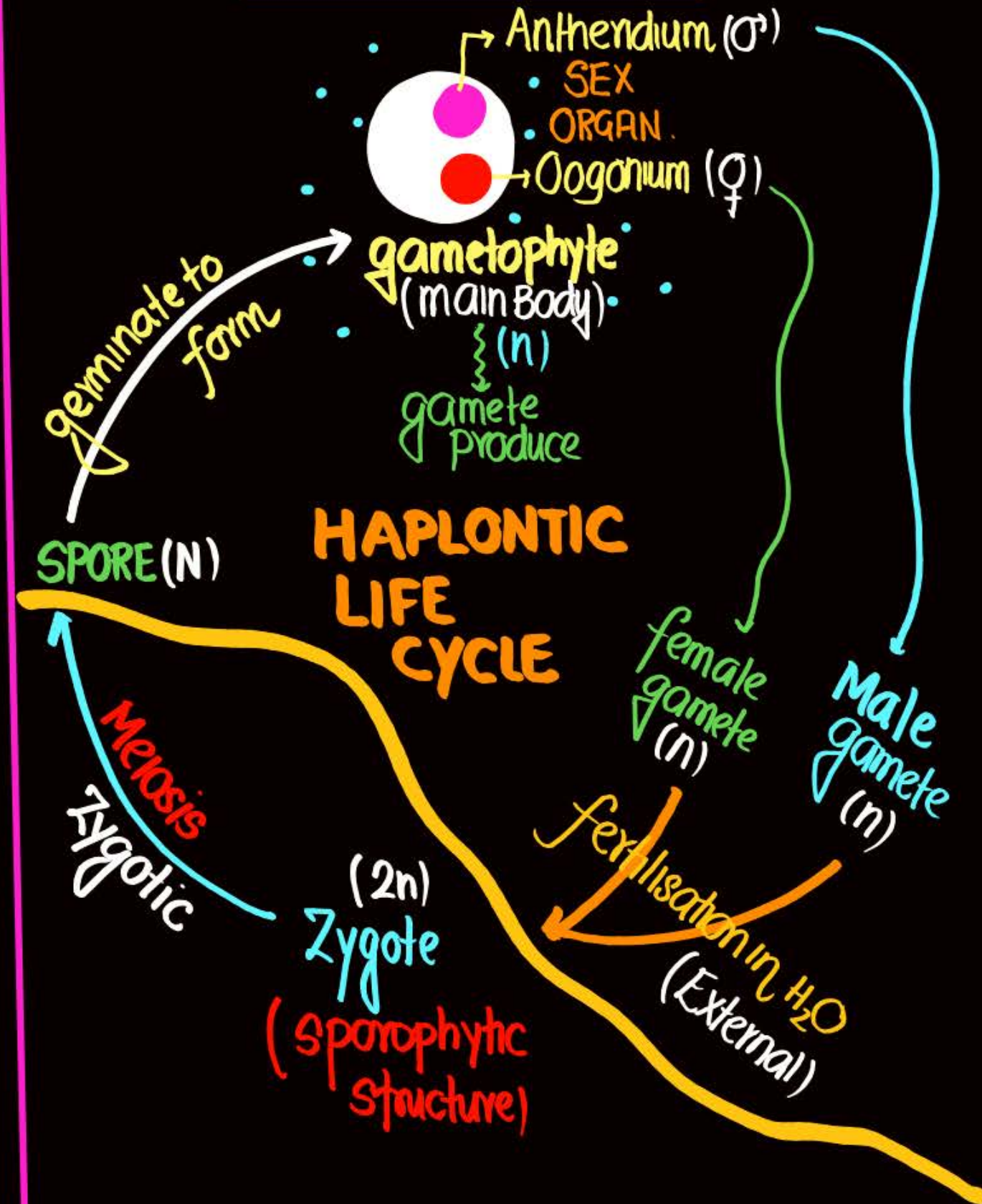
Fertilisation in

Oogonium (internal)

