CHAHAL COACHING CENTRE –C3

Class 8th Chapter 2 (Microorganisms: Friend and foe)

Microorganisms:

Microorganisms are tiny living organisms that cannot be seen with the naked eye. They are present everywhere in our environment, including the air, water, soil, and even within other living organisms. These microorganisms play a crucial role in various processes, both beneficial and harmful to humans, animals, and the environment.

Types of Microorganisms:

- **Bacteria:** Bacteria are single-celled microorganisms that come in various shapes such as spherical, rod-shaped, and spiral. Some bacteria are beneficial and play essential roles in processes like curd formation and nitrogen fixation in the soil. However, some bacteria are harmful and can cause diseases like tuberculosis, cholera, and strep throat.

- **Fungi:** Fungi are diverse microorganisms that can be single-celled (yeast) or multicellular (mushrooms). They obtain nutrients by absorbing them from their surroundings. Fungi are used in making bread and some types of cheese. However, some fungi can cause diseases like athlete's foot and ringworm.

- **Protozoa:** Protozoa are single-celled microorganisms found in water bodies. They can be free-living or parasitic. Some protozoa are responsible for diseases like malaria, dysentery, and sleeping sickness.

- **Algae:** Algae are simple, photosynthetic microorganisms that can range from microscopic to macroscopic forms. They are found in aquatic environments and are responsible for producing a significant portion of the Earth's oxygen. Algae are also used as food sources, such as seaweed.

- **Viruses**: Viruses are unique entities that are not classified as cells. They consist of genetic material (DNA or RNA) enclosed in a protein coat. Viruses cannot carry out metabolic processes on their own and require a host cell to reproduce. Some viruses cause diseases in humans, animals, and plants, such as the common cold, influenza, and plant mosaic diseases.

Habitat of Microorganisms:

Microorganisms inhabit a wide range of environments. They can be found in extreme conditions, such as hot springs and cold polar regions, as well as in deep-sea hydrothermal vents. Microorganisms also play a crucial role in nutrient cycling and decomposition in various ecosystems.

Friendly Microorganisms:

- **Curd and Bread Making:** Bacteria play a vital role in the fermentation process that converts milk into curd. Similarly, yeast is used in the fermentation of dough to make bread rise.

- **Commercial Use**: Microorganisms are utilized in various industrial processes. For instance, they are employed in the production of alcohol, enzymes (used in detergents and food processing), and antibiotics.

Medical Use of Microorganisms:

- **Antibiotics**: Antibiotics are substances produced by microorganisms (usually bacteria or fungi) that can kill or inhibit the growth of other bacteria. Penicillin, derived from the fungus Penicillium, was the first antibiotic discovered.

- **Vaccines**: Vaccines contain weakened or killed microorganisms (or their parts) that stimulate the immune system to produce antibodies. This helps the body develop immunity to specific diseases, preventing future infections.

- **Antibodies**: Antibodies are proteins produced by the body's immune system in response to the presence of foreign substances (antigens), including microorganisms. They help neutralize pathogens and prevent infections.

Cleaning the Environment:

Microorganisms play a crucial role in the decomposition of organic matter, recycling nutrients back into the ecosystem. They break down dead plants, animals, and waste materials, contributing to the health of ecosystems and soil fertility.

Harmful Microorganisms:

- **Pathogens**: Pathogens are microorganisms that cause diseases. They can infect humans, animals, and plants.

- **Communicable Diseases**: These are diseases that can spread from one individual to another. Examples include the flu, tuberculosis, and COVID-19.

- **Non-Communicable Diseases**: These diseases are not contagious and cannot be transmitted from person to person. Examples include cancer and genetic disorders.

Disease-causing Microorganisms in Animals and Plants:

- **Animals**: Microorganisms can cause diseases in animals, leading to economic losses in agriculture and affecting animal health.

- **Plants**: Microbes can cause diseases in plants, leading to reduced crop yield and quality. Examples include rust, smut, and wilting diseases.

Food Poisoning and Prevention:

Consuming food contaminated with harmful microorganisms can lead to food poisoning, resulting in gastrointestinal symptoms. Proper cooking, refrigeration, and hygiene practices help prevent foodborne illnesses.

Preservatives and Pasteurization:

- **Preservatives**: Chemicals like common salt, sugar, and vinegar are added to food to prevent the growth of spoilage and disease-causing microorganisms.

- **Pasteurisation**: This heat treatment process kills harmful microorganisms in liquids (like milk) while retaining flavour and nutritional value.

Nitrogen Fixation and Nitrogen Cycle:

- Some bacteria in soil convert atmospheric nitrogen into forms that plants can use (nitrogen fixation).
- The nitrogen cycle involves various processes that move nitrogen through the ecosystem, including nitrogen fixation, nitrification, and denitrification.