Text Book Questions

Dept. of Botany
Dinakrushna College, Jaleswar, Balasore

Question Bank — Semester 1, Paper: Major-I

Paper I - Microbiology & Phycology

UG 1st Semester — Botany Honours

Pattern followed in every Unit

Section A: Fill in the Blanks & Multiple-Choice Questions (with answers)
Section B: Very Short Answer Questions (2–3 sentences)
Section C: Short Notes (5 marks)
Section D: Long / Essay-type Questions (8 marks)

Contents

Unit I: Microbial World & Viruses

Syllabus coverage: The Microbial World, Microbial Nutrition, Microbial Growth & Metabolism, Viruses

Section A: Fill in the Blanks & Multiple Choice Questions (1 Mark each, with Answers)

(i) Fill in the Blanks

No.	Fill in the Blank	Answer
1	Small pox vaccine was first discovered by _____.	*Edward Jenner (1798)*
2	Germ theory of disease was first put forth by _____.	*Robert Koch*
3	Kingdom Protista was first introduced by _____.	*Ernst Haeckel*
4	There are _____ number of Kingdoms in the domain concept put forth by Woese.	*Three*
5	The initiator RNA in bacteria is _____.	*F-methionine*
6	The microorganisms which live in very acidic conditions are called _____.	*Acidophiles*
7	Microorganisms growing in a pH range of 5.5 to 8.0 are called _____.	*Neutrophiles*
8	The culture in which all cells of a population are physiologically identical is called _____.	*Synchronous culture*
9	The specific time interval between one binary fission and the next binary fission is known as _____.	*Generation time*
10	Sterilization of packed foods and products by electromagnetic radiations is otherwise called _____.	*Radio pasteurization*
11	The rod of TMV contains _____ subunits of capsomeres.	*2130*
12	Each capsomere of TMV contains _____ number of amino acids.	*158*
13	Viroids were first discovered by _____.	*Theodor Otto Diener*
14	The viral agent causing potato spindle tuber disease is called _____.	*PSTVd*
15	Prions were first discovered by _____.	*S. B. Prusiner*

(ii) Multiple Choice Questions

1. Methanogenesis is found in
(a) Bacteria (b) Archaea (c) Eukarya (d) Both a and b

2. Which group of organisms generally can grow at temperature 80°C or above?
(a) Archaea (b) Fungi (c) Bacteria (d) Eukarya

3. Kingdom Protista includes members which are
(a) Eukaryotic microorganisms (b) Prokaryotic microorganisms (c) Both prokaryotic and eukaryotic microorganisms (d) Only eukaryotic Protozoans

4. Circular DNA is seen in
(a) Archaea and Eukarya (b) Bacteria and Eukarya (c) Archaea (d) Bacteria and Archaea

5. Chlorophyll dependent photosynthesis is not seen in
(a) Bacteria (b) Archaea (c) Eukarya (d) All the above

6. With respect to nutrition, slime moulds are
(a) Symbionts (b) Holotrophs (c) Saprotrophs (d) None of the above

7. Iron bacteria are a group of
(a) Photoheterotrophs (b) Chemoautotrophs (c) Organotrophs (d) Chemoheterotrophs

8. Which of the following group of elements are known as micro-nutrients?
(a) C, H, Ca, Ni (b) Mo, Co, P, S (c) Mg, Mn, N, S (d) Se, Co, Mo, Ni

9. Which of the following growth factors helps in amino acid metabolism?
(a) Biotin (b) Pyridoxine (c) Lipoic acid (d) Thiamine

10. Minimal medium contains
(a) Five specific amino acids (b) No amino acids (c) All essential amino acids (d) Both b and c

11. Soil extract is an example of
(a) Synthetic general medium (b) Complex general medium (c) Undefined enriched medium (d) None of the above

12. Which of the following elements is a component of cytochrome?
(a) Cu (b) Fe (c) K (d) Mg

13. Which of the following is known as Vitamin B12?
(a) Pyridoxine (b) Riboflavin (c) Niacin (d) Cyanocobalamin

14. Generation time for E. coli at 37°C is
(a) 20 minutes (b) 29 minutes (c) 30 minutes (d) 10 minutes

15. At a particular point of time all cells of the population in a synchronous culture are physiologically
(a) different (b) identical (c) at same stage of cell cycle (d) both b & c

16. Continuous culture is a process where microbial growth is maintained at
(a) Lag phase (b) Log phase (c) Stationary phase (d) Both b & c

17. E. coli is an example of
(a) Mesophile (b) Psychrophile (c) Thermophile (d) Psychrotroph

18. Microbes which do not use oxygen but can grow in presence of oxygen are called
(a) Obligate anaerobes (b) Facultative anaerobes (c) Micro aerophiles (d) Aero tolerant anaerobes

19. Alcohols kill microbes by

(a) affecting their cell wall permeability (b) hydrolysis and protein denaturation (c) oxidation (d) chemically altering the cellular components