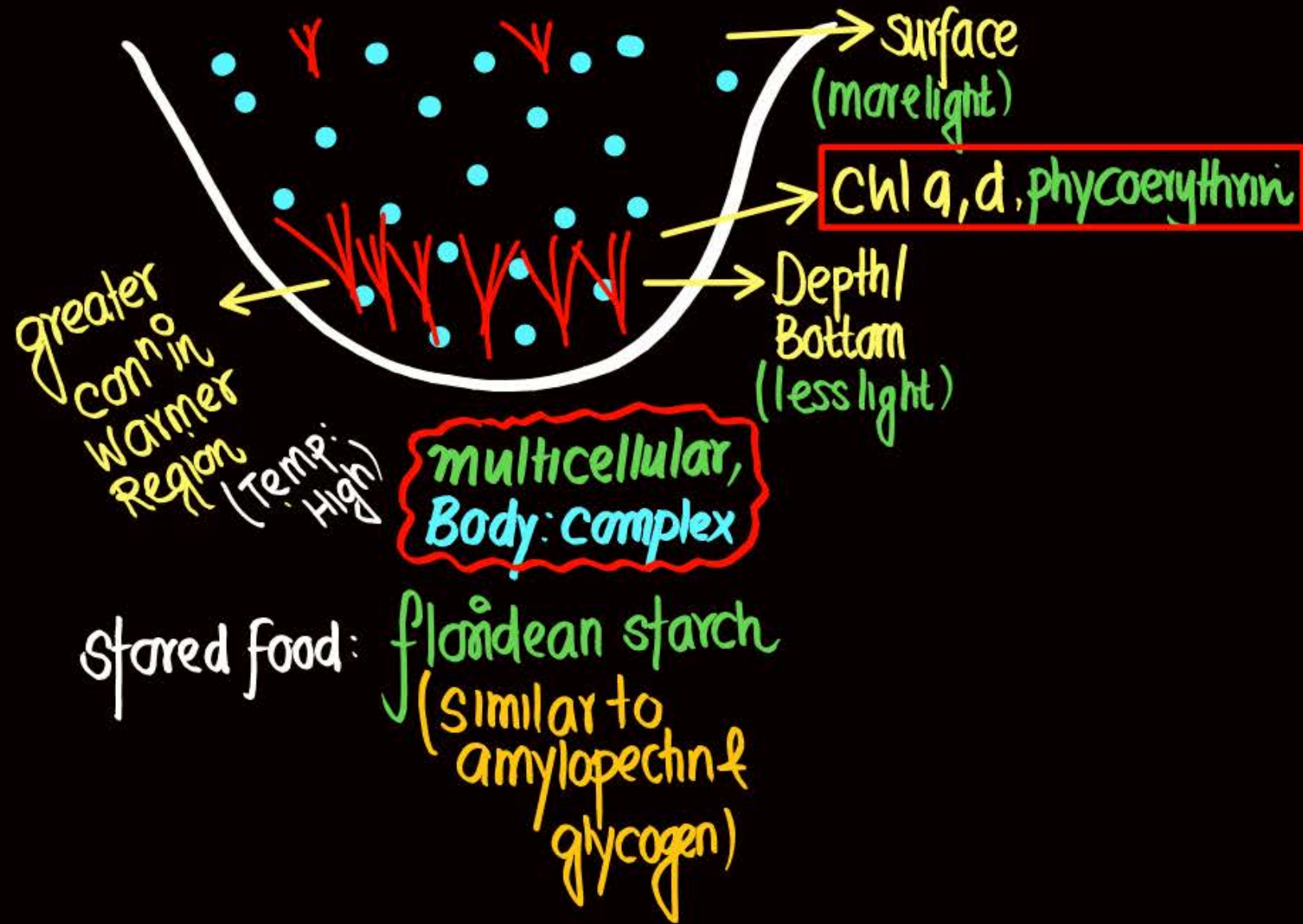
H₂O (External)

eg: Dictyota
Sargassum
Ectocarpus → Haplodiplontic
Laminaria
Fucus → Diplontic

LIFE CYCLE OF ALGAE



Red algae (Rhodophyceae)



