

Question Bank with Previous Year Question



Department of Botany
Dinakrushna College, Jaleswar, Balasore

Paper I: MICROBIOLOGY AND PHYCOLOGY

Question Bank — Semester 1, Paper: Major-I (Botany)

Question Pattern Followed (based on previous year papers)

Section	Question Type	Marks
A	Fill in the Blanks	1 mark each (10 to be attempted)
B	Short Notes	2 marks each (9 to be attempted)
C	Write Notes / Answer (any eight)	5 marks each
D	Long / Essay type Answer (any four)	8 marks each

Unit 1: Viruses and the Microbial World

Syllabus scope: The microbial world, microbial nutrition, growth and metabolism. Viruses: discovery, nature, physicochemical and biological characteristics; classification (Baltimore); general structure with special reference to viroids and prions; replication; DNA virus (T-phage), lytic and lysogenic cycle; RNA virus (TMV). Economic importance of viruses. Vaccine production; role in research, medicine and diagnostics. Viral plant diseases - symptoms, effect and control.

SECTION A — Fill in the Blanks

42 questions · 1 mark each

- Genetic material of Bacteriophage T-Phage is _____. (Ans: DNA) [2025]
- The double stranded RNA virus is called _____. (Ans: Reovirus) [2025]
- The protein coat that encloses the viral genes is called as _____. (Ans: Capsid) [2024]
- Viruses were discovered while working on _____ disease of tobacco. (Ans: Mosaic)
- Tobacco Mosaic Virus (TMV) was first crystallised by _____. (Ans: W. M. Stanley)
- TMV was first shown to be filterable through bacteria-proof filters by _____. (Ans: D. Ivanowski)
- Viruses are obligate _____ parasites. (Ans: Intracellular)
- The Baltimore classification of viruses is based on the nature of their _____. (Ans: Genome (nucleic acid))
- According to Baltimore classification, viruses are grouped into _____ classes.
- The protein subunits that make up the viral capsid are called _____. (Ans: Capsomeres)
- A complete virus particle, including its envelope (if present), is called a _____. (Ans: Virion)
- Viroids consist only of a short strand of infectious _____, without a protein coat. (Ans: RNA)
- Prions are infectious agents composed only of _____, without any nucleic acid. (Ans: Protein)
- Prions are responsible for neurodegenerative diseases such as _____ disease in humans. (Ans: Creutzfeldt-Jakob)
- TMV is a _____ (DNA/RNA) virus. (Ans: RNA)
- TMV shows a _____ type of capsid symmetry. (Ans: Helical)
- Bacteriophages that infect bacteria such as E. coli are commonly called _____ phages. (Ans: T-phages / coliphages)
- The tail fibres of a T-phage help in _____ to the host bacterial cell wall. (Ans: Attachment)
- In the lytic cycle, the host bacterial cell is ultimately _____. (Ans: Lysed)
- In the lysogenic cycle, viral DNA integrates into the host genome as a _____. (Ans: Prophage)
- A bacteriophage capable of undergoing both lytic and lysogenic cycles is called a _____ phage. (Ans: Temperate)
- The enzyme that helps a phage break open the host bacterial cell wall on release is called _____. (Ans: Lysozyme)
- Interferons are proteins produced by host cells in response to _____ infection. (Ans: Viral)
- A vaccine prepared using a weakened form of the pathogen is called a _____ vaccine. (Ans: Live attenuated)
- A vaccine prepared using a killed pathogen is called a(n) _____ vaccine. (Ans: Inactivated (killed))
- mRNA vaccines work by directing host cells to produce a viral _____. (Ans: Antigen (protein))

27. The virus responsible for the mosaic disease of tobacco is _____. (Ans: TMV)
28. Viral diseases in plants are commonly transmitted by insect _____ such as aphids. (Ans: Vectors)
29. Common symptoms of viral infection in plants include mosaic patterns, leaf curling and _____ growth. (Ans: Stunted)
30. Control of viral plant diseases mainly relies on controlling their insect _____. (Ans: Vectors)
31. Molecular diagnosis of viral infections is commonly carried out using the _____ technique. (Ans: PCR / ELISA)
32. The microbial world includes bacteria, archaea, fungi, protists and _____. (Ans: Viruses)
33. Microorganisms that derive energy from light are called _____. (Ans: Phototrophs)
34. Microorganisms that derive energy from chemical compounds are called _____. (Ans: Chemotrophs)
35. The exponential phase of microbial growth is also known as the _____ phase. (Ans: Log phase)
36. The phase of microbial growth in which cell division and cell death occur at similar rates is the _____ phase. (Ans: Stationary phase)
37. Microbial nutrition that requires pre-formed organic compounds is called _____ nutrition. (Ans: Heterotrophic)
38. The four phases of a bacterial growth curve are lag, log, stationary and _____ phase. (Ans: Death (decline))
39. Interferon acts as a substance that interferes with viral _____. (Ans: Replication)
40. Icosahedral and helical are the two principal types of viral _____ symmetry. (Ans: Capsid)
41. A virus that infects bacteria is generally referred to as a _____. (Ans: Bacteriophage)
42. A virus lacking a lipid envelope around its capsid is described as a _____ virus. (Ans: Non-enveloped (naked))