20. Pasteurization involves heating of materials
(a) at 72°C for 15 seconds (b) at 80°C for 10 seconds (c) at 50°C for 1 minute (d) at 100°C for 10 seconds

21. The lowest concentration of a chemical or drug that kills the target organism is called
(a) minimum inhibitory concentration (b) minimum sterilizing concentration (c) minimum lethal concentration (d) optimum lethal concentration

22. The lowest concentration of a drug that inhibits growth of a particular organism with no visible growth is called
(a) minimum inhibition concentration (b) minimum lethal concentration (c) optimum lethal concentration (d) optimum lethal inhibition

23. Which of the following is an obligate aerobic organism?
(a) Campylobacter (b) Lactobacillus plantarum (c) Methanococcus (d) Micrococcus utens

24. In ED pathway, the net production of ATP per each glucose molecule processed is
(a) 2 (b) 1 (c) 4 (d) 8

25. Which of the following is a hydrolase class of enzyme?
(a) Cytochrome oxidase (b) Alanine deaminase (c) DNA ligase (d) Sucrase

26. TMV is filtrable and could not be detained by filters that retain the smallest bacteria. This was put forth by
(a) M. Beijernick (b) A. Mayor (c) D. Ivanovsky (d) F. Twort

27. TMV was first purified to white crystals by
(a) W.M. Stanley (b) Max Debruck (c) Bawden and Pirie (d) Mathews

28. Hepatitis B virus contains
(a) ssDNA (b) partially ds DNA (c) ds DNA (d) ssRNA

29. Herpes virus has a
(a) ds DNA (b) ds RNA (c) ss DNA (d) ssRNA

30. Which of the following viruses has an icosahedral symmetry?
(a) Adeno virus (b) T4 phage (c) TRV (d) Potato virus X

31. A virion is the
(a) Nucleic acid of the virus (b) Protein coat of the virus (c) Both nucleic acid and protein coat (d) None of the above

32. Which of the following is a ssDNA virus?
(a) φ6 (b) Parvo virus (c) Rhabdo virus (d) Lambda virus

33. Which of the following is not true for a virus?
(a) It possesses one nucleic acid RNA or DNA (b) Genetic material may be encased in a protein sheath or shell (c) It can reproduce extra-cellularly (d) Both a & b

34. During lytic cycle, synthesis of virus nucleic acid takes place in
(a) Early phase (b) Middle phase (c) Late phase (d) In all phases

35. Replication of RNA virus in eukaryotic cells occurs in
(a) Cytoplasm (b) Nucleus (c) Both a & b (d) Mitochondria

Answer Key: 1-(b), 2-(a), 3-(a), 4-(d), 5-(b), 6-(c), 7-(b), 8-(d), 9-(b), 10-(b), 11-(c), 12-(b), 13-(d), 14-(a), 15-(d), 16-(b), 17-(a), 18-(d), 19-(b), 20-(a), 21-(c), 22-(a), 23-(d), 24-(b), 25-(d), 26-(c), 27-(a), 28-(b), 29-(a), 30-(a), 31-(c), 32-(b), 33-(c), 34-(b), 35-(a)

Section B: Short Notes (3 Marks each)

1. Doctrine of spontaneous generation
2. Germ theory of disease (Koch's Postulates)
3. Swan-neck flask experiment
4. Five Kingdom system of classification
5. Protista
6. Domain concept
7. Differences between Archaea and Bacteria
8. Trace elements
9. Transport of nutrients to micro-organisms
10. Photolithotrophs
11. Intermediate photoheterotrophs
12. Chemoautotrophs
13. Culture Media
14. Enrichment media
15. Differential Media
16. Transport Media
17. Minimal Medium
18. Growth curve in bacteria
19. Diauxic growth curve
20. Viable counts
21. Pour Plate Method
22. Extremophiles
23. Use of radiation for sterilization
24. Autoclave
25. Pasteurization
26. Tyndalization
27. Liquid filtration process
28. Metabolic Integration
29. Electron Transport Chain
30. Protein and Lipid Catabolism
31. ED Pathway
32. Glycolysis and its significance
33. Chemistry of Virus
34. Cubical symmetry in Virus
35. Nature of Virus

36. Origin of Virus
37. Lytic Cycle
38. Lysogenic Cycle
39. Replication of viroid
40. Role of Virus in Cancer
41. Virus in biocontrol of pests
42. LHT classification of virus

Section C: Short / Very Short Answer Questions (5 Marks each)