Vegetative: fragmentation

Asexual: Zoospore absent, **By non-motile spore**

Sexual: Only oogamous.

male gamete
(small)
(non-motile)

female gamete
(Large)
(non-motile)

post fertilisation: structure/changes.
Complex.

eg: porphyra
polysiphonia
Gracilaria
Gelidium



Gametophyte

sporophyte

Bryophyte

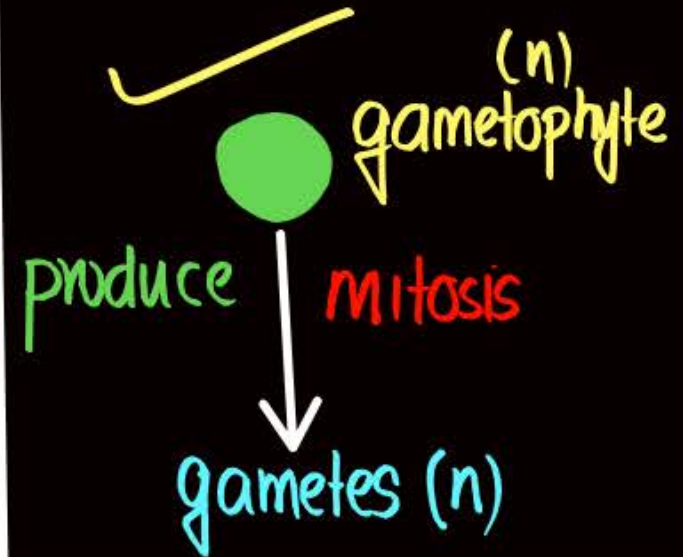
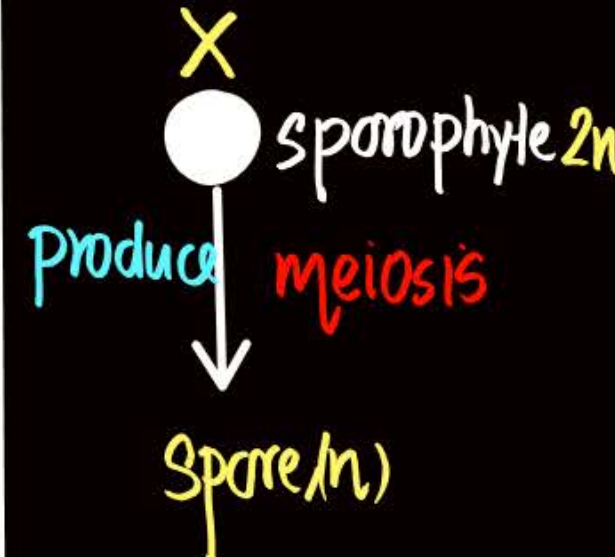
★ Root, stem, leaves, seed, fruit, vascular Tissue: X

★ First embryophyte

★ Root like, stem like, leaf like structure ✓

★ INCLUDES: ① LIVERWORT ② MOSSES.

★ BODY: ① Gametophyte
② sporophyte.

| character | Gametophyte | sporophyte |
|---------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| ① Multicellular | prostrate, green ✓ | erect, non green ✓ |
| ③ Photosynthetic | Haploid ✓ | diploid X |
| Independent (Free living) | ✓ | X |
| Dependent | X | ✓ on gametophyte for Food. |
| dominant / main Body |  |  |

3.1.1 Chlorophyceae

The members of chlorophyceae are commonly called green algae. The plant body may be unicellular, colonial or filamentous. They are usually grass green due to the dominance of pigments chlorophyll *a* and *b*. The pigments are localised in definite chloroplasts. The chloroplasts may be discoid, plate-like, reticulate, cup-shaped, spiral or ribbon shaped in different species.

Most of the members have one or more storage bodies called pyrenoids located in the chloroplasts. Pyrenoids contain protein besides starch. Some algae may store food in the form of oil droplets. Green algae usually have a rigid cell wall made of an inner layer of cellulose and an outer layer of pectose.