SECTION B — Short Notes

40 questions · 2 marks each

1. What is prions? [2025]
2. Justify Viruses - living? [2025]
3. What is lysogenic cycle? [2024]
4. Discovery of viruses - a brief note
5. Physicochemical characteristics of viruses
6. Biological characteristics of viruses
7. Baltimore classification of viruses
8. General structure of a virus
9. Structure of viroids
10. Difference between viroids and viruses
11. Difference between viruses and prions
12. Structure of a bacteriophage (T-phage)
13. Structure of TMV
14. Replication of DNA viruses - an overview

15. Replication of RNA viruses - an overview
16. Lytic cycle - a brief account
17. Lysogenic cycle - a brief account
18. Temperate phage
19. Economic importance of viruses
20. Role of viruses in research
21. Role of viruses in medicine
22. Role of viruses in diagnostics
23. Vaccine production - an overview
24. Live attenuated vaccine
25. Inactivated vaccine
26. Symptoms of viral plant diseases
27. Control measures for viral plant diseases
28. Mosaic disease of tobacco
29. Interferons and their role
30. Bacteriophage adsorption and penetration
31. Capsid and capsomere
32. Enveloped and non-enveloped viruses
33. Microbial nutrition - types
34. Microbial growth curve - phases
35. Microbial metabolism - an overview
36. Difference between lytic and lysogenic cycles
37. Host specificity in viruses
38. Emerging viral diseases - a brief note
39. Satellite viruses
40. Structure and significance of viral envelope

SECTION C — Write Notes / Answer (5 Marks)

40 questions · 5 marks each

1. Lytic life cycle of virus [2025]
2. TMV [2025]
3. Structure of Prions [2024]
4. Viroids [2024]
5. Discovery and nature of viruses
6. Physicochemical and biological characteristics of viruses
7. Baltimore classification of viruses
8. General structure of viruses with special reference to viroids

9. General structure of viruses with special reference to prions
10. Structure and replication of bacteriophage (T-phage)
11. Lysogenic cycle of bacteriophage
12. Structure and replication of TMV
13. Economic importance of viruses
14. Role of viruses in vaccine production
15. Role of viruses in research, medicine and diagnostics
16. Viral plant diseases - symptoms and effects
17. Control of viral plant diseases
18. Comparative account of lytic and lysogenic cycles
19. Differences between viroids, prions and viruses
20. Mechanism of viral genome replication - an overview
21. Interferons and host defence against viruses
22. Structure and significance of capsid symmetry
23. Emerging and re-emerging viral diseases
24. Diagnostic techniques for viral infections
25. Prion diseases in animals and humans
26. Viroid diseases in plants
27. Vaccine types and their mechanism of action
28. Microbial world - an overview of major groups
29. Microbial nutrition - types and significance
30. Microbial growth curve and its phases
31. Microbial metabolism - an overview
32. Bacteriophage life cycle - lytic versus lysogenic
33. Molecular structure of TMV in detail
34. Historical discovery of viruses - key experiments
35. Applications of virology in biotechnology
36. Host-virus interactions
37. Latent and persistent viral infections
38. Retroviruses - a brief account
39. Structure of enveloped viruses
40. Role of viruses as vectors in genetic engineering

SECTION D — Long Answer / Essay Type (8 Marks)

16 questions · 8 marks each

1. Describe the structure of DNA and RNA viruses. Explain the economic importance of viruses. **[2025]**
2. Draw the labelled diagram of Bacteriophage and explain the method of its replication. **[2024]**

3. Discuss the general structure, Baltimore classification and biological characteristics of viruses.
4. Describe the discovery, nature and physicochemical characteristics of viruses.
5. Give a detailed account of the lytic and lysogenic cycles of bacteriophage.
6. Describe the structure and replication of TMV with a labelled diagram.
7. Discuss viroids and prions with reference to their structure and the diseases they cause.
8. Give a detailed account of vaccine production and its role in disease prevention.
9. Discuss the role of viruses in research, medicine and diagnostics.
10. Describe viral plant diseases - their symptoms, effects and control measures - in detail.
11. Discuss the economic importance of viruses with suitable examples.
12. Give a detailed account of the microbial world, highlighting microbial nutrition, growth and metabolism.
13. Discuss the phases of the microbial growth curve with a suitable diagram.
14. Compare and contrast the lytic and lysogenic cycles of bacteriophages.
15. Discuss the applications of virology in agriculture, medicine and biotechnology.
16. Give an account of the structure and life cycle of a temperate bacteriophage.

