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STUDY COURSE MATERIAL

SCIENCE

SESSION-2020-21

CLASS -VIII

TOPIC: MICROORGANISMS

DAY-1

Topic- Microorganisms

***NCERT Book Link-**

http://ncert.nic.in/textbook/textbook.htm?hesc1=2-18

***Teaching Notes-**

***Definition of microorganisms-**

Organisms that are so small that they can only be seen through a microscope, are called **microorganisms** or **microbes.**

Microorganisms are microscopic organisms that cannot be seen with the naked eye. These organisms have a great impact on humans in many ways. Some cause diseases, whereas others cure them. Some provide us food, where as others spoil them.

The study of microorganisms is known as **microbiology.**

Scientists who study microorganisms are known as **microbiologists.**

***Where are Microbes found-**

Most microorganisms are hardy and can be found in almost any kind of environment. They are found in extreme cold as well as extreme hot climate.

Some microbes live in cracks in the sea floor, can even survive a volcanic eruption.

Microorganisms are found in Salt water, in marshland and even inside our body. Microorganisms are hardy because they form a hard covering called a **cyst** around themselves.

***Types of Microorganisms-**

There are five major groups of microorganisms.

1. Bacteria
2. Algae
3. Protozoa
4. Fungi
5. Viruses

1.Bacteria-

Bacteria are simple, unicellular living things.

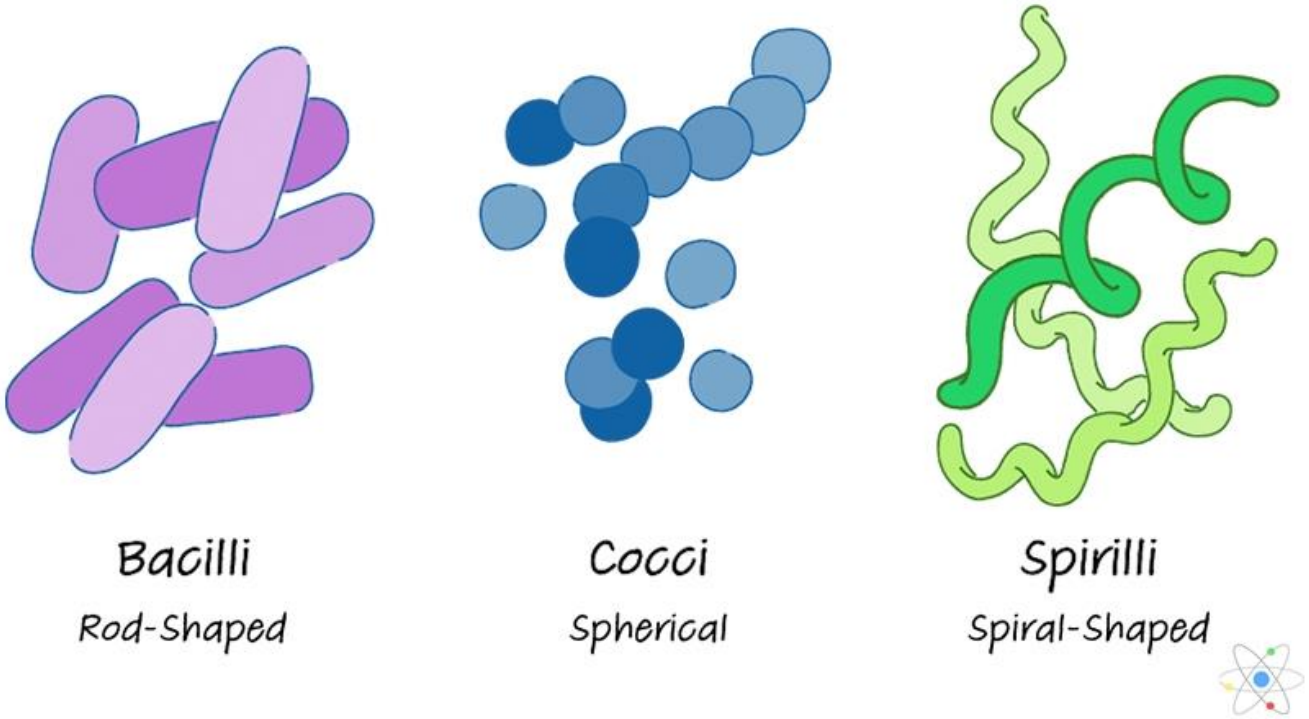
They are found almost everywhere in air, water, soil and in the bodies of most other organisms, including human beings.