Vegetative reproduction usually takes place by fragmentation. Asexual reproduction is by flagellated zoospores produced in zoosporangia. The sexual reproduction shows considerable variation in the type and formation of sex cells and it may be isogamous, anisogamous or oogamous. Some commonly found green algae are: *Chlamydomonas*, *Volvox*, *Ulothrix*, *Spirogyra* and *Chara* (Figure 3.1a).

gamete.

3.1.2 Phaeophyceae

The members of phaeophyceae or **brown algae** are found primarily in marine habitats. They show great variation in size and form. They range from simple branched, filamentous forms (*Ectocarpus*) to profusely branched forms as represented by kelps, which may reach a height of 100 metres. They possess chlorophyll *a*, *c*, carotenoids and xanthophylls.

They vary in colour from olive green to various shades of brown depending upon the amount of the xanthophyll pigment, fucoxanthin present in them. Food is stored as complex carbohydrates, which may be in the form of laminarin or mannitol. The vegetative cells have a cellulosic wall usually covered on the outside by a gelatinous coating of algin.

The protoplast contains, in addition to plastids, a centrally located vacuole and nucleus. The plant body is usually attached to the substratum by a holdfast, and has a stalk, the stipe and leaf like photosynthetic organ – the frond. Vegetative reproduction takes place by fragmentation. Asexual reproduction in most brown algae is by biflagellate zoospores that are pear-shaped and have two unequal laterally attached flagella.

Sexual reproduction may be isogamous, anisogamous or oogamous. Union of gametes may take place in water or within the oogonium (oogamous species). The gametes are pyriform (pear-shaped) and bear two laterally attached flagella. The common forms are *Ectocarpus*, *Dictyota*, *Laminaria*, *Sargassum* and *Fucus* (Figure 3.1b).

3.1.3 Rhodophyceae

The members of rhodophyceae are commonly called red algae because of the predominance of the red pigment, r-phycocerythrin in their body. Majority of the red algae are marine with greater concentrations found in the warmer areas. They occur in both well-lighted regions close to the surface of water and also at great depths in oceans where relatively little light penetrates.

The red thalli of most of the red algae are multicellular. Some of them have complex body organisation. The food is stored as floridean starch which is very similar to amylopectin and glycogen in structure.

The red algae usually reproduce vegetatively by fragmentation. They reproduce asexually by non-motile spores and sexually by non-motile gametes. Sexual reproduction is oogamous and accompanied by complex post fertilisation developments. The common members are: *Polysiphonia*, *Porphyra* (Figure 3.1c), *Gracilaria* and *Gelidium*.

TABLE 3.1 Divisions of Algae and their Main Characteristics

| Classes | Common Name | Major Pigments | Stored Food | Cell Wall | Flagellar Number and Position of Insertions | Habitat |
|---------------|-------------|----------------------------------------------|-----------------------|------------------------------------------------------------------|---------------------------------------------|-------------------------------------------------------------------------------|
| Chlorophyceae | Green algae | Chlorophyll <i>a, b</i> ✓ | Starch ✓ | Cellulose ✓ | 2-8, equal, apical ✓ | Fresh water, ✓ brackish water, ✓ salt water ✓ |
| Phaeophyceae | Brown algae | Chlorophyll <i>a, c</i> , fucoxanthin ✓ | Mannitol, laminarin ✓ | Cellulose and algin ✓ | 2, unequal, lateral ✓ | Fresh water (rare), <u>brackish water</u> , <u>salt water</u> ✓ |
| Rhodophyceae | Red algae | Chlorophyll <i>a, d</i> , phycoerythrin ✓ | Floridean starch ✓ | <u>Cellulose</u> , <u>pectin</u> and <u>poly sulphate esters</u> | Absent ✓ | <u>Fresh water</u> (some), <u>brackish water</u> , <u>salt water</u> (most) ✓ |

✗

Life cycle of *Ectocarpus* and *Fucus* respectively are:

(2017 - Delhi)

- 1 Haplontic, Diplontic
- 2 Diplontic, Haplodiplontic
- 3 Haplo-diplontic, Diplontic
- 4 Haplo-diplontic, Haplontic

