

2 Biological Classification

Book:



1 Mark Questions

(A) Give One Word Answer :

Q. 1. Name the photosynthetic autotroph monerans.

Ans. Cyanobacteria.

Q. 2. Who classified two Kingdoms as Plantae and Animalia.

Ans. Linnaeus.

Q. 3. Name an archaeobacteria that live in marshy areas.

Ans. Methanogens.

Q. 4. Who proposed the five kingdom classification?

Ans. R.H. Whittaker.

Q. 5. Smallest known prokaryotes which lack a cell wall and can survive without oxygen :

Ans. Mycoplasma.

(B) Each of the following questions has four choices. Choose the correct option in each case :

Q. 1. *Spirulina* is used as human food as:

- (A) it is rich in carbohydrates
- (B) it is rich in proteins
- (C) it is rich in minerals
- (D) none of these

Ans. Option (B) is correct.

Explanation: *Spirulina* is a member of cyanobacteria which is very rich in protein.

Q. 2. Most common method of reproduction in bacteria is :

- (A) Multiple fission
- (B) Fragmentation
- (C) Budding
- (D) Binary fission

Ans. Option (D) is correct.

Explanation: The most common method of reproduction found in bacteria is binary fission. Fission, budding and fragmentation are not that common.

Q. 3. Under unfavourable conditions, Monerans become encysted and form :

- (A) Endospores
- (B) Zoospores
- (C) Spores
- (D) Basidiospores

Ans. Option (A) is correct.

Explanation: Species of bacteria are capable to form dormant, tough, and non-reproductive structure under unfavorable condition are called endospores.

Q. 4. Linnaeus used which system of classification?

- (A) Natural system
- (B) Artificial system
- (C) Phylogenetic system
- (D) None of the above

Ans. Option (A) is correct.

Explanation: Carolus Linnaeus is the father of taxonomy, used natural system of classification.

Q. 5. The natural system of classification is based on

- (A) Anatomy
- (B) Morphology and affinities
- (C) Evolutionary trend
- (D) None of the above

Ans. Option (B) is correct.

Explanation: According to a natural classification system, all members of a particular group have same morphology and affinities. Evolutionary trends are not taken into consideration.

Q. 6. Which among the following bacteria is resistant to penicillin?

- (A) Spirochetes
- (B) Cyanobacteria
- (C) Mycoplasmas
- (D) None of the above

Ans. Option (C) is correct.

Explanation: Penicillin acts on the cell wall of micro organism. However, mycoplasma lack cell wall in their structure. Thus they are resistant to penicillin.

(C) Answer the following questions :

Q. 1. Why archaeobacteria are able to survive in extreme conditions?

Ans. Archaeobacteria are able to survive in extreme conditions due to the presence of a unique cell wall that differ from other bacteria. The cell wall consists of polysaccharides and protein.

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Q. 2. Name two nitrogen fixing cyanobacteria.

Ans. *Nostoc* and *Anabaena*

Q. 3. What is the function of *Lactobacillus*?

Ans. *Lactobacillus* bacteria ferment lactose in milk to lactic acid and convert it into curd.

Q. 4. Name the moneran known as chief decomposers.

Ans. Denitrifying bacteria (*Pseudomonas*).

Q. 5. What is the function of plasmid?

Ans. Donor bacterium contains a fertility gene known as plasmid which contain a resistant factor R which

makes the bacterium resistant to antibiotics.

Q. 6. Write the name of the material present in the cell wall of bacteria which gives protection against mechanical injury.

Ans. Murein or peptidoglycan is the main component of bacterial cell wall.

Q. 7. Name the smallest known prokaryote.

Ans. *Mycoplasma* is the smallest known prokaryote.



2 Marks Questions

Q. 1. Name the types of bacteria based on their shape.

Ans. Depending on their shape, bacteria are of four types :

- (i) Coccus (ii) Bacillus
- (iii) Vibrium (iv) Spirillum

Q. 2. What do you understand by the terms algal bloom and red tide?

Ans. An algal bloom is a rapid increase or accumulation in the population of algae in freshwater or marine water systems and is often recognized by the discoloration in the water from their pigments.