Unit 2: Bacteria and Cyanobacteria

Syllabus scope: *Bacteria: discovery, general characteristics, types - archaebacteria, eubacteria, mycoplasma and spheroplasts; cell structure, inclusions, nutrition, reproduction - vegetative, asexual and recombination (conjugation, transformation and transduction); economic importance in agriculture, medicine and industry. Cyanobacteria: ecology, occurrence, cell structure, heterocyst, reproduction, economic importance, role in biotechnology; morphology and life-cycle of Nostoc. General characteristics of Prochlorophyceae; evolutionary significance of Prochloron.*

SECTION A — Fill in the Blanks

42 questions · 1 mark each

1. Conjugation without sex pilli occurs in _____ bacteria. (Ans: Gram-positive) [2025]
2. The type of Archaeobacteria present inside the cattle's rumen is _____. (Ans: Methanogens) [2025]
3. Heterocyst occurs in _____. (Ans: Cyanobacteria (e.g., Nostoc)) [2025]
4. The bacteria which have a group of flagella at one end only are called _____. (Ans: Lophotrichous) [2024]
5. The bacterial cell wall is made up of _____. (Ans: Peptidoglycan (murein)) [2024]
6. In algae, akinetes are formed under _____ condition. (Ans: Unfavourable) [2024]
7. The principal pigment of blue-green algae (Cyanophyceae) is _____. (Ans: Phycocyanin) [2024]
8. Bacteria were first observed by _____ using a simple microscope. (Ans: Antonie van Leeuwenhoek)
9. Archaeobacteria are also known as _____. (Ans: Archaea)
10. Eubacteria are also referred to as _____ bacteria. (Ans: True)
11. Bacteria that naturally lack a cell wall are called _____. (Ans: Mycoplasma)
12. Bacterial cells that have lost their cell wall artificially are called _____. (Ans: Spheroplasts (protoplasts))
13. The rigid layer of the bacterial cell wall is composed mainly of _____. (Ans: Peptidoglycan (murein))
14. Gram-positive bacteria retain the _____ stain during Gram staining. (Ans: Crystal violet)
15. Gram-negative bacteria possess an additional _____ membrane outside the peptidoglycan layer. (Ans: Outer)
16. The jelly-like layer surrounding some bacterial cells is called the _____. (Ans: Capsule (slime layer))
17. Storage granules of phosphate seen in some bacteria are called _____ granules. (Ans: Volutin (metachromatic))
18. Bacteria that derive nutrition from dead organic matter are called _____. (Ans: Saprophytic)
19. A genus of bacteria capable of fixing atmospheric nitrogen in root nodules is _____. (Ans: Rhizobium)
20. Asexual reproduction in bacteria mainly occurs by _____. (Ans: Binary fission)
21. Under unfavourable conditions, some bacteria form a resistant resting structure called an _____. (Ans: Endospore)
22. Transfer of genetic material between bacteria through direct cell contact is called _____. (Ans: Conjugation)
23. Uptake of free DNA from the environment by a bacterial cell is called _____. (Ans: Transformation)
24. Transfer of bacterial DNA from one cell to another via a bacteriophage is called _____. (Ans: Transduction)
25. Bacteria used in the production of curd/yogurt belong to the genus _____. (Ans: Lactobacillus)
26. Bacteria are widely used in industry for the production of _____. (Ans: Antibiotics)

27. Cyanobacteria are also commonly known as _____. (Ans: Blue-green algae)
28. Cyanobacteria possess a prokaryotic _____, lacking a true membrane-bound nucleus. (Ans: Nucleoid)
29. Nitrogen fixation in cyanobacteria mainly occurs in specialised cells called _____. (Ans: Heterocysts)
30. The genus _____ is a filamentous, heterocystous cyanobacterium commonly studied for its life cycle. (Ans: Nostoc)
31. Asexual reproduction in Nostoc occurs by fragmentation and formation of motile filaments called _____. (Ans: Hormogonia)
32. Resting spores formed by cyanobacteria under unfavourable conditions are called _____. (Ans: Akinetes)
33. Cyanobacteria are used as biofertilizers mainly due to their ability to fix atmospheric _____. (Ans: Nitrogen)
34. Prochlorophyceae are photosynthetic prokaryotes that possess chlorophyll _____ in addition to chlorophyll a. (Ans: b)
35. The genus _____ is considered evolutionarily significant as a possible ancestor of the chloroplast. (Ans: Prochloron)
36. Prochloron lives in symbiotic association with marine invertebrates called _____. (Ans: Ascidians (sea squirts))
37. Bacterial endospores are highly heat resistant due to the presence of _____. (Ans: Calcium dipicolinate)
38. The rod-shaped bacterium capable of causing botulism disease is _____. (Ans: Clostridium botulinum)
39. The gelatinous sheath surrounding cyanobacterial filaments is composed mainly of _____. (Ans: Mucilage (polysaccharide))
40. Bacterial cell inclusions storing carbon reserves are called _____ granules. (Ans: PHB (poly- β -hydroxybutyrate))
41. True sexual reproduction in cyanobacteria is generally _____ (present/absent). (Ans: Absent)
42. Photosynthetic pigments in cyanobacteria are located on membranes called _____. (Ans: Thylakoids)

