Question 1:

Discuss how classification systems have undergone several changes over a period of time?

Answer

The classification systems have undergone several changes with time. The first attempt of classification was made by Aristotle. He classified plants as herbs, shrubs, and trees. Animals, on the other hand, were classified on the basis of presence or absence of red blood cells. This system of classification failed to classify all the known organisms.

Therefore, Linnaeus gave a two kingdom system of classification. It consists of kingdom Plantae and kingdom Animalia. However, this system did not differentiate between unicellular and multicellular organisms and between eukaryotes and prokaryotes. Therefore, there were large numbers of organisms that could not be classified under the two kingdoms.

To solve these problems, a five kingdom system of classification was proposed by R.H Whittaker in 1969. On the basis of characteristics, such as cell structure, mode of nutrition, presence of cell wall, etc., five kingdoms, Monera, Protista, Fungi, Plantae, and Animalia were formed.

Question 2:

State two economically important uses of:

(a) Heterotrophic bacteria

(b) Archaebacteria

Answer

(a) Heterotrophic bacteria

(1) They act as decomposers and help in the formation of humus.

(2) They help in the production of curd from milk.

(3) Many antibiotics are obtained from some species of bacteria.

(4) Many soil bacteria help in fixation of atmospheric nitrogen.

(b) Archaebacteria

(1) Methane gas is produced from the dung of ruminants by the methanogens.

(2) Methanogens are also involved in the formation of biogas and sewage treatment.

Question 3:

What is the nature of cell-walls in diatoms?

Answer

The cell walls of diatoms are made of silica. Their cell wall construction is known as frustule. It consists of two thin overlapping shells that fit into each other such as a soap box. When the diatoms die, the silica in their cell walls gets deposited in the form of diatomaceous earth. This diatomaceous earth is very soft and quite inert. It is used in filtration of oils, sugars, and for other industrial purposes.

Question 4:

Find out what do the terms 'algal bloom' and 'red-tides' signify.

Answer

Algal bloom

Algal bloom refers to an increase in the population of algae or blue-green algae in water, resulting in discoloration of the water body. This causes an increase in the biological oxygen demand (BOD), resulting in the death of fishes and other aquatic animals.

Red-tides

Red tides are caused by red dinoflagellates (*Gonyaulax*) that multiply rapidly. Due to their large numbers, the sea appears red in colour. They release large amounts of toxins in water that can cause death of a large number of fishes.

Question 5:

How are viroids different from viruses?

Answer

Viroids were discovered in 1917 by T.O. Denier. They cause potato spindle tuber disease. They are smaller in size than viruses. They also lack the protein coat and contain free RNA of low molecular weight.

Question 6:

Describe briefly the four major groups of Protozoa.

Answer

Protozoa are microscopic unicellular protists with heterotrophic mode of nutrition. They may be holozoic, saprobic, or parasitic. These are divided into four major groups.

(1) Amoeboid protozoa or sarcodines

They are unicellular, jelly-like protozoa found in fresh or sea water and in moist soil. Their body lacks a periplast. Therefore, they may be naked or covered by a calcareous shell. They usually lack flagella and have temporary protoplasmic outgrowths called pseudopodia. These pseudopodia or false feet help in movement and capturing prey. They include free living forms such as *Amoeba* or parasitic forms such as *Entamoeba.*

(2) Flagellated protozoa or zooflagellates

They are free living, non-photosynthetic flagellates without a cell wall. They possess flagella for locomotion and capturing prey. They include parasitic forms such as *Trypanosoma*, which causes sleeping sickness in human beings.

(3) Ciliated protozoa or ciliates

They are aquatic individuals that form a large group of protozoa. Their characteristic features are the presence of numerous cilia on the entire body surface and the presence of two types of nuclei. All the cilia beat in the same direction to move the water laden food inside a cavity called gullet. They include organisms such as *Paramoecium*, *Vorticella*,etc.

(4) Sporozoans

They include disease causing endoparasites and other pathogens. They are uninucleate and their body is covered by a pellicle. They do not possess cilia or flagella. They include the malaria causing parasite *Plasmodium*.

Question 7:

Plants are autotrophic. Can you think of some plants that are partially heterotrophic?