A red tide is a toxic event that occurs on the coastline when algae grows out of control. These toxic algal blooms, some deep red in colour, trigger a tide of effects on animals and humans.

Q. 3. Explain the mode of nutrition in cyanobacteria.

Ans. Cyanobacteria are the most successful photosynthetic bacteria. They take in water and

carbon dioxide from the aqueous medium and use light energy to synthesise simple sugars. Many can fix nitrogen and many others can release nitrogenous compounds into the atmosphere.

Q. 4. What is botulism? Mention its cause.

Ans. Botulism is a fatal illness caused by a toxin produced by bacteria *Clostridium botulinum*. It is an anaerobic bacteria and infects the canned food. Botulinum toxins block nerve functions and can lead to respiratory and muscular paralysis.

Q.5. Name the sources of antibiotics tetracycline and chlorotetracycline.

Ans. Tetracycline — *Streptomyces rimosus*

Chlorotetracycline — *Streptomyces aureofaciens*

Q.6. Name the bacteria found in the roots of leguminous plants and also mention its function.

Ans. *Rhizobium* bacterium is found in the roots of leguminous plants. It fixes atmospheric nitrogen as ammonia which is converted to amino acids and then utilized by the plants.



3 Marks Questions

Q. 1. What are the main disadvantages of two kingdom classification?

Ans. Main disadvantages of two kingdom classification are:

- (i) Prokaryotes like bacteria and blue-green algae and eukaryotes were placed together in this classification.
- (ii) Unicellular and multicellular organisms were placed in same group.
- (iii) This classification was unable to categorize non-photosynthetic fungi and autotrophic green plants separately.

Q. 2. Explain why gram negative bacteria are resistant to antibiotics.

- Ans. (i) The lipid rich outer membrane makes gram negative bacteria resistant to many antibiotics.
- (ii) The outer membrane of gram negative

bacteria contains proteins called porins, which function as channels for the entry and exit of hydrophilic low molecular weight substances.

- (iii) Because they have a highly impermeable cell membrane, gram negative bacteria are more resistant to gram positive bacteria.

Q. 3. Explain the process of conjugation in bacteria.

Ans. In the process of conjugation, a fine bridge gets formed between the mating cells. One cell (male) uses this bridge to donate a piece of its DNA to the recipient cell (female). This newly donated piece becomes inserted in place of an equivalent piece that was originally present in the circular DNA molecule. The new individual possesses

the recombinant DNA and hence possesses the hereditary traits of both.

Q. 4. Mention important characteristics of monera.

Ans. Important characteristics of Monerans are :

- (i) They are simple prokaryotic unicellular organisms. All bacteria and cyanobacteria are unicellular.
- (ii) They have rigid cell wall but lack true nucleus and membrane bounded organelles.
- (iii) They have various modes of nutrition, could be autotrophs or heterotrophs.

Q. 5. Mention the types of heterotrophic mode of

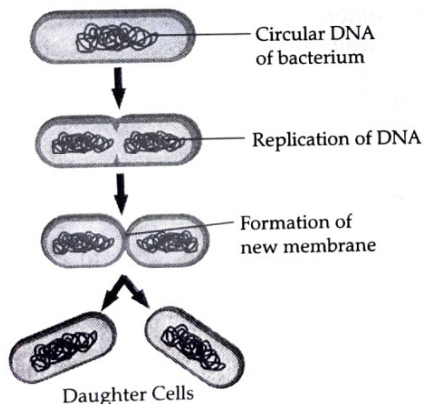


5 Marks Questions

Q. 1. Explain binary fission in bacteria.

Ans. Binary fission in bacteria : Bacteria undergo binary fission when conditions are favorable.

- (i) The cell simply grows larger.
- (ii) The DNA of bacterium replicates itself and the two daughter molecules are attached to the membrane at separate but adjacent sites.
- (iii) When bacterium grows, there is a formation of new membrane between two DNA attachment sites so that they grow away from each other.
- (iv) In the middle, cell membrane and cell wall are formed separating the two daughter cells.



Binary fission in bacteria



Commonly Made Error

- Students often write vague answer. It seems they have not studied the process of binary fission carefully.