SECTION B — Short Notes

40 questions · 2 marks each

1. What is binary fission? [2025]
2. Describe the vegetative reproduction of Bacteria. [2025]
3. Name a rod-shaped bacterium which has the capacity to produce endospores. [2024]
4. Name the bacterium responsible for botulism disease. [2024]
5. Discovery of bacteria
6. General characteristics of bacteria
7. Archaeobacteria - a brief account
8. Eubacteria - a brief account
9. Mycoplasma
10. Spheroplasts
11. Cell structure of bacteria
12. Bacterial cell inclusions
13. Nutrition in bacteria

14. Endospore formation in bacteria
15. Conjugation in bacteria
16. Transformation in bacteria
17. Transduction in bacteria
18. Economic importance of bacteria in agriculture
19. Economic importance of bacteria in medicine
20. Economic importance of bacteria in industry
21. Ecology and occurrence of Cyanobacteria
22. Cell structure of Cyanobacteria
23. Heterocyst - structure and function
24. Reproduction in Cyanobacteria
25. Economic importance of Cyanobacteria
26. Role of Cyanobacteria in biotechnology
27. Morphology of Nostoc
28. Life cycle of Nostoc - an overview
29. General characteristics of Prochlorophyceae
30. Evolutionary significance of Prochloron
31. Gram staining and its significance
32. Flagellar arrangement in bacteria
33. Capsule and slime layer in bacteria
34. Bacterial cell wall composition
35. Akinetes in Cyanobacteria
36. Hormogonia in Cyanobacteria
37. Nitrogen fixation in Cyanobacteria
38. Biofertilizer role of Cyanobacteria
39. Comparison of Gram-positive and Gram-negative bacteria
40. Antibiotic-producing bacteria - examples

SECTION C — Write Notes / Answer (5 Marks)

40 questions · 5 marks each

1. Spheroplast [2025]
2. Genetic recombination [2025]
3. Economic importance of Bacteria [2025]
4. Cyanobacteria [2025]
5. Endospores of Bacteria [2024]
6. Mycoplasma [2024]
7. Heterocyst [2024]

8. Economic importance of B.G.A. (Blue-Green Algae) **[2024]**
9. General characteristics and types of bacteria
10. Cell structure of bacteria in detail
11. Nutrition and modes of nutrition in bacteria
12. Vegetative reproduction in bacteria
13. Asexual reproduction (binary fission and endospore formation) in bacteria
14. Genetic recombination in bacteria - conjugation, transformation and transduction
15. Conjugation in bacteria - mechanism
16. Transformation in bacteria - mechanism
17. Transduction in bacteria - mechanism
18. Role of bacteria in agriculture
19. Role of bacteria in medicine
20. Role of bacteria in industry
21. Archaeobacteria - characteristics and significance
22. Eubacteria - characteristics and classification
23. Ecology and occurrence of Cyanobacteria
24. Cell structure of Cyanobacteria
25. Morphology and life cycle of Nostoc
26. Reproduction in Cyanobacteria
27. Role of Cyanobacteria in biotechnology
28. General characteristics of Prochlorophyceae
29. Evolutionary significance of Prochloron
30. Nitrogen fixation and heterocyst function in Cyanobacteria
31. Comparative account of bacteria and Cyanobacteria
32. Bacterial endospores - structure and significance
33. Mycoplasma and spheroplasts - a comparative account
34. Bacterial cell inclusions and their functions
35. Economic significance of nitrogen-fixing bacteria
36. Industrial applications of bacteria (antibiotics, fermentation)
37. Pathogenic bacteria and diseases they cause
38. Biofertilizers derived from Cyanobacteria
39. Symbiotic nitrogen fixation by bacteria (Rhizobium)
40. Structure and reproduction of filamentous Cyanobacteria

SECTION D — Long Answer / Essay Type (8 Marks)

14 questions · 8 marks each

1. What is genetic recombination? Explain the different methods of genetic recombination in bacteria. [2024]
2. Give an account of the economic importance of Bacteria. [2024]
3. Describe the morphology and life cycle of Nostoc. [2025]
4. Discuss the general characteristics, types and cell structure of bacteria.
5. Describe the modes of reproduction in bacteria - vegetative, asexual and recombination.
6. Discuss conjugation, transformation and transduction in bacteria with suitable diagrams.
7. Give a detailed account of the economic importance of bacteria in agriculture, medicine and industry.
8. Discuss the general characteristics, cell structure and reproduction of Cyanobacteria.
9. Describe the ecology, occurrence and economic importance of Cyanobacteria.
10. Give a detailed account of heterocyst structure, function and its role in nitrogen fixation.
11. Discuss the role of Cyanobacteria in biotechnology and agriculture.
12. Describe the general characteristics of Prochlorophyceae and the evolutionary significance of Prochloron.
13. Discuss archaeobacteria, eubacteria, mycoplasma and spheroplasts with reference to their distinguishing features.
14. Give a detailed account of bacterial endospore formation and its significance.