They grow and multiply very fast.

One bacterium divides to form two bacteria in 10 to 30 minutes.

Bacteria are found in three different shapes-

- Rod-shaped, called bacilli
- Spherical, called cocci
- Spiral, called spirilla.



2. Algae-

Algae are the simplest plant like organisms that have cell walls and chlorophyll within the cells. Algae can be unicellular or multicellular.

The make their own food by photosynthesis.

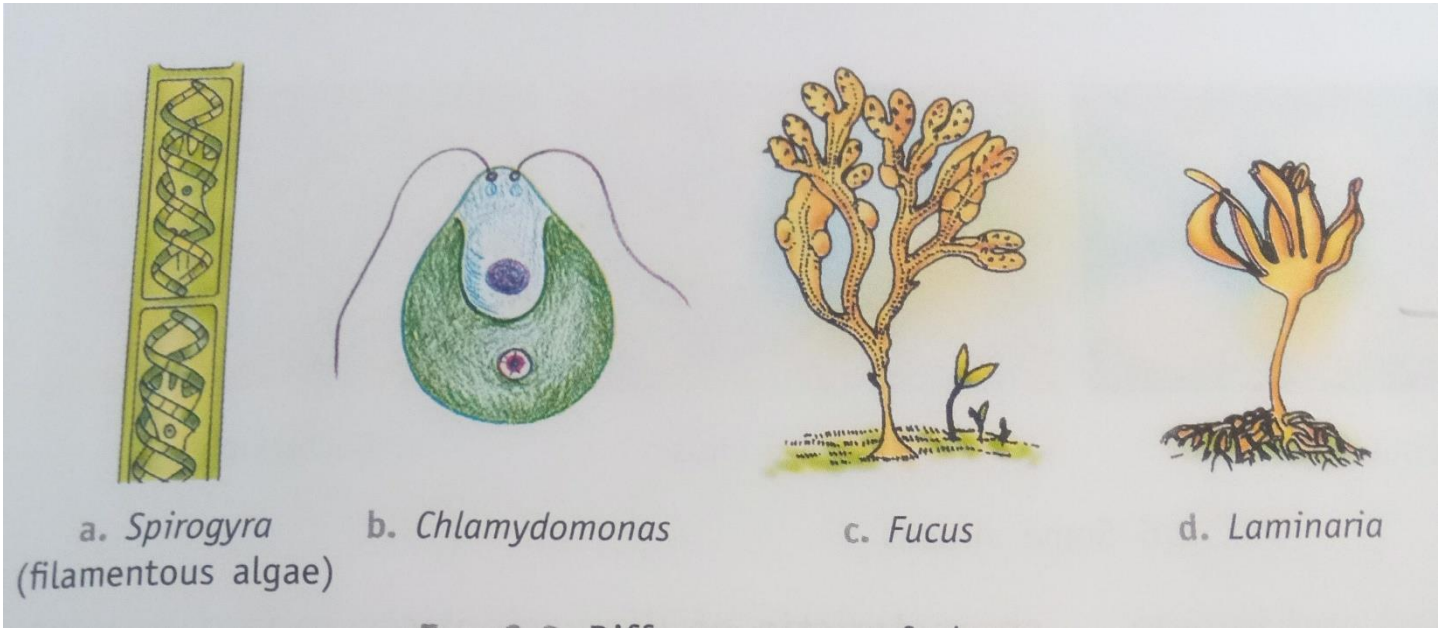
They have no true roots stems or leaves.