Q. 3. Write five differences between cyanobacteria and eubacteria.

Ans. Differences between cyanobacteria and eubacteria:

nutrition in Bacteria.

Ans. The types of heterotrophic mode of nutrition in Bacteria are :

- (i) **Saprophytes :** These are the decomposers that obtain their food from dead and decaying matter.
- (ii) **Symbionts :** They live in close relationship with other living organisms. For example, *Rhizobium* is found in the root nodules of leguminous plants.
- (iii) **Parasites :** They live on other organisms called host, from which they obtain food.



Answering Tip

- Learn the process of binary fission with proper diagram.

Q. 2. Mention the criteria for five kingdom classification, in detail.

Ans. Criteria for five kingdom classification are as follows:

- (i) **Complexity of cell structure :** All prokaryotic organisms are separated into kingdom monera.
- (ii) **Body organisation :** All unicellular organisms are grouped under kingdom protista, while multicellular organisms are placed under kingdoms fungi, plantae and animalia.
- (iii) **Mode of nutrition :** Autotrophs, heterotrophs and holozoic organisms are separated in the kingdoms plantae, fungi and animalia respectively.
- (iv) **Life style :** Producers are placed in kingdom plantae, while consumers are placed in kingdom animalia and decomposers in kingdom fungi.
- (v) **Phylogenetic relationship :** The primitive prokaryotic organisms are placed in kingdom monera. Kingdom protista include all unicellular and eukaryotic forms of life and it shows resemblances to the other kingdoms fungi, animalia and plantae.

S. No.	Cyanobacteria	Eubacteria
(i)	It has a larger cell.	It has a smaller cell.
(ii)	Do not have flagella.	Many have flagella.
(iii)	Oxygen released as a by-product of photosynthesis.	Oxygen not released during photosynthesis.
(iv)	Chlorophyll a and phycobilin are there as photosynthetic pigments.	Bacteriochlorophyll is present as photosynthetic pigments.
(v)	Conjugation is not possible.	Sexual reproduction by conjugation takes place.



1 Mark Questions

(A) Give One Word Answer :

Q. 1. Who discovered tobacco mosaic virus?

Ans. Ivanowsky.

Q. 2. To which class sac-fungi belongs ?

Ans. Ascomycota.

Q. 3. Long, slender, thread-like structures present in fungal body.

Ans. Hyphae.

Q. 4. Smallest known infectious agents that consist of a short-single stranded RNA, which lack capsid.

Ans. Viroids.

Q. 5. Name the chemical that constitutes the fungal cell wall.

Ans. Chitin.

Q. 6. Name the viruses which infect bacteria.

Ans. Bacteriophage.

Q. 7. Name the pollution indicators which do not grow in the polluted areas.

Ans. Lichens.

Q. 8. Name a bacterium used in the production a "swiss cheese".

Ans. *Propionibacterium shermanii*.

(B) Each of the following questions has four choices. Choose the correct option in each case:

Q. 1. The class to which imperfect fungi belong :

- (A) Ascomycetes (B) Basidiomycetes
(C) Phycomycetes (D) Deuteromycetes

Ans. Option (D) is correct.

Explanation: Sexual or perfect stages of deuteromycetes are not known. Only asexual or vegetative stages are known. Because of this they are commonly known as imperfect fungi.

Q. 2. Organism, which cause red tides in oceans :

- (A) Cyanobacteria (B) Dinoflagellates
(C) Euglena (D) Slime moulds

Ans. Option (B) is correct.

Explanation: Red dinoflagellates such as *Gonyaulax* undergo rapid multiplication. Due to presence of a large number of red dinoflagellates, the sea appears red (red tides).

Q. 3. Fungus used in bakeries and breweries :

- (A) *Penicillin* (B) Yeast
(C) *Rhizopus* (D) *Ustilago*

Ans. Option (B) is correct.

Explanation: Yeast is used as a leavening agent in bakery. It adds sponginess to cakes and bread with the help of its product which is CO₂.

Q. 4. Slime mould resembles fungi in having :

- (A) Saprotrophic mode of nutrition
(B) Holozoic mode of nutrition
(C) Autotrophic mode of nutrition
(D) Parasitic mode of nutrition

Ans. Option (A) is correct.

