

**Semester - IV**  
**Course MI-205**  
**Food and Dairy Microbiology**

**Unit I. Microbes in Food Infection and Poisoning**

1. Food as a substrate for microorganisms (1 hr)
2. Microbial flora of foods: Milk, fruits, vegetables, meat, eggs (2 hr)
3. Factors affecting kinds and numbers of microorganisms, intrinsic and extrinsic factors (2 hr)
4. Food and milk borne infections (2 hr)
  - A. Sources of contamination
  - B. Major food and milk borne diseases
5. Food poisoning (3 hr)
  - A. Microorganisms involved, sources of contamination
  - B. Role of *Staphylococcus aureus*, *Clostridium botulinum* and *Salmonella* spp
  - C. Molds as poisoning agents

**Unit II. Microbial Food Spoilage and Preservation**

1. Microbial Spoilage of food (4 hr)
  - A. Causes of spoilage
  - B. Biochemical changes caused by microbes
  - C. Spoilage of milk and milk products, fruits, vegetables, eggs, meat
  - D. Spoilage of canned foods
2. Preservation of food and Milk (6 hr)
  - A. General principles
  - B. Methods of preservation
    - i. Use of aseptic handling
    - ii. High temperature: Pasteurization, sterilization, canning
    - iii. Low temperature: Refrigeration and freezing
    - iv. Dehydration
    - v. Osmotic pressure
    - vi. Preservatives
    - vii. Radiations: Ionizing and non ionizing radiation

- Unit III. Microbes as Food and Food Products**
1. Fermented dairy products (5 hr)
    - A. Starter culture
    - B. Cheese: Types, curdling, processing, ripening
    - C. Other fermented dairy products- Yogurt, cultured buttermilk, acidophilus milk, Kefir and cultured sour milk
    - D. Introduction to probiotics, prebiotics and synbiotics
  2. Indian fermented food products: Pickles, idli, Khaman and bread (2 hr)
  4. Microbes as food: Mushrooms, spirulina and yeasts (3 hr)

**Unit IV. Methods in Food Microbiology**

1. Biological methods: Generalized scheme for microbiological examination (5 hr)
  - A. Direct microscopic examination, colony forming units (CFU),
  - B. Most probable number (MPN),
  - C. Identification of specific group or species of microorganisms
2. Bacteriological analysis of milk (3 hr)
  - A. Grading of milk: Resazurin test
  - B. Determination of efficiency of pasteurization: Phosphatase test
  - C. Determination of MPN
  - D. Acid-fast staining
3. Microbiological criteria of food safety (2 hr)

**Text Books:**

1. Pelczar Jr, M J, Chan E C S, Krieg N R, (1986), *Microbiology: An Application Based Approach*, 5th edn. McGraw-Hill Book Company, NY
2. Frazier W C and Westhoff D C (1988), *Food Microbiology*, 4th edn. McGraw-Hill Book Company, NY.
3. Prescott L, Harley J P, and Klein D A, (2008), *Microbiology*, 7th edn. Wm C. Brown - McGraw Hill, Dubuque, IA.

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