1. What is the theory of abiogenesis?
2. Write the major contribution of F. Redi.
3. What is the Swan-necked flask experiment?
4. What is tyndalization?
5. Name the major divisions of the living world proposed by C. Linnaeus.
6. What is Protista?
7. What are the major kingdoms under eukaryotes in the five Kingdom system of classification?
8. What are the three domains in the living world proposed by Carl Woese?
9. Write any two differences between Bacteria and Archaea.
10. What is the difference between Protoctista and Protista?
11. The method of nutrient uptake in fungi — name it.
12. The method of food ingestion in animals — name it.
13. Name the alternate heating and cooling process for sterilization of liquid substances.
14. Name the scientist who first used the term 'Protista' as a new Kingdom.
15. Name the scientist who first proposed the eight Kingdom system of classification.
16. Write the role of trace elements.
17. What do you mean by active transport?
18. What are chemoorganotrophs?
19. What is a differential medium?
20. What is a complex medium?
21. What is an enriched medium?
22. What is the importance of agar-agar in a medium?
23. What is a minimal medium?
24. What are the different types of chemoheterotrophs?
25. What is symport and antiport?
26. What is generation time?
27. What is a batch culture?
28. What is synchronous culture?
29. Give the mathematical expression of microbial growth in the log phase.
30. What do you mean by psychrophiles?
31. What do you mean by facultative anaerobes?

32. What is Taq DNA?
33. What is the difference between sterilization and disinfection?
34. Define thermal death point and thermal death time.
35. What is radio pasteurization?
36. What is activation energy of an enzyme?
37. What do you mean by amphibolic pathway?
38. What is water activity?
39. Write two differences between microbial metabolism and eukaryotic metabolism.
40. What is a virus?
41. What is a capsomere?
42. What is a naked virus?
43. What is delysogenization?
44. What is a temperate phage?
45. What do you mean by eclipse period?
46. Give two differences between a virus and a viroid.
47. Write two functions of prions.
48. Name three important prion diseases.
49. Write three features supporting virus as non-living.
50. Name the two families of viroids.
51. Give two examples each of temperate phage and filamentous phages.

Section D: Long Answer Questions (8 Marks each)

1. Give an account of the status of microorganisms in the living world.
2. What is the position of microorganisms in the domain concept of the living world?
3. Explain how the doctrine of spontaneous generation was rejected.
4. Give an account of different nutritional groups of microorganisms.
5. What do you mean by microbial nutrition? Briefly write about the nutrients required for growth of microorganisms.
6. What is a culture medium? Discuss different types of culture media.
7. Describe the nature of bacterial growth in batch culture.
8. Discuss the factors that affect bacterial growth.
9. Give a grouping of microorganisms with reference to temperature and pH. Discuss their significance.
10. What do you mean by extremophiles? Discuss their significance and uses.
11. Discuss various physical methods to control the growth of microorganisms.
12. Give an account of various chemical agents used for disinfection and sterilization.
13. Give an account of the relative importance of different chemical agents used for control of microbial growth.
14. Discuss various methods to measure microbial growth.
15. Give an account of carbohydrate catabolism in microbes.
16. Discuss the electron transport chain in microbes.
17. Give an account of metabolic integration in microbes.

18. Discuss the ATP generation processes in microbes in brief.

19. Discuss the measurement of microbial growth by cell numbers.

20. Give an account of microbial photosynthesis.

21. Discuss the diauxic growth in bacteria.

22. Give a general account of virus structure.

23. How are viruses classified? Discuss Baltimore's system of classification of virus.

24. Give an account of Prions.

25. Give an account of viroids.

26. Describe the structure and multiplication of T4 bacteriophage.

27. Describe the structure and multiplication of TMV.

28. Give a general account of the multiplication of DNA viruses.

29. Give a general account of the multiplication of RNA viruses.

30. Discuss the role of virus in production of vaccines and medicines.

31. Give a brief account of the economic importance of viruses.

Unit II: Bacteria & Cyanobacteria

Syllabus coverage: Bacteria (discovery, structure, nutrition, reproduction, recombination, economic importance), Other forms of Bacteria (Archaebacteria, Mycoplasma, Spheroplasts), Cyanobacteria (ecology, cell structure, heterocyst, reproduction, economic importance, Nostoc, Prochlorophyceae)

Section A: Fill in the Blanks & Multiple Choice Questions (1 Mark each, with Answers)

(i) Fill in the Blanks

No.	Fill in the Blank	Answer
1	Genetic recombination in bacteria mediated by a prime factor is called _____.	*Sexduction*
2	Number of endospores formed per cell of a bacterium is _____.	*One*
3	When flagella are distributed on the cell wall of a bacterium at several locations, the distribution is known as _____.	*Peritrichous*
4	Chains of rod shaped bacteria are called _____.	*Streptobacillus*
5	Fimbrae is made up of a protein called _____.	*Pilin*
6	NAG and NAM are joined by _____ type of bond in the cell wall of bacteria.	*β 1-4 bond*
7	Intracellular membrane structures continuous with the cell membrane in bacteria are called _____.	*Mesosomes*
8	50S subunit of bacterial ribosome contains _____ number of molecules of rRNA.	*Two (2)*
9	The 30S subunit of bacterial ribosome contains _____ number of molecules of rRNA.	*One*
10	Botulism is caused by the bacterium named _____.	*Clostridium botulicum*
11	Cyanobacteria belong to the Kingdom _____.	*Monera (or Monera and Plantae)*
12	The main food storage in Cyanobacteria is _____.	*Cyanophycin / cyanophycean starch*
13	Photosynthetic pigments are embodied in _____ found in rows on the outer surface of thylakoids.	*Phycobilisomes*
14	A vegetative cell which differentiates into a heterocyst is very often called _____.	*Proheterocyst*
15	Single cell protein mostly produced from a cyanobacterial member is called _____.	*Spirulina*
16	Nostoc belongs to the order _____.	*Nostocales*