Zygotic meiosis is characteristic of:

(2017-Delhi)

- 1 *Marchantia*
- 2 *Fucus*
- 3 *Funaria*
- 4 *Chlamydomonas*

Select the wrong statement:

(2013)

- 1 *Chlamydomonas* exhibits both isogamy and anisogamy and *Fucus* shows oogamy
- 2 Isogametes are similar in structure, function and behaviour
- 3 Anisogametes differ either in structure, function or behaviour
- 4 In oogamous reproduction, female gamete is smaller and motile, while male gamete is larger and non motile

Read the following statements and choose the set of correct statements. (2024)

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:

- | | |
|-----------------------------|-----------------------------|
| 1 A, C, D and E only | 2 A, B, C and E only |
| 3 A, B, C and C only | 4 B, C, D and E only |

Which classes of algae possess pigment fucoxanthin and pigment phycoerythrin, respectively? (2023-Manipur)

- 1 Phaeophyceae and Chlorophyceae
- 2 Phaeophyceae and Rhodophyceae
- 3 Chlorophyceae and Rhodophyceaea.
- 4 Rhodophyceae and Phaeophyceae

Question



Read the following statements and identify the characters related to the alga shown in the diagram (2022 Re)

- A. It is a member of Chlorophyceae
- B. Food is stored in the form of starch
- C. It is a monoecious plant showing oogonium and antheridium
- D. Food is stored in the form of laminarin or mannitol
- E. It shows dominance of pigments Chlorophyll a, c and Fucoxanthin

Choose the correct answer from the options given below:

1 (C), (D) and (E) only

2 (A) and (B) only

3 (A), (B) and (C) only

4 (A), (C) and (D) only



Which of the following is incorrectly matched?

(2022)

- 1 *Volvox* – Starch
- 2 *Ectocarpus* – Fucoxanthin
- 3 *Ulothrix* – Mannitol
- 4 *Porphyra* – Floridean Starch

Hydrocolloid carrageen is obtained from:

(2022)

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

Which of the following algae produce Carrageen?

(2021)

- 1 Brown algae
- 2 Red algae
- 3 Blue-green algae
- 4 Green algae

Which of the following algae contains mannitol as reserve food material? (2021)

- 1 *Gracilaria*
- 2 *Volvox*
- 3 *Ulothrix*
- 4 *Ectocarpus*

Which of the following pairs is of unicellular algae?

(2020)

- 1 *Gelidium* and *Gracilaria*
- 2 *Anabaena* and *Volvox*
- 3 *Chlorella* and *Spirulina*
- 4 *Laminaria* and *Sargassum*

Floridean starch has structure similar to:

(2020)

- 1 Amylopectin and glycogen
- 2 Mannitol and algin
- 3 Laminarin and cellulose
- 4 Starch and cellulose

Phycoerythrin is the major pigment in:

(2020-Covid)

1 Blue green algae

2 Green algae

3 Brown algae

4 Red algae

An example of colonial alga is

(2017-Delhi)

1 *Chlorella*

2 *Volvox*

3 *Ulothrix*

4 *Spirogyra*

Which one of the following statements is wrong?

(2016 - II)

- 1 Agar-agar is obtained from *Gelidium* and *Gracilaria*.
- 2 *Laminaria* and *Sargassum* are used as food.
- 3 Algae increase the level of dissolved oxygen in the immediate environment.
- 4 Algin is obtained from red algae, and carrageen from brown algae.