Unit 3: Algae (General Account) and Chlorophyta

Syllabus scope: *Algae: general characteristics; ecology and distribution; range of thallus organisation; cell structure and components; cell wall, pigments, reserve food, flagella; methods of reproduction; classification - criteria, Fritsch's system, and Lee's evolutionary classification (up to groups); role of algae in environment, agriculture, biotechnology and industry. Chlorophyta: general characteristics, occurrence, range of thallus organisation, cell structure and reproduction. Morphology and life-cycles of Chlamydomonas, Volvox, Oedogonium and Coleochaete.*

SECTION A — Fill in the Blanks

42 questions · 1 mark each

1. Algal cell wall is made up of _____. (Ans: Cellulose) [2025]
2. _____ is the photosensitive organ of Chlamydomonas. (Ans: Eyespot (stigma)) [2025]
3. The colonial form of green algae is _____. (Ans: Volvox) [2025]
4. _____ is the type of sexual reproduction of order Conjugales of Chlorophyceae. (Ans: Conjugation) [2024]
5. The colony of Volvox is termed as _____. (Ans: Coenobium) [2024]
6. Palmelloid stage is seen in _____ algae. (Ans: Chlorophyceae) [2024]
7. The branch of botany dealing with the study of algae is called _____. (Ans: Phycology)
8. Algae are mostly _____ (autotrophic/heterotrophic) organisms. (Ans: Autotrophic)
9. The green colour of Chlorophyta is due to the dominance of chlorophyll a and _____. (Ans: Chlorophyll b)
10. The main reserve food material in Chlorophyta is _____. (Ans: Starch)
11. Algae showing a unicellular, flagellated thallus organisation are called _____ forms. (Ans: Motile (flagellate))
12. A non-motile, single-celled algal thallus embedded in mucilage is termed the _____ form. (Ans: Palmelloid (coccoid))
13. Fritsch's classification of algae is mainly based on pigmentation, reserve food and _____. (Ans: Flagellation)
14. Lee's evolutionary classification of algae groups organisms up to the level of _____. (Ans: Divisions (groups))
15. The whip-like locomotory organelle in motile algae is called the _____. (Ans: Flagellum)
16. A flagellum bearing fine lateral hair-like structures is called a _____ flagellum. (Ans: Tinsel (pleuronematic))
17. A smooth flagellum without lateral hairs is called a _____ flagellum. (Ans: Whiplash (acronematic))
18. Chlamydomonas possesses _____ number of flagella. (Ans: Two)
19. The contractile vacuoles in Chlamydomonas mainly function in _____. (Ans: Osmoregulation)
20. Asexual reproduction in Chlamydomonas commonly occurs by the formation of _____. (Ans: Zoospores)
21. Fusion of two morphologically similar motile gametes is called _____ reproduction. (Ans: Isogamous)
22. Fusion of two morphologically dissimilar motile gametes is called _____ reproduction. (Ans: Anisogamous)
23. Fusion of a large non-motile female gamete with a small motile male gamete is called _____ reproduction. (Ans: Oogamous)
24. Volvox exhibits a colonial type of thallus organisation known as a _____. (Ans: Coenobium)
25. In Volvox, reproductive cells specialised for asexual reproduction are called _____. (Ans: Gonidia)

26. Oedogonium shows a _____ type of thallus organisation. (Ans: *Filamentous*)
27. The characteristic caps formed at the apex of cells after division in Oedogonium are called _____. (Ans: *Cap cells*)
28. The dwarf male of Oedogonium develops from a small spore called the _____. (Ans: *Androspore*)
29. Coleochaete shows a discoid or parenchymatous thallus and is considered close to the ancestry of _____. (Ans: *Land plants (bryophytes)*)
30. The oogonium of Oedogonium produces a single, large, non-motile female gamete called the _____. (Ans: *Oosphere (egg)*)
31. Algae contribute significantly to the environment through global _____ production. (Ans: *Oxygen*)
32. Algae used as a source of biofuel are primarily obtained from _____. (Ans: *Microalgae*)
33. In agriculture, algae such as Cyanobacteria are used as _____. (Ans: *Biofertilizers*)
34. Agar-agar and carrageenan, industrially important products, are extracted mainly from _____ algae. (Ans: *Red*)
35. The palmelloid stage refers to a non-motile stage in which cells remain embedded in _____. (Ans: *Mucilage*)
36. The thick-walled, resting asexual spore formed by some algae under unfavourable conditions is called an _____. (Ans: *Akinete*)
37. The pyrenoid found within algal chloroplasts is mainly associated with synthesis and storage of _____. (Ans: *Starch*)
38. The cell wall of most Chlorophyta is composed mainly of _____. (Ans: *Cellulose*)
39. Sexual reproduction in the order Conjugales occurs through a process called _____. (Ans: *Conjugation*)
40. Chlamydomonas commonly forms a thick-walled resting stage under unfavourable conditions called a(n) _____. (Ans: *Palmella stage / hypnospore*)
41. The classification system that arranges algae based on evolutionary trends up to groups was proposed by _____. (Ans: *R. E. Lee*)
42. Motile colonial forms of algae, as in Volvox, are collectively described as showing _____ level of organisation. (Ans: *Coenobial*)

