II Year B.Tech. Food Tech. I-Semester	L	T	P	To	C
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FT203 FOOD MICROBIOLOGY

Course Description & Objectives:

This course will impart basic knowledge about micro-organisms associated with foods

By the end of the course, the students will be able to gain knowledge on the sources, contamination and spoilage of micro-organisms, the preservation of food for future use.

Course Outcomes:

1. *Identify the important pathogens and spoilage microorganisms in foods and the conditions under which they will grow.*
2. *Identify the conditions under which the important pathogens are commonly inactivated, killed or made harmless in foods.*
3. *Utilize laboratory techniques to identify microorganisms in food.*
4. *Know the principles involving food preservation via fermentation processes.*

UNIT I - Microorganism and Food Spoilage

Microbial spoilage of foods. Cause of spoilage classification of foods by ease of spoilage. Factors affecting kinds and numbers of microorganisms in food. Factors affecting growth and survival of microorganismsinfoods. Intrinsic factors – Nutrient content, pH, buffering capacity, redo potential (En), Inhibitory substances andbiological structures (Antimicrobial barriers and constituents) water activity. Extrinsic factors – Relative Humidity, Temperature, and Gaseous Atmosphere. Chemical changes caused by microorganisms - changes in nitrogenous organic compounds, non-nitrogenous organic compounds, organic acids, other compounds, Lipids, Pectic substances. Contamination of Foods. Sources of contamination. Green plants and Fruits, Animals, Sewage, Soil, Water, Air.

UNIT II - Classification of Micro-Organism

Microorganismsimportance in Food Microbiology. Moulds - General characteristic of moulds, classificationand identification of moulds. Yeasts and Yeast like fungi - General characteristics of yeasts, classification andidentification of yeasts, yeasts of industrial importance. Bacteria - Morphological characteristics important inFood Bacteriology. Cultural and Physiological characteristics important in food bacteriology. Genera of bacteria important in Food Bacteriology groups of bacteria important in food bacteriology. Principles of FoodPreservation. Methods of Food preservation, application in food preservation. Asepsis, removal of Microorganisms. Maintenance of Anaerobic conditions.

UNIT III - Methods of Food Preservation

Food Preservation by use of high temperature. Factors affecting heat resistance (Thermal death time). Heat resistance of Microorganisms and their spores. Determination of heat resistance. Heat penetration - Pasteurization, Heating at about 100 C. Heating above 100 C, canning.Preservation by use of low temperatures. Growthmicroorganisms at low temperatures. Common or Cellar storage. Chilling or cold storage. Freezing or Frozenstorage. Sharp Freezing and quick freezing. Changes during freezing, storage and thawing. Preservation bydrying, methods of drying. Intermediate moisture foods. Preservation by food additives - The ideal antimicrobial preservatives.Organic acids and their salts, nitrites and nitrates, sulfur dioxide and sulfites. Ethylene and propylene oxide,sugar and salt. Preservation by Food Additives - Alcohol, formaldehyde, wood smoke, spices and othercondiments and other additives. Other groupings of chemical agents, antibiotics, developed preservatives. FoodPreservation by Radiation - U.V. Radiation, ionizing radiations, definition of terms, xrays, gamma rays andcathode rays, Microwave processing. High pressure processing, pascalization

UNIT IV - Microbial spoilage and preservation of milk and milk Products

Microbiology of milk and milk products. Contamination, preservation, pasteurization and ultra pasteurization,vat pasteurization. Vacreation, use of low temperatures, freezing, drying etc. Spoilage of milk and cream, gasproduction proteolysis, ropiness, changes in milk fat. Alkali production. Flavours changes & colour changes. Spoilage of milk at different

temperatures. Condensed and dry milk products. Flavour defects, colour defects.Microbiology of fruits and vegetables, contamination, preservation of vegetables, asepsis, chilling, freezing,drying, preservatives, CA storage, MA storage. Spoilage of fruits and vegetables. Microbiology of cereal andcereal products contamination, preservation and spoilage of flours. Microbiology of cereal and cereal products.Spoilage-Bread, Mold, Rope, Red bread, Chaky Bread.

UNIT V- Spoilage and preservation of Meat

Microbiology of Meat and Meat Products. Contamination, preservation. Spoilage of meat and meat products. Invasion of tissues by microorganisms and growth of microorganisms in meat General types of spoilage of meats. Spoilage under anaerobic conditions, spoilage of different kinds of meats. Contamination, preservation, spoilage. Factors influencing kind and rate of spoilage, evidences of spoilage, bacteria causing spoilage. Microbiology of eggs. Contamination, preservation, spoilage. Changes during storage. Changes not caused by microorganisms and changes caused bymicroorganisms. Microbiology of canned foods. Causes of spoilage, appearance of the unopened container, types of biologicalspoilage of canned foods. Flat sour spoilage, TA spoilage, sulphide spoilage. Types of spoilage of canned foodsby bacteria, yeasts, molds. Spoilage of canned meat.

TEXTBOOKS:

1. Food Microbiology, TMH, New Delhi *by* W C Frazier & D C Westhoff
2. Modern Food Microbiology, CBS Publication, New Delhi *by* J M Jay

REFERENCE BOOKS:

1. G.L. Ganwart (1987), *Basic Food Microbiology,* AVI Publishing Co. Inc., USA. Frazier and WesUobb.
2. Adam M R and Moss M.O., *Food Microbiology,* New Age International (P) Ltd., Publishers, NewDelhi.
3. Frazer, Math and Deibel, *Laboratory Manual for Food Microbiology*, Burgers Publishers –Minnesota, USA.
4. CarlvanDerzant and Splittsoessev, *Methods for Microbial Examination of Foods*, APHAPublishers, Washington DC, USA.