

*After successful completion of the course, students will be able to :*

- CO 1. Understand the applications of Microbiology in biomedical and industrial fields.
- CO 2. Comprehend the beneficial and harmful interactions of microbes with other organisms.
- CO 3. Use fermentation for production of ethanol, lactic acid and other industrial products.
- CO 4. Gain theoretical knowledge of food microbiology, prevention of air- and food- borne diseases and food poisoning.
- CO 5. Gain the basics of soil microbiology and its allied applications in agriculture.
- CO 6. Know the importance of aquatic microbiology and learn water purification and assessment of drinking water quality.

#### UNIT I (13 hrs)

Microbial Ecology: Microbial symbiosis, mutualism, plant-microbe interactions (e.g. mycorrhizas), animal-microbe interactions (human, ruminants and non-ruminants). Microbes in extreme environments - hydrothermal vents and coral reefs. Microorganisms as bio-indicators. Microbial bioremediation - role in environmental management, advantages and disadvantages. Ecological implications of genetically modified microorganisms.

**Fermentation:** Ethanol, lactic acid, mixed acids, 2-3 butanediol, clostridial and propionic acid fermentation with emphasis on their ecological niches, merits and demerits.

#### UNIT II (13 hrs)

**Food Microbiology:** Classification of foods and oriental foods; Basic principles of food spoilage and methods of food preservation; Milk and milk products, milk microflora and their estimation, milk-borne diseases and prevention; Food poisoning, food-borne diseases and prevention.

**Air Microbiology:** Microflora of air and methods of their estimation, monitoring air allergens, air-borne diseases and prevention.

#### UNIT III (13 hrs)

**Soil Microbiology:** Soil microflora and methods of their estimation, role of soil microorganisms, bioconversion and decomposition. Biological nitrogen fixation (symbiotic and non-symbiotic), microbial phosphorus solubilization and their importance in soil fertility and agriculture.

**Aquatic Microbiology:** Microbes in water and wastewater and methods of their estimation (e.g. MPN), drinking water microbial standards and water purification; Water-borne diseases and prevention.