SECTION B — Short Notes

40 questions · 2 marks each

1. Describe role of algae in agriculture. [2025]
2. Discuss the types of sexual reproduction found in algae. [2025]
3. Define isogamous reproduction. [2025]
4. What is the function of the eye spot in an algal cell? [2024]
5. In which alga is the palmelloid stage found? [2024]
6. Name the structure which develops into a dwarf male in Oedogonium. [2024]
7. What is the range of sexual reproduction found in green algae? [2024]
8. General characteristics of algae
9. Ecology and distribution of algae
10. Range of thallus organisation in algae

11. Cell structure of algae
12. Cell wall composition in algae
13. Pigments found in algae
14. Reserve food materials in algae
15. Flagella and their types in algae
16. Methods of reproduction in algae - an overview
17. Fritsch's system of classification of algae
18. Lee's evolutionary classification of algae
19. Role of algae in the environment
20. Role of algae in biotechnology
21. Role of algae in industry
22. General characteristics of Chlorophyta
23. Range of thallus organisation in Chlorophyta
24. Cell structure and reproduction in Chlorophyta
25. Morphology of Chlamydomonas
26. Asexual reproduction in Chlamydomonas
27. Sexual reproduction in Chlamydomonas
28. Morphology of Volvox
29. Coenobium formation in Volvox
30. Reproduction in Volvox
31. Morphology of Oedogonium
32. Cap cell formation in Oedogonium
33. Nannandria (dwarf males) in Oedogonium
34. Morphology of Coleochaete
35. Reproduction in Coleochaete
36. Evolutionary significance of Coleochaete
37. Pyrenoids and their function
38. Zoospore formation in algae
39. Anisogamy and oogamy - a comparison
40. Palmelloid and palmella stages in algae

SECTION C — Write Notes / Answer (5 Marks)

40 questions · 5 marks each

1. Pigment system of Algae [2025]
2. Cap cell of Oedogonium [2024]
3. Thallus structure of Volvox [2024]
4. Alternation of generation [2024]

5. General characteristics and classification of algae
6. Ecology and distribution of algae
7. Range of thallus organisation in algae
8. Cell structure and components of algae
9. Pigments and their taxonomic significance in algae
10. Reserve food materials in different algal groups
11. Flagella - types and arrangement in algae
12. Methods of reproduction in algae
13. Fritsch's classification of algae - criteria and outline
14. Lee's evolutionary classification of algae up to groups
15. Role of algae in the environment
16. Role of algae in agriculture
17. Role of algae in biotechnology and industry
18. General characteristics and occurrence of Chlorophyta
19. Range of thallus organisation in Chlorophyta
20. Structure and reproduction of Chlamydomonas
21. Structure and reproduction of Volvox
22. Structure and reproduction of Oedogonium
23. Structure and reproduction of Coleochaete
24. Life cycle of Chlamydomonas
25. Life cycle of Volvox
26. Life cycle of Oedogonium
27. Life cycle of Coleochaete
28. Evolutionary significance of Coleochaete in relation to land plants
29. Nannandrous and macrandrous species in Oedogonium
30. Sexual reproduction types in algae - isogamy, anisogamy and oogamy
31. Comparative account of motile and non-motile algal thalli
32. Colonial organisation in algae with reference to Volvox
33. Vegetative, asexual and sexual reproduction in Chlorophyta
34. Economic importance of Chlorophyta
35. Cell wall and pigment composition in Chlorophyta
36. Classification criteria used for algae
37. Distribution of algae in different habitats
38. Role of algae as primary producers
39. Biotechnological applications of microalgae
40. Comparative account of Fritsch's and Lee's classification systems

SECTION D — Long Answer / Essay Type (8 Marks)

14 questions · 8 marks each

1. Describe the ranges of thallus organisation in algae. [2025]
2. Write the structure and life cycle of Coleochaete. [2025]
3. Describe the structure and reproduction of Chlamydomonas. [2024]
4. Discuss the general characteristics, classification and economic importance of algae.
5. Describe Fritsch's system of classification of algae with suitable examples.
6. Discuss Lee's evolutionary classification of algae up to groups.
7. Give a detailed account of the cell structure, pigments and reserve food of algae.
8. Describe the methods of reproduction found in algae with suitable examples.
9. Give a detailed account of the morphology and life cycle of Volvox.
10. Describe the morphology and life cycle of Oedogonium in detail.
11. Discuss the evolutionary significance of Coleochaete in relation to the origin of land plants.
12. Give a detailed account of the general characteristics and range of thallus organisation in Chlorophyta.
13. Discuss the role of algae in the environment, agriculture, biotechnology and industry.
14. Describe the various types of sexual reproduction observed in algae with suitable examples.