(ii) Multiple Choice Questions

1. Cubical cocci are called
(a) Gaffkya (b) Sarcinae (c) Vibrio (d) Sporillum

2. The shape of Clostridium cell is
(a) Coccus type (b) Bacillus type (c) Spirillum type (d) Vibrio type

3. When a tuft of flagella is present at one end of the bacterial cell, it is called
(a) Peritrichous (b) Monotrichous (c) Amphitrichous (d) Lophotrichous

4. Which statement is correct?
(a) Gram +ve cell wall has no DAP (b) Gram −ve cell wall has no DAP (c) Gram +ve cell wall has no lysine (d) Gram −ve cell wall has both DAP and lysine

5. Which of the following is true for gram +ve bacterial cell wall?
(a) Lysine absent (b) NAG and NAM are loosely linked (c) DAP is present (d) Less sensitive to antibiotics

6. The genome of the recipient cell is called
(a) Exogenate (b) Endogenate (c) Mesogenate (d) Mesozygote

7. The result of Hfr × F− conjugation results in
(a) all F+ cells (b) Hfr or F− cells (c) all F− cells (d) F+ and F− cells

8. Which of the following helps in non-symbiotic nitrogen fixation?
(a) Rhizobium species (b) Klebsiella sp. (c) Rhodospirillum species (d) None of the above

9. Which is not true for the bacterial chromosome?
(a) One chromosome per cell (b) Nucleosomal organization absent (c) Not enclosed in a membrane (d) Introns present

10. Plasmids were first discovered by
(a) Tatum (b) Wilkens (c) Lederberg (d) Morgan

11. Which of the following archaean member has a needle-like filamentous morphology?
(a) Thermofilum (b) Thermoproteus (c) Sulpholobus (d) Haploquadratum

12. Which is not true for archaeal cell?
(a) Spores are not formed (b) Flagella are solid (c) Muramic acid present (d) No response to antibiotics

13. Which is not true for Mycoplasma?
(a) 70S ribosomes (b) Cell wall is never formed (c) C+G content lower (d) Contains ds DNA

14. Wall-less bacteria are
(a) gram +ve (b) gram −ve (c) gram insensitive (d) None of the above

15. The archaeal species of Thermoplasma contain
(a) cell wall, no cell membrane (b) cell membrane but no cell wall (c) two layers of cell wall (d) a glycocalyx

16. Cell wall of cyanobacteria is similar to
(a) Gram −ve bacterial cell wall (b) Gram +ve bacterial cell wall (c) Eukaryotic algal cell wall (d) Mycoplasmal cell wall

17. Metachromatic granules contain
(a) Polysaccharides (b) Proteins (c) Calcium crystals (d) Polyphosphates

18. Which of the following does not form heterocysts?
(a) Nostoc (b) Gloeotrichia (c) Oscillatoria (d) Aulosira

19. In Gloeotrichia, the position of heterocyst is
(a) Terminal (b) Basal (c) Intercalary (d) Not found

20. Cell wall of Prochloron is of _____ nature.
(a) Gram +ve (b) Gram −ve (c) Gram insensitive (d) None of the above

21. Which of the following pigments is not found in Prochloron?
(a) Chl. a (b) Zeaxanthin (c) Chl. b (d) Phycobilins

Answer Key: 1-(b), 2-(b), 3-(d), 4-(d), 5-(c), 6-(b), 7-(b), 8-(b), 9-(d), 10-(c), 11-(a), 12-(c), 13-(d), 14-(c), 15-(b), 16-(a), 17-(d), 18-(c), 19-(a), 20-(b), 21-(d)

Section B: Short Notes (3 Marks each)

1. Bacterial Cell Wall

2. Gram Stain

3. Bacterial Genome

4. Hfr Strain

5. Fertility Factor

6. Sexduction

7. Nutritional types of bacteria

8. Abortive transduction

9. F+ × F− conjugation

10. Acid fast stain

11. Endospore

12. Binary fission in bacteria

13. Role of Bacteria in biotechnology

14. Transformation

15. Cell wall of Archaebacteria

16. Distinguish archaebacteria and eubacteria

17. Economic significance of archaebacteria

18. Wall-less bacteria

19. Spheroplasts

20. L-forms of bacteria

21. Heterocyst

22. Cell wall in cyanophycean cell

23. Akinetes

24. Nostoc

25. Anabaena

26. Pigments in Cyanophyceae

27. Reproduction in Cyanophyceae

28. Role of blue green algae in biotechnology

Section C: Short / Very Short Answer Questions (5 Marks each)