Explanation: Slime mould resembles fungi in having saprotrophic mode of nutrition. and a cell wall at some stage in the life cycle.

Q. 5. Locomotion in *Paramecium* is through :

- (A) Pseudopodia (B) Flagella
(C) Cilia (D) None of these

Ans. Option (C) is correct.

Explanation: Ciliated protozoans have their body covered with thousands of cilia which help in movement and capturing of food such as *Paramecium*.

Q. 6. Which among the following do not belong to Protista?

- (A) Ciliates (B) Euglenoids
(C) Methanogens (D) Both (A) and (B)

Ans. Option (C) is correct.

Explanation: There are certain bacteria which grow anaerobically on cellulosic material and produce large amount of methane gas along with carbon dioxide and hydrogen. These bacteria are called methanogens.

Q. 7. Lichens are the major pollution indicators of which gas ?

- (A) SO₂ (B) NO₂
(C) CO (D) Both (A) and (B)

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Ans. Option (A) is correct.

Explanation: Lichens are good indicators of air pollution, especially for sulfur dioxide.

(C) Answer the following questions :

Q. 1. Name any two viral diseases in plants.

Ans. Tobacco mosaic and cauliflower mosaic are viral diseases.

Q. 2. Name the symbiont which live in the roots of higher plants in mycorrhizae.

Ans. Fungi.

Q. 3. Mention the mode of nutrition in kingdom Animalia.

Ans. Holozoic mode of nutrition.

Q. 4. How asexual reproduction occur in class ascomycetes?

Ans. Asexual reproduction in ascomycetes is by conidia.

Q. 5. Name the genetic material of Bacteriophage.

Ans. Double stranded DNA.

Q. 6. Name the two phases in the life cycle of a plant.

Ans. Sporophyte and gametophyte

Q. 7. Name the organisms that belong to the group chrysophytes of kingdom Protista.

Ans. Diatoms and Desmide.

(D) Give one significant contribution of each of the following scientists :

(i) D. J Ivanowky

(ii) M. S Beijerinck

(iii) W. M. Stanley

Ans. (i) **D.J. Ivanowsky:** He found that certain microbes caused Tobacco Mosaic Disease in tobacco plant.

(ii) **M.W. Beijerinck :** He demonstrated that the extract of the infected plants of tobacco could cause infection in healthy plants and called the fluid as "Contagium vivum fluidum" (infectious living fluid).

(iii) **W. M. Stanley:** He showed viruses could be crystallized to form crystals of protein, which are inert outside their specific host.



2 Marks Questions

Q. 1. Why oomycetes are considered to be primitive fungi? AI

Ans. Oomycetes are considered to be primitive fungi because of biochemical and physiological studies. They seem to resemble the protists as well.



Commonly Made Error

- Students often get confused between oomycetes and deuteromycetes.



Answering Tip

- Deuteromycetes are imperfect fungi and oomycetes are primitive fungi.

Q. 2. Mention the symbiotic association in lichen. AI

Ans. In lichen, both the alga and the fungus benefit from the association and neither can survive alone in the environment. The fungus absorbs water and minerals from the surface and alga in turn prepares food by photosynthesis.

Q. 3. Name the club shaped structure in basidiomycetes and mention its role.

Ans. The club shaped structure is called basidium formed at the end of certain reproductive hyphae. The basidium is the site for haploid spore production.

Q. 4. Give two examples of ascomycetes and zygomycetes.

Ans. (i) **Ascomycetes :** (a) *Penicillium*, (b) Yeast
(ii) **Zygomycetes :** (a) *Rhizopus*, (b) *Mucor*

Q. 5. Who are the producer in marine ecosystem? To which phylum it belong ? AI

Ans. Diatoms and golden brown algae are the most important producers in marine ecosystem. They belongs to phylum chrysophytes.

Q. 6. Why are fungi called saprophytes ?

Ans. Fungi do not form their own food. They depend upon dead and decaying matter to obtain their food. The organisms which obtain their food from dead and decay matter are called saprophytes. So, fungi are called saprophytes.