Male gametes are flagellated in:

(2015)

- 1 *Ectocarpus*
- 2 *Spirogyra*
- 3 *Polysiphonia*
- 4 *Anabaena*

Isogamous condition with non-flagellated gametes is found in :

(2013)

1 *Fucus*

2 *Chlamydomonas*

3 *Spirogyra*

4 *Volvox*



Homework from **YAKEEN NEET 2.0 2026** Module



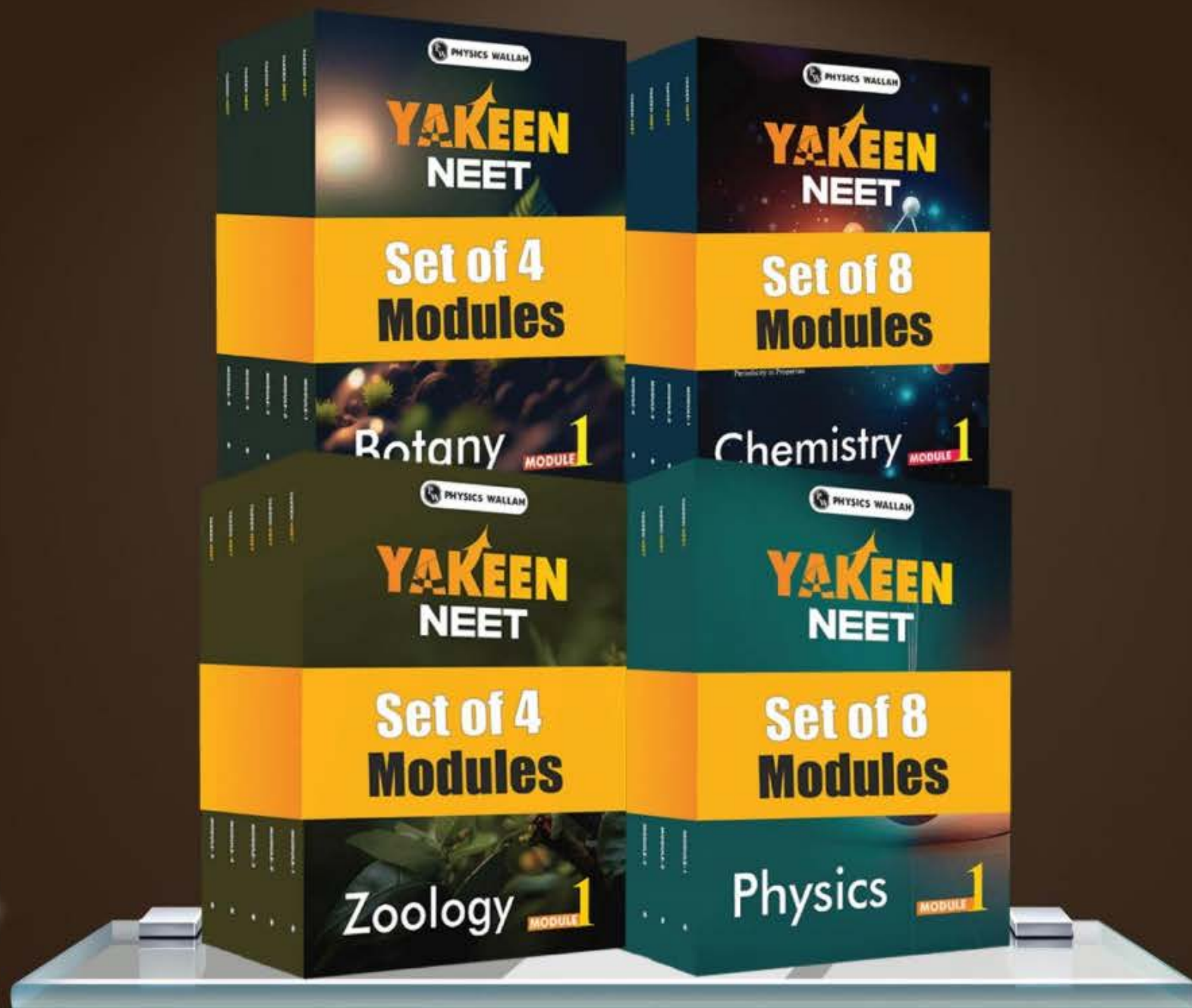
Module:
Algae Question

- ① : HW Question + algae.
- ② : Bryophyte + green algae, protista.
- ③ : Bryo Revⁿ + RED + Phycomyces.
- ④ : Asco, Basid, deutermy + Bryo Revⁿ.
- ⑤



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