

SRI VENKATESWARA UNIVERSITY: TIRUPATI
B.Sc. Honours in FOOD SCIENCE & TECHNOLOGY (MINOR)
SEMESTER-III
W. E. F. 2024-25
COURSE 5: FOOD MICROBIOLOGY

Theory _____ Credits: 3 _____ 3 hrs/week

LEARNING OBJECTIVES

To introduce the fundamental concepts of microbiology.

LEARNING OUTCOMES

Upon successful completion of the course, a student will be able to:

LO1: To understand about scope of microbiology & classification of micro organisms & sterilization methods.

LO2: To study about the prokaryotic cells like bacteria, yeast, molds & viruses which are associated with food.

LO3: To learn about physical & chemical factors affecting growth of micro organisms.

LO4: To understand about metabolism & growth of micro organisms.

LO5: To study bacterial genetics & mutation.

UNIT – I

Historical aspects, Scope of microbiology, General classification of microorganisms, morphology, Structure and function of prokaryotic cells and their organelles – Structure and function of eukaryotic cells and their organelles morphological and biochemical characteristics of important groups. Brief survey of microbes as friends and foes. Characteristics, growth and reproduction, Sterilization and disinfections.

UNIT – II

Characteristics of growth and reproduction. Physical and chemical factors affecting growth of microorganisms like temperature, pH, oxygen, Osmotic pressure, nutrients etc, bacteriostatic and bactericidal. Physiology, Nutritional requirement of bacteria, yeast and fungi, bacterial growth curve. Structure of DNA, Types of RNA and difference between DNA & RNA.

UNIT – III

Microorganisms associated with foods, Sources of microorganisms – Soil, water, plants and of animal origin. Useful microorganisms –Endospore formers, Irregular non-sporing gram positive rods. Yeasts & molds their role in food spoilage, Estimating number of microorganisms, sampling, sample size. Aseptic collection of samples, total cell counts and viable cell counts, plate counters. Indicator organisms. Alternative and Rapid methods for detection of specific microbes and toxins : Dye-reduction tests, Electrical methods, ATP determination –Pure cultures-preparation, maintenance and preservation –Microbiological quality control and HACCP

UNIT – IV

Microbiology of Food commodities, Contamination, preservation and spoilage & beneficial role of microorganisms in Cereals, Pulses, Nuts and Oilseeds, Fruits and Fruit products ,Vegetables and Vegetable products Meat , dairy and their products.

Microbiology of water- Contamination and microbial standards.

Food Borne Illnesses Food poisoning, Food borne infections, Food borne Intoxications (*Aeromonashydrophila*, *Bacillus cereus*, *Brucella*, *Camphylobacter*, *Clostridium botulinum*, *Clostridium perfringenes*, *Escherichia coli*, *Salmonella*, *Staphylococcus aureus*, *vibrio*, *yersinia*, *Listeria*) Hepatitis A and B Gastroenteritis viruses.

Spongiform encephalopathy - occurrence, symptoms, Preventive and control measures

UNIT – V

Food preservation Heat processing: Pasteurization and appertization, Determination of D and z values. Heat sensitivity of micro-organisms & Spoilage of canned foods. Aseptic packaging, Irradiation Brief account of microwave, UV and ionizing radiation. Brief account of High pressure processing Low temperature storage –Chilling and freezing. Effect of chemical and natural preservatives on microbes in food.

REFERENCES:

1. General microbiology – Pelzar
2. Food Microbiology – Frazier
3. Molecular biology of the Cell – Bruce Alberts
4. Cell and molecular biology – De Roberties&De Roberties
5. W.C.Frazier: *Food Microbiology (IV edition)*Mcgraw Hill Book Company, New York (1995)
6. James M jay: *Modern food microbiology IV edition*, CBS publishers, New Delhi (1996)
7. M.R. Adams and M.O. Moss, *Food Microbiology*, Second Edition, Panima Publishing corporation, New Delhi. Third reprint 2004.
8. Gustavo F Gutierrez-Lopez, Gustavo V Barbosa-Canovas *Food Science and Food Biotechnology:* CRCPress 2003
9. Bibek Ray: *Fundamental Food Microbiology*, (Third Edition) CRC Press December 2003

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SEMESTER-III

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COURSE 5: FOOD MICROBIOLOGY

Practical	Credits: 1	2 hrs/week
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1. Identification of microbes by Simple staining
2. Identification of microbes by Gram staining
3. Microbial mobility test (hanging drop method)
4. Determination of size of microbes (micrometry)
5. Direct microscopic count (DMC) of microorganisms
6. Identification of common microorganisms.
7. Identification of fungi in bread, pickles, jam, groundnut etc.
8. Microbiological examination of fresh fruits, vegetables and spices.
9. Microbiological examination of canned foods (acidic and non-acidic foods)
10. Microbiological examination of bottled and aseptically packed beverages a. water
(MPN method for determination of coliform count)
11. Microbiological examination of flour, bread, cakes, sugar and
cocoa confectionery products
12. Microbiological examination of meat, milk and their products
13. Visit to food microbiology lab.