Answer

Plants have autotrophic mode of nutrition as they contain chlorophyll pigment. Thus, they have the ability to prepare their own food by the process of photosynthesis. However, some insectivorous plants are partially heterotrophic. They have various means of capturing insects so as to supplement their diet with required nutrients derived from insects, causing proliferation of growth. The examples include pitcher plant (*Nepenthes*), Venus fly trap, bladderwort, and sundew plant.

Question 8:

What do the terms phycobiont and mycobiont signify?

Answer

Phycobiont refers to the algal component of the lichens and mycobiont refers to the fungal component. Algae contain chlorophyll and prepare food for fungi whereas the fungus provides shelter to algae and absorbs water and nutrients from the soil. This type of relationship is referred to as symbiotic.

Question 9:

Give a comparative account of the classes of Kingdom Fungi under the following:

(i) Mode of nutrition

(ii) Mode of reproduction

Answer

(A) Phycomycetes- This group of fungi includes members such as *Rhizopus*, *Albugo*, etc.

(i) Mode of nutrition

They are obligate parasites on plants or are found on decaying matter such as wood.

(ii) Mode of reproduction

Asexual reproduction takes place through motile zoospores or non-motile aplanospores that are produced endogenously in sporangium.

Sexual reproduction may be of isogamous, anisogamous, or oogamous type. It results in the formation of thick-walled zygospore.

(B) Ascomycetes- This group of fungi includes members such as *Penicillium*, *Aspergillus*, *Claviceps*, and *Neurospora.*

(i) Mode of nutrition

They are sporophytic, decomposers, parasitic or coprophilous (growing on dung).

(ii) Mode of reproduction

Asexual reproduction occurs through asexual spores produced exogenously, such as conidia produced on conidiophores.

Sexual reproduction takes place through ascospores produced endogenously in sac-like asci and arranged inside ascocarps.

(C) Basidiomycetes- This group of fungi includes members such as *Ustilago*, *Agaricus* and *Puccinia*.

(i) Mode of nutrition

They grow as decomposers in soil or on logs and tree stumps. They also occur as parasites in plants causing diseases such as rusts and smuts.

(ii) Mode of reproduction

Asexual reproduction takes place commonly through fragmentation. Asexual spores are absent.

Sex organs are absent but sexual reproduction takes place through plasmogamy. It involves fusion of two different strains of hyphae. The resulting dikaryon gives rise to a basidium. Four basidiospores are produced inside a basidium.

(D) Deuteromycetes – This group of fungi includes members such as *Alternaria, Trichoderma*, and *Colletotrichum.*

(i) Mode of nutrition

Some members are saprophytes while others are parasites. However, a large number act as decomposers of leaf litter.

(ii) Mode of reproduction

Asexual reproduction is the only way of reproduction in deuteromycetes. It occurs through asexual spores called conidia.

Sexual reproduction is absent in deuteromycetes.

Question 10:

What are the characteristic features of Euglenoids?

Answer

Some characteristic features of Euglenoids are as follows.

- Euglenoids (such as *Euglena*) are unicellular protists commonly found in fresh water.
- Instead of cell wall, a protein-rich cell membrane known as pellicle is present.
- They bear two flagella on the anterior end of the body.
- A small light sensitive eye spot is present.
- They contain photosynthetic pigments such as chlorophyll and can thus prepare their own food. However, in absence of light, they behave similar to heterotrophs by capturing other small aquatic organisms.
- They have both plant and animal-like features, which makes them difficult to classify.

Question 11:

Give a brief account of viruses with respect to their structure and nature of genetic material. Also name four common viral diseases.

Answer

Viruses are sub-microscopic infectious agents that can infect all living organisms. A virus consists of genetic material surrounded by a protein coat. The genetic material may be present in the form of DNA or RNA.

Most of the viruses, infecting plants, have single stranded RNA as genetic material. On the other hand, the viruses infecting animals have single or double stranded RNA or double stranded DNA.

Bacteriophages or viruses infecting bacteria mostly have double stranded DNA. Their protein coat called capsid is made up of capsomere subunits. These capsomeres are arranged in helical or polyhedral geometric forms.

A.I.D.S, small pox, mumps, and influenza are some common examples of viral diseases.

Question 12:

Organise a discussion in your class on the topic- Are viruses living or non-living?