Q. 7. Why lichens are called pioneer plants ? AI

Ans. Lichens are the first to colonize bare rocks, mountains, and cliffs. They corrode rocks and accumulate a certain amount of minerals and organic matter. So, they are called pioneer plants. The plants like mosses and grasses appear later in succession, utilizing the first soil formed by lichens.

Q. 8. What do you understand by diatomaceous earth? How it is formed ? AI

Ans. Diatomaceous earth is a soft, crumbly, porous, sedimentary deposit formed from the fossil remains of diatoms. Their skeletons are made of a natural substance called silica. Over a long period of time, diatoms got accumulated in the sediment of rivers, streams, lakes and oceans.

Q. 9. Explain how bacteria can also be used as sources of energy.

Ans. There are certain bacteria which grow anaerobically on cellulosic material and produce large amount of methane gas along with carbon dioxide and hydrogen. These bacteria are called methanogens. The excreta of cattle (dung) commonly called 'gobar' is rich in these bacteria and undigested cellulose. Therefore, during can be used to generate a gaseous fuel called biogas or gobar gas.



3 Marks Questions

Q.1. Explain the modes of locomotion in kingdom protista.

Ans. Protists show locomotion by flagella, cilia and pseudopodia.

- (i) **Flagella** : These are long, whip-like, fine structures which help organisms to propel. e.g. *Euglena*.
- (ii) **Cilia** : These are short fine hair like structures present all over the body to bring about locomotion. Due to cilia, organisms move rapidly, they can turn, tumble or reverse. e.g. *Paramecium*.
- (iii) **Pseudopodia** : These are also known as false feet. These are protoplasmic extension, which give irregular shape to the organism. e.g. *Amoeba*.

Q. 2. Describe budding in yeast.

Ans. Yeast reproduce asexually by budding under favourable conditions. A bud starts as a small outgrowth from the surface of mother cell. As it enlarges the nucleus of the mother cell divides and then the bud gets cut off but still remains attached to the mother cell. It in turn produces another bud.

Q. 3. What do you understand by zygotic meiosis and gametic meiosis?

- Ans.**
- (i) **Zygotic meiosis** : It occurs in haploid protist in which two haploid cells fuse to form diploid (2n) zygote.
 - (ii) **Gametic meiosis**: It occurs in diploid (2n) protists. The diploid (2n) cells divide meiotically to produce 4 haploid (n) gametes prior to sexual reproduction. The haploid gametes fuse in pairs to form a diploid (2n) zygote. Diploid individuals are produced when zygote divides mitotically.

Q. 4. (i) Why Deuteromycetes are called fungi imperfecti?

(ii) **Mention two reasons why slime mould resembles fungi?**

Ans. (i) Because members of this group lack a sexual stage, they are often referred to as fungi imperfecti.

- (ii) **Slime moulds resemble fungi in having :**
 - (a) saprotrophic mode of nutrition.
 - (b) a cell wall at some stage in the life cycle.

Q. 5. Mention some characteristics of dinoflagellates.

Ans. Some characteristics of dinoflagellates are :

- (i) They are unicellular, motile and photosynthetic organisms.
- (ii) Body is enclosed in a cellulose wall divided into plates.
- (iii) Two unequal flagella are found, one lies longitudinally and other lies transversely between wall plates.

Q. 6. Name the protozoans which have following special characteristics :

- (i) Have defence organelles called trichocyst.
- (ii) Have pseudopodia extensions to trap and engulf food.
- (iii) Have semi-rigid cell covering called pellicle.

Ans. (i) Ciliates (ii) Rhizopoda

(iii) Flagellates

Q. 7. Mention few characteristics of fungi.

Ans. Characteristic of fungi are :

- (i) Fungi have rigid cell wall generally made up of chitin.
- (ii) The body is in the form of mycelium. The individual filament is called hyphae.
- (iii) The stored food material is glycogen.
- (iv) Reproduction is by means of spores.

Q. 8. Differentiate between chrysophytes and euglenoids.

Ans.

S. No.	Chrysophytes	Euglenoids
(i)	Silicon dioxide is present in cell wall.	There is no cell wall but a flexible pellicle is present.
(ii)	They lack flagella.	They have 1-3 flagella.
(iii)	Reproduce both asexually and sexually.	Reproduce by binary fission and form cysts during unfavourable conditions.