1. What are the components of the cell wall of bacteria?
2. What do you mean by eubacteria?
3. What is glycocalyx?
4. What are the types of flagellar distribution in bacteria?
5. Write any two differences between cell walls of gram +ve and gram −ve bacteria.
6. What is an episome and a plasmid?
7. What is a conjugative plasmid?
8. Write one point of difference between Hfr and F+ strain.
9. What is copy number?
10. What is competence factor?
11. What do you mean by F-duction?
12. What is a transducing phage?
13. What do you mean by abortive transduction?
14. What are transformosomes?
15. What is an F′ (F prime) cell?
16. Name three bacteria involved in symbiotic nitrogen fixation.
17. Name two bacteria used as biofertilizers.
18. Name some bacteria used for industrial production of amino acids.
19. What are vaccines?
20. Name four bacterial species found in milk.
21. Which bacterial species are used as biopesticides?
22. Write two roles of bacteria in the environment.
23. Write the reactions during biogas production by bacteria.
24. Name four bacteria and their corresponding antibiotic they produce.
25. What is fertility factor?
26. Where are Archaebacteria found?
27. What are the chemical components of the cell membrane in archaea?
28. Write two differences between bacterial flagella and archaeal flagella.
29. Write two differences between the tRNA of bacteria and archaea.
30. Write two similarities between bacteria and Mycoplasma.
31. Write two differences between wall-less forms and L-forms.
32. What is a spheroplast?
33. What is a trichome?
34. What is chromoplasm?
35. Write the difference between a trichome and a filament.
36. What are the layers in the cyanobacterial cell wall?
37. What is the composition of the sheath in a cyanobacterial cell?
38. What are the photosynthetic pigments in cyanobacteria?

39. What are the granular inclusions in a cyanobacterial cell?

40. What are carboxysomes?

41. Name four genera in which heterocysts are found.

42. What are akinetes?

43. Write any two beneficial effects of Cyanobacteria.

44. Write any two harmful effects of Cyanobacteria.

45. Give the systematic position of Nostoc.

46. What is cyanotoxin?

47. Write three lines on the pili of a Cyanobacterium.

Section D: Long Answer Questions (8 Marks each)

1. Give a brief account of the characters of bacteria.

2. Discuss the structure of a bacterial cell.

3. Give an account of the economic importance of bacteria.

4. What do you mean by genetic recombination? Discuss the mechanism of transformation in bacteria.

5. Give an account of transduction.

6. Give an account of conjugation in bacteria.

7. Give an account of different nutritional groups of bacteria.

8. Discuss the industrial uses of bacteria.

9. Give an account of specialized transduction.

10. Give an account of Archaebacteria.

11. Compare Archaebacteria with Eubacteria.

12. Describe the structure and reproduction in Mycoplasma.

13. Give an account of the cell structure of a cyanophycean cell.

14. Discuss the range of thallus organization in Cyanophyceae.

15. Give an account of the economic importance of blue-green algae.

16. Discuss the structure, production and functions of heterocysts in Cyanophyceae.

17. Give the salient points of class Cyanophyceae.

Unit III: Algae & Chlorophyta

Syllabus coverage: Algae (general characteristics, ecology, thallus organization, cell structure, classification, economic importance), Chlorophyta (general characteristics, Chlamydomonas, Volvox, Oedogonium, Coleochaete)

Section A: Fill in the Blanks & Multiple Choice Questions (1 Mark each, with Answers)

(i) Fill in the Blanks

No.	Fill in the Blank	Answer
1	Peitschengeissel is the alternative name of _____ type of flagella in algae.	*Whiplash / Acronematic*
2	Flimmergeissel is the alternative name of _____ type of flagella in algae.	*Tinsel / Pantonematic*
3	If the flagella are of different lengths they are called _____.	*Heterokont*
4	Starch found in Rhodophycean members is known as _____.	*Floridean starch*
5	Laminarin is mainly the storage food material in class _____.	*Phaeophyta*
6	The shape of chloroplast in Volvocales is _____.	*Cup-shaped*
7	In Ulothrix, _____ type of chloroplast is found.	*Girdle type*
8	Very thick-walled aplanospores are called _____.	*Hypnospores*
9	Non-motile spores that develop singly in a monosporangium are called _____.	*Monospores*
10	Life cycle in Oedogonium is of _____ type.	*Haplontic*
11	The colourless basal cell of the Oedogonium filament is called _____.	*Hold fast*
12	A colony of a number of independent Chlamydomonas cells in a common gelatinous substance is known as _____.	*Coenobium (Palmella stage)*
13	In nannandrous species of Oedogonium, antheridia are formed on filaments called _____.	*Dwarf males / nannandria*
14	The small aperture in the hollow sphere in the colony of Volvox through which the daughter colony comes out is known as _____.	*Phialophore*
15	The cells responsible for the growth of the Oedogonium filament are called _____ cells.	*Cap cells*