Almost all algae live in water in points, lakes and seawater.

Some algae are found in snow and some in hot springs.

They also grow in moist soil, barks of trees and rock surfaces.

The green growth often seen in water and on the surface of wet rocks is algae.



***Video Link-**

https://youtu.be/0TdQeTM0xec

***PPT Link-**

https://www.slideshare.net/mobile/praveenjigajinni/chapter-02-microorganisms-friend-amp-foe

***Assignments-**

1. where are Microbes found?
2. What is cyst?
3. What is microbiology?

DAY-2

Topic- Protozoa, Fungi and Viruses

***Teaching Notes-**

3. Protozoa-

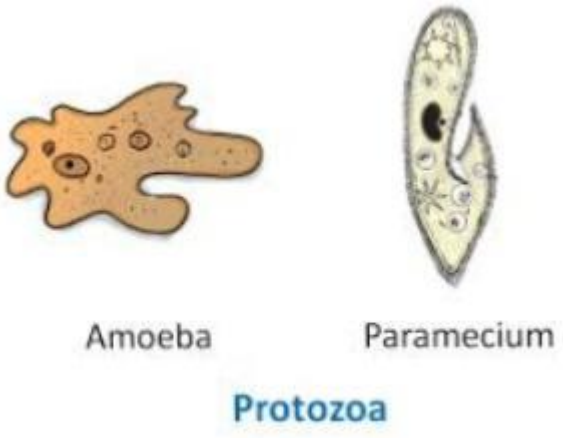
Protozoa unicellular organisms that have animal like characteristic.

That can move from place to place.

The capture and eat food.

Some protozoa live in fresh or saltwater. Others live in soil.

Some are parasites that live in the bodies of other organisms, including human beings.



4. Fungi-

Fungi are plant like organisms that do not contain chlorophyll.

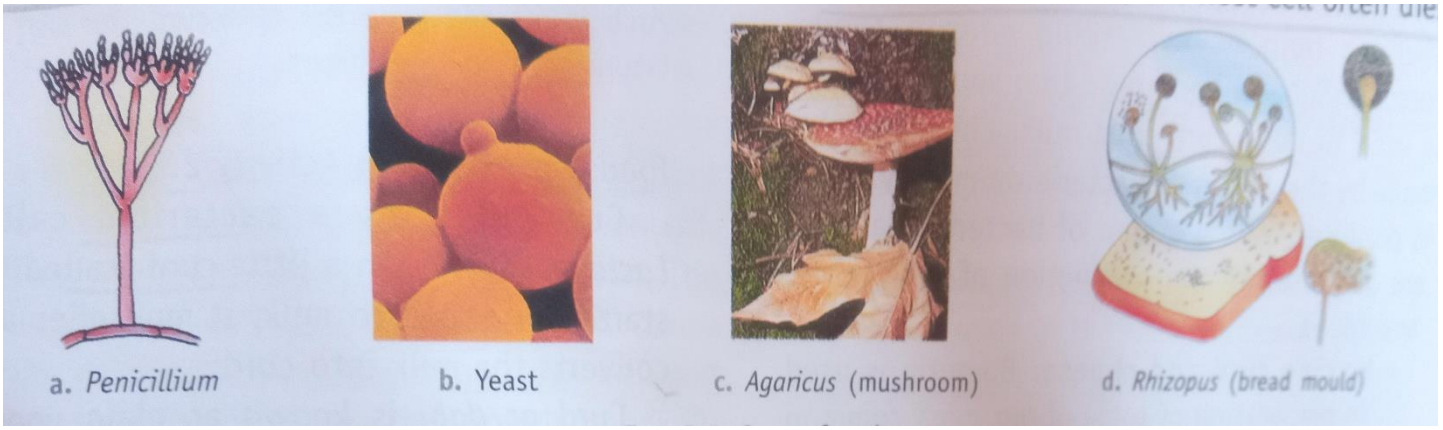
They may be unicellular or multicellular. Yeasts are unicellular where as bread mould is multicellular.