Answer

Viruses are microscopic organisms that have characteristics of both living and non-living. A virus consists of a strand of DNA or RNA covered by a protein coat. This presence of nucleic acid (DNA or RNA) suggests that viruses are alive. In addition, they can also respond to their environment (inside the host cell) in a limited manner. However, some other characters, such as their inability to reproduce without using the host cell machinery and their acellular nature, indicate that viruses are non-living. Therefore, classifying viruses has remained a mystery for modern systematics.

Question 1:

Name the parts of an angiosperm flower in which development of male and female gametophyte take place.

Answer

The male gametophyte or the pollen grain develops inside the pollen chamber of the anther, whereas the female gametophyte (also known as the embryo sac) develops inside the nucellus of the ovule from the functional megaspore.

Question 2:

Differentiate between microsporogenesis and megasporogenesis. Which type of cell division occurs during these events? Name the structures formed at the end of these two events.

Answer

(a)

	Microsporogenesis	**Megasporogenesis**
1.	It is the process of the formation of microspore tetrads from a microspore mother cell through meiosis.	It is the process of the formation of the four megaspores from a megaspore mother cell in the region of the nucellus through meiosis
2.	It occurs inside the pollen sac of the anther.	It occurs inside the ovule.

(b) Both events (microsporogenesis and megasporogenesis) involve the process of meiosis or reduction division which results in the formation of haploid gametes from the microspore and megaspore mother cells.

(c) Microsporogenesis results in the formation of haploid microspores from a diploid microspore mother cell. On the other hand, megasporogenesis results in the formation of haploid megaspores from a diploid megaspore mother cell.

Question 3:

Arrange the following terms in the correct developmental sequence:

Pollen grain, sporogenous tissue, microspore tetrad, pollen mother cell, male gametes

Answer

The correct development sequence is as follows:

Sporogenous tissue – pollen mother cell – microspore tetrad – Pollen grain – male gamete

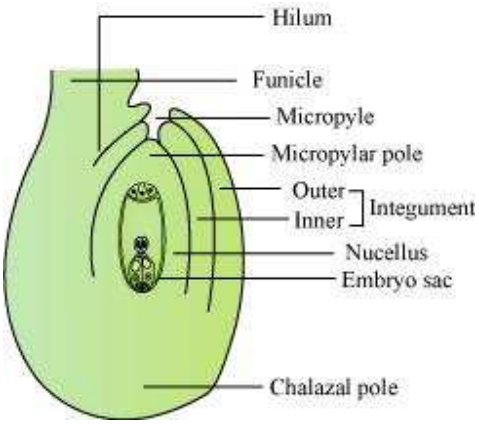
During the development of microsporangium, each cell of the sporogenous tissue acts as a pollen mother cell and gives rise to a microspore tetrad, containing four haploid microspores by the process of meiosis (microsporogenesis). As the anther matures, these microspores dissociate and develop into pollen grains. The pollen grains mature and give rise to male gametes.

Question 4:

With a neat, labelled diagram, describe the parts of a typical angiosperm ovule.

Answer

An ovule is a female megasporangium where the formation of megaspores takes place.



The various parts of an ovule are –

(1) Funiculus – It is a stalk-like structure which represents the point of attachment of the ovule to the placenta of the ovary.

(2) Hilum – It is the point where the body of the ovule is attached to the funiculus.

(3) Integuments –They are the outer layers surrounding the ovule that provide protection to the developing embryo.

(4) Micropyle – It is a narrow pore formed by the projection of integuments. It marks the point where the pollen tube enters the ovule at the time of fertilization.

(5) Nucellus – It is a mass of the parenchymatous tissue surrounded by the integuments from the outside. The nucellus provides nutrition to the developing embryo. The embryo sac is located inside the nucellus.

(6) Chalazal – It is the based swollen part of the nucellus from where the integuments originate.

Question 5:

What is meant by monosporic development of female gametophyte?

Answer

The female gametophyte or the embryo sac develops from a single functional megaspore. This is known as monosporic development of the female gametophyte. In most flowering plants, a single megaspore mother cell present at the micropylar pole of the nucellus region of the ovule undergoes meiosis to produce four haploid megaspores. Later, out of these four megaspores, only one functional megaspore develops into the female gametophyte, while the remaining three degenerate.