(ii) Multiple Choice Questions

1. Anisogamous reproduction is seen in
(a) Chara sps. (b) Nitella sp. (c) Chlamydomonas braunii (d) Vaucheria

2. Leucosin is found in
(a) Chrysophyceae (b) Bacillariophyceae (c) Prymnesiophyta (d) All the above

3. Pyrenoid consists of
(a) only protein (b) only starch (c) starch surrounded by protein (d) protein surrounded by starch

4. Starch in algae is composed of
(a) only amylose (b) amylopectin + amylose (c) amylopectins only (d) glycogen + amylopectins

5. Tetraspores in Rhodophyta are
(a) Meiospores, non-motile (b) Meiospores, motile (c) Single-celled hormogonia (d) Non-motile spores developing in a monosporangium

6. Kelps are
(a) Red sea weeds (b) Green sea weeds (c) Diatoms (d) Brown sea weeds

7. Which of the following does not help in N2 fixation?
(a) Oedogonium (b) Cylindrospermum (c) Anabaena (d) Nostoc

8. Saxitoxin is secreted by
(a) Chlorella (b) Gonyaulax (c) Lyngbya (d) Microcystis

9. Isomorphic diplohaplontic life cycle is seen in
(a) Ectocarpus (b) Cladophora (c) Ulva (d) All the above

10. Chantransia stage is seen in
(a) Chlorophyceae (b) Rhodophyceae (c) Bacillariophyceae (d) Phaeophyceae

11. Pediastrum represents a _____ thallus.
(a) motile colonial (b) non-motile colonial (c) unbranched filamentous (d) branched filamentous

12. Chloroplasts of the Chlorophyta group are
(a) single membrane envelope with no chloroplast ER (b) single membrane envelope with chloroplast ER (c) double membrane envelope with chloroplast ER (d) double membrane envelope with no chloroplast ER

13. Chlamydomonas braunii shows _____ reproduction.
(a) Anisogamous (b) Oogamous (c) Isogamous (d) Both a & b

14. Which of the following does not show isogamous sexual reproduction?
(a) Chlamydomonas monoica (b) Chlamydomonas coccifera (c) Chlamydomonas media (d) Chlamydomonas reinhardii

15. The chloroplast in Zygnema is
(a) cup shaped (b) reticulate (c) girdle type (d) stellate

16. The antheridium in Oedogonium produces
(a) 2 antherozoids (b) 4 antherozoids (c) one antherozoid (d) many antherozoids

17. In Oedogonium, which of the following represents the diploid phase?
(a) Antheridium (b) Dwarf male branch (c) Zygote (d) Androspore

18. In Coleochaete, antheridia are developed in
(a) erect system (b) on either system depending on species (c) prostrate system (d) all the above

19. Spermocarp is formed in

(a) Oedogonium (b) Volvox (c) Chlamydomonas (d) Coleochaete

20. Suffultory cell is found during formation of oogonium in

(a) Coleochaete (b) Zygnema (c) Oedogonium (d) Volvox

Answer Key: 1-(c), 2-(b), 3-(d), 4-(b), 5-(a), 6-(d), 7-(a), 8-(b), 9-(d), 10-(b), 11-(b), 12-(d), 13-(a), 14-(b), 15-(d), 16-(c), 17-(c), 18-(b), 19-(d), 20-(c)

Section B: Short Notes (3 Marks each)

1. Cell wall in Algae
2. Algal flagella
3. Pigments in Algae
4. Vegetative reproduction in Algae
5. Isogamy
6. Origin of sex in algae
7. Haplodiplontic life cycle
8. Zoospores
9. Algal classification by Fritsch
10. Lee's system of algal classification
11. Evolution of sexual reproduction in algae
12. Harmful effects of algae
13. Algae as food and fodder
14. Storage products of algae
15. Algae in industry
16. Thallus of Coleochaete
17. Palmella stage
18. Asexual reproduction in Volvox
19. Oogamy
20. Macrandrous sexual reproduction in Oedogonium
21. Sexual reproduction in nannandrous species of Oedogonium
22. Life cycles in Chlorophyceae

Section C: Short / Very Short Answer Questions (5 Marks each)

1. Name the different types of starch in different classes of algae.
2. Name the types of spores found in algae.
3. What is a synzoospore?
4. What is a haplodiplontic life cycle?
5. Name three genera of algae showing unicellular motile thallus.
6. Name three genera of algae in which Palmelloid stages are found.
7. What do you mean by coenobium and coenocytic thallus?
8. What is a pyrenoid?
9. What is a hypnospore?
10. What do you mean by paraspores?
11. Write on the structure of the eye spot.
12. What are the pigments found in Chlorophyta?
13. Write the systematic position of Chlamydomonas.
14. Draw the graphic life cycle found in Chlamydomonas.