Mushrooms are large multicellular fungi.

Fungi cannot make their own food.

They are parasites or saprophytes.

Saprophytes are organisms that feed on waste and dead plants and animals.



5.Viruses-

Viruses are the smallest microorganisms.

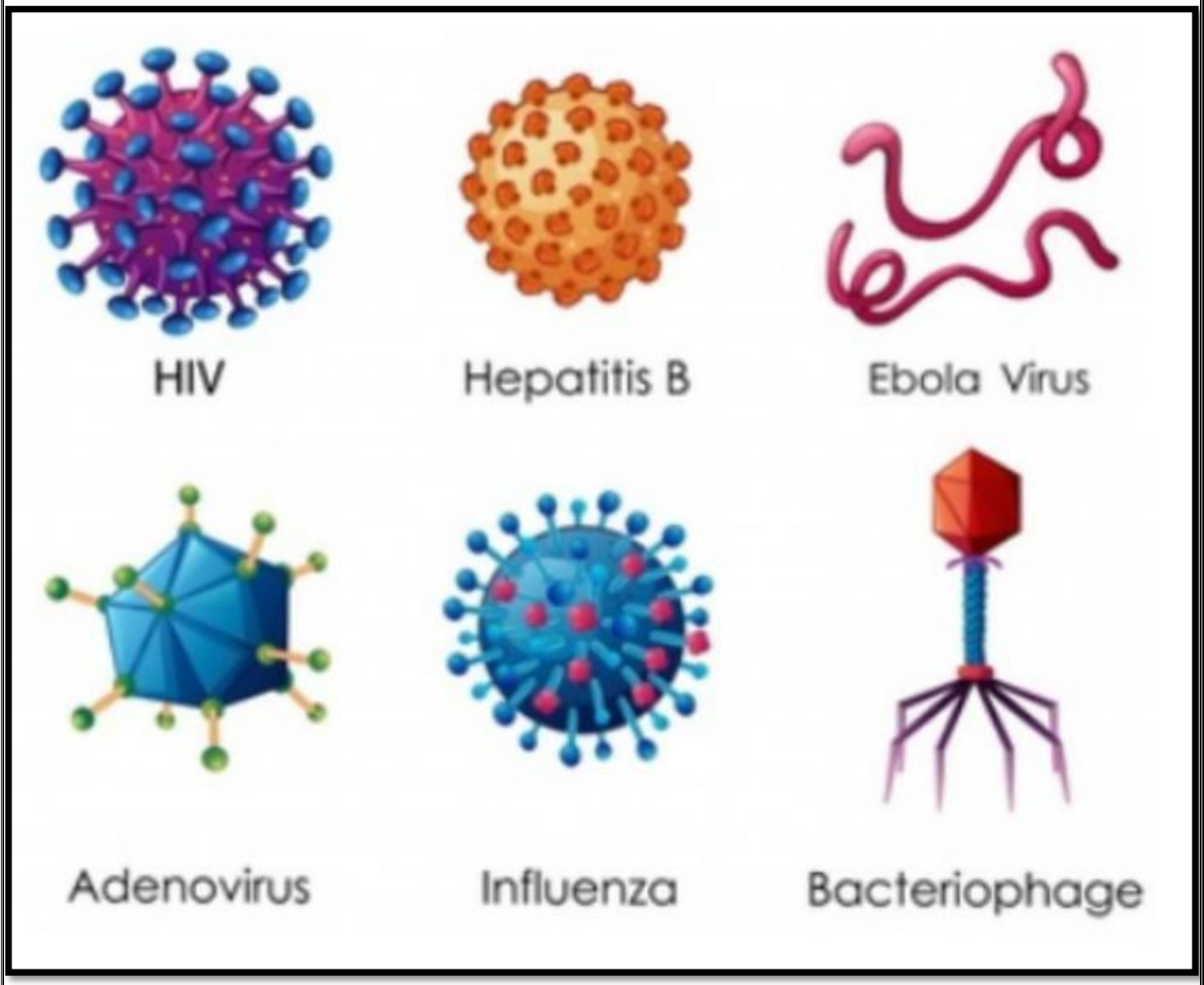
They do not have a cellular structure.