5 Marks Questions

Q. 1. Describe the structure of bacteriophage virus.

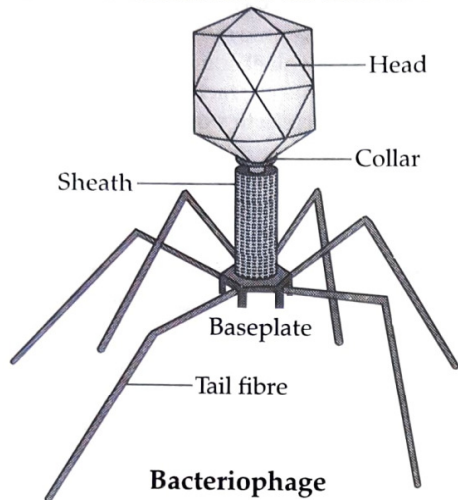
Ans. Bacteriophage have a tadpole like structure with a head and tail. The head is in the form of bipyramidal hexagonal prism, whereas tail is cylindrical. The tail is attached to the head with the help of collar. The head has a proteinaceous membrane enclosing

the core of a double - stranded DNA. The tail has four components :

- (i) The central hollow, helical tube or core.
- (ii) Core surrounded by a protein-sheath which is capable of longitudinal contraction.
- (iii) Sheath connected to the head by collar and at the distal end to basal hexagonal plate.

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- (iv) At the corners of the basal plates, fins are present.
- (v) Basal plate bears six long tail fibres which are meant for attachment to the bacterial surface.



Commonly Made Error

- Students often consider bacteriophage as a bacteria instead of virus.



Answering Tip

- Students should clearly understand the difference between the characteristics of bacteria and virus.

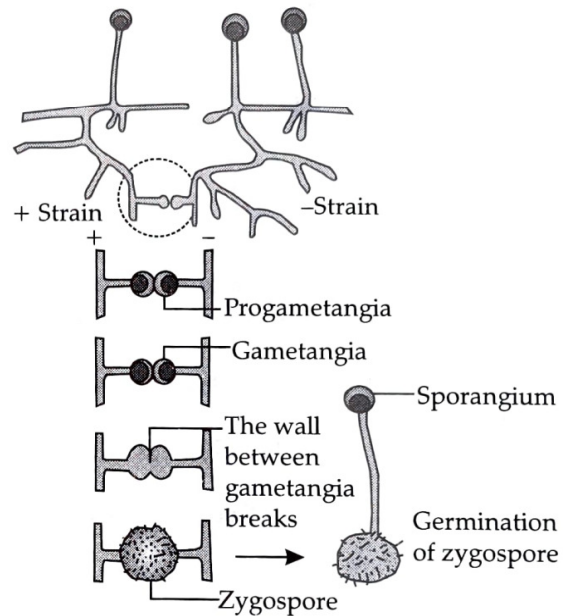
Q. 2. Explain the sexual reproduction in *Rhizopus* with detail and also draw the diagram.

Ans. Sexual reproduction in *Rhizopus* :

- (i) It occurs only when different strains called plus (+) and minus (-) which are morphologically similar but are physiologically different comes in contact with each other.
- (ii) The lateral branches from each hypha grow and come in contact at tips. The swollen ends containing several nuclei and dense cytoplasm are called gametangia.
- (iii) Each gametangia is cut off by a cross wall from the hyphae. When the gametangia mature, the wall between them breaks down and the nuclei

fuse in pairs, plus (+) with minus (-) to form diploid nuclei.

- (iv) The wall of fused gametangium thickens to form a resting zygospore containing many diploid nuclei. It accumulates food reserves like lipids and glycogen.
- (v) In the zygospore, each diploid nucleus undergoes meiosis and out of four haploid nuclei formed, 3 degenerate and only one is left. This remaining nucleus develops into a new haploid hypha that produces asexual spores again.



Sexual reproduction in *Rhizopus*



Commonly Made Error

- Students often forgot to put plus (+) and (-) minus signs on hyphae.



Answering Tip

- Students should practice to make the diagram accordingly so that sexual reproduction should be seen clearly in the diagram.

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