15. What do you mean by coenobium?

16. Why did the evolution of motile colonial thallus stop at Volvox and not progress further?

17. Give the systematic position of Oedogonium.

18. What are dwarf males in Oedogonium?

19. What is the difference between macrandrous and nannandrous species of Oedogonium?

20. What do you mean by idioandrosporous Oedogonium?

21. Write the sequence of stages leading to formation of antherozoids in a nannandrous species.

22. Give the systematic position of Coleochaete.

Section D: Long Answer Questions (8 Marks each)

1. Give an account of classification of algae.

2. Give a general account of the range of thallus structure in algae.

3. Discuss the cell structure in eukaryotic algae.

4. Describe sexual reproduction in eukaryotic algae.

5. Discuss various methods of asexual reproduction in algae.

6. With examples, explain the origin and evolution of sex in algae.

7. Discuss the various economic uses of algae.

8. Give an account of algal classification as proposed by R. E. Lee.

9. What do you mean by life cycle? Discuss different types of life cycle found in algae.

10. Give an account of the thallus structure and sexual reproduction in Chlorophyceae.

11. Write the life history of Chlamydomonas.

12. Discuss the sexual reproduction in Oedogonium.

13. Give an account of the structure and reproduction of Ulothrix.

14. Give an account of thallus organization and reproduction of Volvox.

Unit IV: Charophyta, Xanthophyta, Phaeophyta & Rhodophyta

Syllabus coverage: Charophyta (Chara), Xanthophyta (Vaucheria), Phaeophyta (Ectocarpus, Fucus), Rhodophyta (Polysiphonia)

Section A: Fill in the Blanks & Multiple Choice Questions (1 Mark each, with Answers)

(i) Fill in the Blanks

No.	Fill in the Blank	Answer
1	Charophytes are known as _____.	*Stone worts*
2	The number of coronary cells in the female sex organ of Chara is _____.	*5*
3	Xanthophyta represents _____ coloured algal group.	*Yellow green*
4	Leucosin is a polymer containing _____.	*Oil, lipid, glucose*
5	Hapteron is an alternative name for _____.	*Hold fast*
6	The brown colour of Phaeophyta is due to _____.	*Fucoxanthin*
7	Carposporophyte is borne on _____.	*Gonimoblast filaments*
8	Tetrasporophyte develops from _____.	*Carpospore*
9	_____ is known as the father of modern phycology in India.	*M. O. P. Iyengar*
10	The Atlas of Indian diatoms was published by _____.	*H. D. Kumar*

(ii) Multiple Choice Questions

1. Charophytes are known as
(a) Horsetails (b) Stone worts (c) Liverworts (d) Bug moss

2. The female sex organ in Chara is known as
(a) Globule (b) Corona (c) Nucule (d) Carpogonium

3. The number of coronary cells in the female sex organ in Chara is
(a) 8 (b) 4 (c) 7 (d) 5

4. Which of the following is not the part of a globule in Chara?
(a) Tube cells (b) Shield cells (c) Manubrial cells (d) Capitulum cells

5. The life cycle in Chara is
(a) Haplo-diplontic (b) Diplontic (c) Haplontic (d) Diplo-haplontic

6. Xanthophyta represents _____ coloured algal group.
(a) Green (b) Yellow green (c) Blue green (d) Purple green

7. Leucosine is a polymer containing
(a) Oil droplets (b) Oil, lipid, glucose (c) Glucose (d) Proteins

8. Which pigment is totally absent in Xanthophyta?
(a) Chl. a (b) Carotenoids (c) Xanthophylls (d) Chl. b

9. The zoospore in Vaucheria is
(a) multiflagellate, uninucleate (b) uniflagellate, uninucleate (c) multiflagellate, multinucleate (d) biflagellate, multinucleate

10. Sexual reproduction in Vaucheria is
(a) Oogamous (b) Anisogamous (c) Isogamous (d) No sexual reproduction

11. Life cycle in Vaucheria is
(a) Diplontic (b) Diplohaplontic (c) Haplontic (d) Haplodiplontic

12. Unilocular sporangia are seen in the _____ Ectocarpus.
(a) Diploid (b) Haploid plant (c) Both a & b (d) None of the above

13. Which of the following pigments is absent in Phaeophyta?
(a) Chl. a (b) Carotene (c) Chl. c (d) Chl. b

14. Meiosis in Phaeophyta occurs during
(a) Zygote germination (b) Spore formation (c) Formation of gametes (d) Formation of akinetes

15. Fucus is very often called
(a) Stone worts (b) Rock weed (c) Maiden hair (d) None of the above

16. The life cycle in Fucus is
(a) Diplontic type (b) Haplontic type (c) Haplodiplontic type (d) Diplohaplontic type

17. The life cycle in Ectocarpus is
(a) Diplontic type (b) Haplontic type (c) Haplodiplontic type (d) Both b and c

18. Fertilization in Fucus is
(a) Internal (b) External (c) Both a and b (d) None of the above

19. Sperm cell of Fucus is
(a) Uniflagellate (b) Biflagellate (c) Quadriflagellate (d) No flagella

20. Carposporophyte is borne on
(a) Female gametophyte (b) Gonimoblast filaments (c) Sporophyte (d) Male gametophyte

21. Tetrasporophyte develops from
(a) Carpospore (b) Carpogonium (c) Tetraspore (d) Cystocarp

22. The life cycle in Polysiphonia is
(a) Haplontic (b) Diplontic (c) Diplohaplontic (d) Haplodiplontic

23. From which of the following does the haploid plant develop in Polysiphonia?
(a) Carposporophyte (b) Tetrasporophyte (c) Tetraspore (d) Carpospores