They are so small that they cannot be seen by a light microscope, they can be seen only by electron microscope.

Viruses are non living as they cannot reproduce by themselves, respond to changes or use energy to grow.

When viruses enters the living cell of an organism, it is able to reproduce.

Since reproduction is a very important characteristics of life, scientists regard viruses as a link between living and non- living.



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***Assignments-**

1. What is saprophytes?
2. Name a device used to see viruses.
3. Write two characteristics of protozoa.

DAY-3

Topic- Useful Microorganisms

***Teaching Notes-**

***Useful Microorganisms-**

Microorganisms are useful in the following ways:

- In food and beverage industry
- In making medicines and vaccines
- In agriculture
- In cleaning the environment

1.Food and beverage industry:

Bacteria help us in making certain foods. Lactobacillus is a bacterium that sours milk and is used to makes curd from milk.

- Making curd and cheese- Bacteria is used in preparation of some of our most common foods. Curd contains a bacterium called Lactobacillus. When a little curd is added to milk, it multiplies and converts the milk into curd.
- Making Bread- yeast plays an important role in preparation of food. The yeast uses sugar for food. In the process of breaking down of sugar, alcohol is formed and carbon dioxide is given off. This process is known as **fermentation.**

- Making idli, dosa and dhokla.

Fig: The fluffy texture of bread and dhokla.

- Manufacture of alcohol and alcoholic drinks- The process of fermentation of sugar by yeast is used in the manufacture of alcohol and alcoholic drinks such as beer and wine. One of the main differences between wine and beer production is the source of the sugars. Wine is prepared by fermentation of sugar in grapes and beer by fermentation of sugar in germinating barley.

2.Making medicines and vaccines:

- Bacteria and fungi are used to make medicines called antibiotics.
- The first antibiotic, penicillin was discovered by Alexander Flemming using the fungus penicillium.
- Some common antibiotics are streptomycin and terramycin.
- Microbes are used to make vaccines. Vaccines are weakened or dead germs introduced into the body. They offer protection against diseases like tuberculosis, polio etc. by producing anti- bodies.
- Bacteria and Yeast are used in making vitamin B complex tablets.
- The human hormonal called insulin can also be obtained from bacteria.
- Microorganisms are used to make vaccines, which protect humans and other animals from several diseases such as Cholera, typhoid, tuberculosis, hepatitis, chicken pox, measles, polio and smallpox can be prevented by vaccination. vaccine consist of dead or weekend microbes. When these are swallowed or injected into the body of a patient, the body produces antibodies to fight them. The antibodies remain is the body and protect it from any further attack of the disease germs. The body is then said to have develop immunity against the disease. Vaccination is therefore called immunization.

Fig: A child being vaccinated against polio

3.In Agriculture:

- Some bacteria like Rhizobium, blue green algae like Nostoc, live in the root nodules of plants such as gram, pea etc. These bacteria absorb the nitrogen of the atmosphere and convert it into nitrate which serves as natural fertilizers for plants, hence, enhancing soil fertility.

4.In cleaning the environment:

- Microbes help to keep our environment clean by decomposing dead matter. They decomposed substances are recycled as these get reused from the soil by plants.
- Some bacteria decompose sewage and other waste in water. This is nature's method of keeping the environment free from pollution.

5.Some other uses of microorganisms-

- Certain bacteria and protozoa normally live in the digestive system of some animals, cow, gods and safe. They help the animals digest grass and plants by breaking down cellulose which are the animals themselves cannot do.
- Bacteria and useful in tobacco formal leather and jute industries. Tanning(to make animal skin into leather by treating it with chemicals) is done with the help of bacteria.
- In the village, animal waste, waste from crops is decomposed by bacteria in the absence of oxygen to produce methane, which is used as a fuel. It is one of the chief constituent of biogas.