Unit 4: Charophyta, Xanthophyta, Phaeophyta and Rhodophyta

Syllabus scope: *Charophyta: general characteristics; occurrence, morphology, cell structure and life-cycle of Chara; evolutionary significance. Xanthophyta: general characteristics; occurrence, morphology and life-cycle of Vaucheria. Phaeophyta: characteristics, occurrence, cell structure and reproduction; morphology and life-cycles of Ectocarpus and Fucus. Rhodophyta: general characteristics, occurrence, cell structure and reproduction; morphology and life-cycle of Polysiphonia.*

SECTION A — Fill in the Blanks

41 questions · 1 mark each

- Iodine is extracted from _____ algae. (Ans: Brown algae (e.g., Laminaria)) [2025]
- Polysiphonia belongs to the class _____ algae. (Ans: Rhodophyceae) [2025]
- In Rhodophyceae the tip of the carpogonium is prolonged into a structure called _____. (Ans: Trichogyne) [2024]
- The non-motile male gamete in Rhodophyceae is called _____. (Ans: Spermatium) [2024]
- Chara commonly grows in _____ water bodies. (Ans: Fresh)
- The thallus of Chara is differentiated into nodes and _____. (Ans: Internodes)
- The whorled branches arising at the nodes of Chara are called _____. (Ans: Branchlets (laterals))
- The male reproductive organ of Chara is called the _____. (Ans: Globule (antheridium))
- The female reproductive organ of Chara is called the _____. (Ans: Nucule (oogonium))
- The globule of Chara produces the male gametes called _____. (Ans: Antherozoids)
- The nucule of Chara is surrounded by _____ tube (coronula) cells. (Ans: Five)
- Chara is of evolutionary significance due to its similarity in reproductive structures with _____. (Ans: Bryophytes)
- Vaucheria belongs to the class _____. (Ans: Xanthophyceae)
- The thallus of Vaucheria is _____ and lacks septa. (Ans: Coenocytic (aseptate))
- Asexual reproduction in Vaucheria occurs through the formation of a large, multiflagellate _____. (Ans: Zoospore)
- Sexual reproduction in Vaucheria is of the _____ type. (Ans: Oogamous)
- The male reproductive structure in Vaucheria is called the _____. (Ans: Antheridium)
- The female reproductive structure in Vaucheria is called the _____. (Ans: Oogonium)
- Phaeophyta are commonly known as _____ algae due to the presence of fucoxanthin. (Ans: Brown)
- The principal reserve food material in Phaeophyta is _____. (Ans: Laminarin)
- Ectocarpus shows a _____ type of thallus organisation. (Ans: Filamentous)
- Reproduction in Ectocarpus occurs through unilocular and _____ sporangia. (Ans: Plurilocular)
- Fucus shows a _____ type of thallus organisation. (Ans: Thalloid (parenchymatous))
- Reproductive structures of Fucus are borne in cavities called _____. (Ans: Conceptacles)
- Rhodophyta are commonly known as _____ algae. (Ans: Red)
- The red colour of Rhodophyta is mainly due to the pigment _____. (Ans: Phycoerythrin)

27. The principal reserve food material in Rhodophyta is _____. (Ans: Floridean starch)
28. Sexual reproduction in Rhodophyta is of the _____ type. (Ans: Oogamous)
29. The female reproductive organ in Rhodophyta is called the _____. (Ans: Carpogonium)
30. After fertilisation, the carpogonium of red algae develops into a structure called _____. (Ans: Carposporophyte)
31. Spores produced by the carposporophyte in red algae are called _____. (Ans: Carpospores)
32. Polysiphonia shows a characteristic _____ arrangement of pericentral cells around a central axial cell. (Ans: Polysiphonous)
33. Xanthophyta are also referred to as _____ algae, owing to their yellow-green colour. (Ans: Yellow-green)
34. The oogonium of Charophytes is enveloped by a layer of cells called _____ cells. (Ans: Tube (coronula))
35. The life cycle of Polysiphonia shows a characteristic _____ alternation of generations. (Ans: Triphasic)
36. Fucoxanthin is the dominant accessory pigment found in class _____. (Ans: Phaeophyceae)
37. Agar-agar and carrageenan are commercially extracted from members of _____. (Ans: Rhodophyta)
38. The holdfast in brown algae such as Fucus mainly functions in _____. (Ans: Attachment to the substratum)
39. Chara reproduces asexually mainly through _____. (Ans: Fragmentation)
40. In Ectocarpus, the diploid sporophyte generation alternates with a haploid _____ generation. (Ans: Gametophyte)
41. The vegetative cells of Chara are encrusted with deposits of _____, giving the plant a rough, brittle texture. (Ans: Calcium carbonate)