24. Which of the following pigments is absent in Rhodophyta?
(a) r-Phycoerythrin (b) Chl. b (c) r-Phycocyanin (d) Xanthophylls

Answer Key: 1-(b), 2-(c), 3-(d), 4-(a), 5-(c), 6-(b), 7-(b), 8-(d), 9-(c), 10-(a), 11-(c), 12-(a), 13-(d), 14-(b), 15-(b), 16-(a), 17-(c), 18-(b), 19-(b), 20-(b), 21-(a), 22-(c), 23-(c), 24-(d)

Section B: Short Notes (3 Marks each)

1. Globule

2. Nucule

3. Sexual reproduction in Chara

4. Cell structure in Chara

5. Sex organs in Vaucheria

6. Zoospore formation in Vaucheria

7. Sexual reproduction in Vaucheria

8. Plurilocular sporangia
9. Unilocular sporangia
10. Plurilocular gametangia
11. Conceptacles of Fucus
12. Thallus structure in Fucus
13. Carposporophyte
14. Tetrasporophyte
15. Post fertilization changes in Polysiphonia
16. Life cycle in Polysiphonia
17. Sex organs in Polysiphonia

Section C: Short / Very Short Answer Questions (5 Marks each)

1. Why are Charophytes called stone worts?
2. Write three important features of Characeae.
3. Write the systematic position of Chara.
4. How does asexual reproduction take place in Chara?
5. Write three advanced features of Characeae.
6. Write the systematic position of Vaucheria.
7. What are the storage food materials in Xanthophyta?
8. What do you mean by the gangrosira stage?
9. What is the structure of a mature antheridium in Vaucheria?
10. Depict the life cycle of Vaucheria.
11. Why are Vaucheria zoospores called compound zoospores?
12. Write the systematic position of Ectocarpus.
13. Write the systematic position of Fucus.
14. What are the two main pigments of Phaeophyta?
15. What are the main food reserves in Phaeophyta?
16. What are the sub-classes of Phaeophyta? Write one major distinguishing character of each.
17. Depict the life cycle in Fucus.
18. What are the pigments in Rhodophyta?
19. What are the main reserve food materials in Rhodophyta?
20. What are the two subclasses of Rhodophyta according to Fritsch's classification? Give one example of each.
21. Write the systematic position of Polysiphonia.
22. What is a cystocarp?

Section D: Long Answer Questions (8 Marks each)

1. Give an account of thallus organization in Chara.
2. Describe sexual reproduction in Chara.
3. Give an account of the structure and reproduction in Vaucheria.
4. Give an account of the alternation of generations in Ectocarpus.

5. Discuss briefly the life history of Ectocarpus.

6. Discuss the life history of Fucus.

7. Give an account of the sporophytic phase of Ectocarpus.

8. Discuss the sexual reproduction in Fucus.

9. Give an account of sexual reproduction in Polysiphonia.

10. Discuss the life cycle of Polysiphonia.

11. Give an account of the thallus organization in Polysiphonia.

Additional Topic: Contributions of Famous Phycologists

Syllabus coverage: Contributions of Indian and foreign phycologists (supplementary topic from the textbook)

Section A: Fill in the Blanks & Multiple Choice Questions (1 Mark each, with Answers)

(i) Fill in the Blanks

No.	Fill in the Blank	Answer
1	_____ is known as the father of modern phycology in India.	*M. O. P. Iyengar*
2	The Atlas of Indian Diatoms was published by the scientist named _____.	*H. D. Kumar*
3	'Taxonomy and Biology of Blue Green Algae' is written by _____.	*T. V. Desikachary*
4	The book 'The Structure and Reproduction of Algae' is written by _____.	*F. E. Fritsch*
5	Fritsch divided algae into _____ number of classes.	*Eleven*
6	'Phytoplanktons of the Inland Lakes of Wisconsin' is written by _____.	*G. M. Smith*
7	The book 'Cryptogamic Botany' is written by _____.	*G. M. Smith*
8	The book 'Role of Blue Green Algae in Nitrogen Economy of Indian Agriculture' is written by _____.	*R. N. Singh*
9	'Manual of Phycology' was edited by _____ in 1951.	*G. M. Smith*
10	'British Fresh Water Algae' is written by _____.	*F. E. Fritsch*

Section D: Long Answer Questions (8 Marks each)

1. Write the contributions of M. O. P. Iyengar.

2. Write the contributions of T. V. Desikachary.

3. Write notes on: (a) Contributions of F. E. Fritsch (b) Contributions of G. M. Smith (c) Contributions of H. D. Kumar and R. N. Singh.

4. Give a note on the contributions of famous Indian Phycologists.