***Video Link-**

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***Assignments-**

1. What is fermentation?
2. Explain the role of microbes in cleaning environment.
3. What are antibiotics?

DAY-4

Topic- Harmful Microorganisms

***Teaching Notes-**

***Harmful Microorganisms-**

Microorganisms that cause diseases in human, animals and plants are called pathogens or germs.

Germs may enter the body of living organisms through air, contaminated food and water, from an infected person by direct or indirect contact or by a carrier.

1. **Through air-** When a person suffering from common cold or flu sneezes, coughs or spits, germs are released in the air. A healthy person breathing this air can get infected.
2. **Through food and water-** e.g. cholera, typhoid, hepatitis.
3. **Through direct contact** with a sick person e.g. ringworm, common cold, flu, chicken pox.
4. **Through insects** such as mosquitoes, flies and fleas. These are carriers of germs. For example, the female Anopheles mosquito carries the malaria germs. When it bites a healthy person, he / she can get infected with malaria.
5. **Through cuts and wounds,** e.g. tetanus.

Microorganisms also cause diseases in animals and plants. For example-

- Micro organisms also cause diseases in animals and plants. For examples-
- **Anthrax** is a disease caused by bacterium and affects human and cattle.
- A virus causes the dangerous **foot and mouth disease** in cattle.
- **Citrus canker** is a bacterial disease that affects trees of citrus fruits and is spread by air.
- **Rust of wheat** is a viral disease that affects vegetable like bhindi & spread by insects.
- **Malaria** is actually caused by pathogen called plasmodium (protozoa) which is transmitted by female Anopheles mosquito.
- **Dengue** is caused by dengue virus and spread by female Aedes mosquito.

Preventing the spread of Communicable diseases:

Some simple methods of limiting the spread of communicable diseases are:

- To keep the infected person separated from others & to advice his/ her to keep a handkerchief on the nose and mouth while sneezing.
- To keep our environment or surrounding clean.
- Never let garbage collect in the neighborhood.
- Timely vaccination against diseases should also be taken.

- To prevent mosquitoes from breeding we should not allow water to collect anywhere in our neighborhoods.

Food spoilage:

Many bacteria and fungi grow on food items and produce certain toxic substances. This makes the food unfit for consumption. Consuming such food can cause a serious illness called food poisoning**.**

***Video Link-**

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***Assignments-**

1. What is anthrax?
2. What is communicable diseases?

DAY-5

Topic- Food Preservation

***Teaching Notes-**

***Food preservation:**

- Processing of food to prevent their spoilage and to retain their nutritive value for period is called food preservation.
- Food can be preserved using many methods:-
    1. **Heating:** heating food to a high temperature kills microbes. For example: Milk and water are boiled to kill microbes.
    2. **Cooling:** food can be kept in refrigerator at about 5˚C which delays its spoilage.
    3. **Canning:** canning is done to package or preserve food or drink by putting it in sealed, airtight containers.

4. **Chemical preservatives:** such as sodium benzoate and sodium metabisulphite help control microbial growth. Other preservatives that are commonly used are-
    - **Salting:** Fruit and vegetables can be preserved by using salt and then drying. Salts prevent the growth of microbes.
    - **Sweetening:** Excess sugar can also works on the same principle as salting. Jams, jellies & squashes are preserved by this method.
5. **Dry or dehydration:** Dehydration of food remaining water from it. This stops microorganisms from growing as they cannot grow without water.
6. **Pasteurization of milk:** consists of heating it to a high temperature of 70 degree Celsius for about half a minute and then cooling it quickly. This kills most of the bacteria without affecting the flavour. The method was invented by **Louis Pasteur.**

***Video Link-**

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***PPT Link-**

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***Exercise-**

Question 1:

What is a microorganism?