SECTION B — Short Notes

40 questions · 2 marks each

1. Globule of Chara [2025]
2. What is spermatocarp? Where do they occur? [2025]
3. Name the reserve food material found in the cells of Rhodophyceae. [2024]
4. What is the role of the diploid phase in the life cycle of Ectocarpus? [2024]
5. General characteristics of Charophyta
6. Occurrence and morphology of Chara
7. Cell structure of Chara
8. Evolutionary significance of Charophyta
9. Nucule of Chara
10. Globule (antheridium) of Chara
11. General characteristics of Xanthophyta
12. Occurrence and morphology of Vaucheria
13. Reproduction in Vaucheria
14. General characteristics of Phaeophyta
15. Cell structure of Phaeophyta
16. Morphology of Ectocarpus

17. Reproduction in Ectocarpus
18. Plurilocular sporangia in Ectocarpus
19. Unilocular sporangia in Ectocarpus
20. Morphology of Fucus
21. Reproduction in Fucus
22. Conceptacles in Fucus
23. General characteristics of Rhodophyta
24. Cell structure of Rhodophyta
25. Reproduction in Rhodophyta
26. Morphology of Polysiphonia
27. Carposporophyte in red algae
28. Trichogyne and its function
29. Spermatia in red algae
30. Pit connections in Rhodophyta
31. Pericentral cells in Polysiphonia
32. Economic importance of Phaeophyta
33. Economic importance of Rhodophyta
34. Floridean starch
35. Fucoxanthin and its significance
36. Reserve food material in Charophyta
37. Comparative account of Chlorophyta and Charophyta
38. Life cycle pattern (alternation of generations) in Polysiphonia
39. Comparative account of Phaeophyta and Rhodophyta
40. Coenocytic thallus organisation in Xanthophyta

SECTION C — Write Notes / Answer (5 Marks)

40 questions · 5 marks each

1. Plurilocular sporangia [2025]
2. Carposporophytes [2025]
3. Thallus organisation of Vaucheria [2025]
4. General characteristics and evolutionary significance of Charophyta
5. Occurrence, morphology and cell structure of Chara
6. Reproductive structures of Chara - globule and nucule
7. General characteristics and occurrence of Xanthophyta
8. Morphology and cell structure of Vaucheria
9. Asexual reproduction in Vaucheria

10. Sexual reproduction in Vaucheria
11. General characteristics and occurrence of Phaeophyta
12. Cell structure and pigmentation in Phaeophyta
13. Morphology and reproduction of Ectocarpus
14. Life cycle of Ectocarpus
15. Morphology and reproduction of Fucus
16. Life cycle of Fucus
17. Conceptacles and their structure in Fucus
18. General characteristics and occurrence of Rhodophyta
19. Cell structure and pigmentation in Rhodophyta
20. Reproduction in Rhodophyta - an overview
21. Morphology of Polysiphonia
22. Life cycle of Polysiphonia
23. Carpogonium and its structure in red algae
24. Carposporophyte development in red algae
25. Triphasic life cycle in Rhodophyta
26. Economic importance of Phaeophyta (algin, iodine)
27. Economic importance of Rhodophyta (agar, carrageenan)
28. Comparative account of Chlorophyta and Charophyta
29. Comparative account of Xanthophyta and Chlorophyta
30. Evolutionary significance of Chara in relation to land plants
31. Pit connections and their significance in Rhodophyta
32. Reserve food materials across Charophyta, Xanthophyta, Phaeophyta and Rhodophyta
33. Holdfast, stipe and lamina in Fucus
34. Alternation of generations in Ectocarpus and Fucus
35. Classification of Charophyta, Xanthophyta, Phaeophyta and Rhodophyta - an overview
36. Comparative account of oogamous reproduction across algal groups
37. Cell wall composition in Phaeophyta and Rhodophyta
38. Distribution and ecological importance of marine algae
39. Role of Phaeophyta and Rhodophyta in the algin and agar industry
40. Structural adaptations of algae to marine habitats

SECTION D — Long Answer / Essay Type (8 Marks)

12 questions · 8 marks each

1. Give the structure and life cycle of Polysiphonia. [2024]
2. Describe the morphology and reproduction of Chara. [2025]

3. Discuss the general characteristics, morphology, cell structure and life cycle of Chara.
4. Describe the evolutionary significance of Charophyta in relation to land plants.
5. Give a detailed account of the morphology and life cycle of Vaucheria.
6. Discuss the general characteristics of Phaeophyta with special reference to Ectocarpus.
7. Describe the morphology and life cycle of Ectocarpus in detail.
8. Give a detailed account of the morphology and life cycle of Fucus.
9. Discuss the general characteristics and reproduction of Rhodophyta with reference to Polysiphonia.
10. Describe the structure and triphasic life cycle of Polysiphonia in detail.
11. Discuss the economic importance of Phaeophyta and Rhodophyta.
12. Give a comparative account of the morphology and reproduction of Chlorophyta, Charophyta, Xanthophyta, Phaeophyta and Rhodophyta.