ANSWER:

A microorganism is a tiny organism which can only be seen through a microscope. Example: bacteria, virus, protozoa, algae and fungi.

Question 2:

Name the five groups into which microorganisms are divided. Which of these have only unicellular organisms?

ANSWER:

The five groups into which microorganisms are divided are bacteria, virus, protozoa, algae and fungi.
Bacteria and protozoa have only unicellular organisms.

Question 3:

Name the three types of bacteria shown in this figure.

ANSWER:

The three types of bacteria shown in this figure are:
a) cocci
b) bacilli
c) spirilla

Question 4:

What kind of living organisms are classified as algae? Give two examples.

ANSWER:

Simple plant-like organisms that have cell walls and chlorophyll are classified as algae.

They lack roots, stems or leaves, but are able to make their own food through the process of photosynthesis.
Two examples of algae are Spirogyra and Fucus.

Question 5:

Under what circumstances can viruses reproduce?

ANSWER:

Viruses can reproduce only when they are inside the living cell of an organism. They multiply with the help of resources from the host cell.

Question 6:

Give one important use of algae.

ANSWER:

Algae produce oxygen during photosynthesis that animals and humans use during respiration.

Question 7:

How does cooling help in food preservation?

ANSWER:

Cooling helps in food preservation as microorganisms are not able to grow and reproduce at lower temperatures. Thus, food is preserved and microbial growth is prevented.

Short- answer questions-

Question 1:

Why are viruses considered to be on the borderline of the living and non-living?

ANSWER:

Viruses do not grow or reproduce by themselves, which makes them non-living. However, when a virus enters the living cell of an organism, it makes use of the resources in the host cell and starts reproducing. This makes viruses living, as reproduction is an important characteristic of a living organism. Due to this, viruses are considered to be on the borderline of the living and non-living.

Question 2:

Discuss three important ways in which bacteria are useful to us and two ways in which they are harmful.

ANSWER:

The three important ways in which bacteria are useful to us are:

1) Formation of curd: When a small amount of curd (known as starter) is added to milk, the bacteria known as Lactobacillus, convert the milk into curd.
2) Nitrogen fixation: The bacteria known as Rhizobium live in the root nodules of leguminous plants. These bacteria fix the atmospheric nitrogen and converts it into nitrates that can be used by the plants.
3) Retting of jute: Bacteria help in separating jute fibres from the rest of the tissues of the jute plant. These fibres are used in making various articles.

Two ways in which bacteria are harmful to us are:
1) Diseases: Bacteria cause many diseases in humans like cholera and typhoid.
2) Food spoilage: Bacteria spoil food. Examples: putrefaction of meat and rotting of fruits and vegetables.

Question 3:

Discuss the different ways in which communicable diseases spread from person to person.

ANSWER:

Communicable diseases spread from one person to another through various means. These are:

1) Through air: When a person suffering from cold or flu sneezes or coughs, germs are released that spread through the air.
2) Through contaminated food and water: When houseflies sit on garbage, germs stick to their bodies. When these houseflies sit on uncovered food or water, they contaminate the food or water by transferring the germs.
3) Through mosquitoes: Mosquitoes such as the female Aedes carry germs that cause dengue fever.
4) Through cuts and wounds: Microbes also enter our body through cuts or wounds.
5) Through direct contact: Diseases such as chickenpox can spread through direct contact from an infected person.

Question 4:

Discuss five methods of food preservation.

ANSWER:

The following are the five methods of food preservation:
1) Heating: When food is heated at high temperature, all the microorganisms present in it are destroyed.
2) Pasteurisation: In this method, milk is heated at a high temperature for 30 seconds and then quickly cooled. This process kills the microorganisms present in milk.
3) Cooling: It prevents the growth and reproduction of microorganisms because microorganisms are not able to reproduce at low temperatures.
4) Drying: This process removes water from food. Since, microorganisms need water

for their growth, drying food prevents the growth of microorganisms.

5) Canning: In this method, food is sterilised and then canned in airtight containers. This prevents the growth of microorganisms