

Semester	4
Course	Major
Paper Code	C2MB230422T/C2MB230422P
Paper Title	Food and Dairy Microbiology
No. of Credits	4
Theory / Practical / Composite	Composite
Minimum No. of preparatory hours per week a student has to devote	4 hours/week
Number of Modules	No modules
Syllabus	<p>Unit 1: Food as a substrate for microorganisms Intrinsic and extrinsic factors that affect growth and survival of microbes in foods, natural flora and source of contamination of foods in general.</p> <p>Unit 2: Microbial spoilage of various foods Principles, Spoilages of vegetables, fruits, meat, fish, eggs and milk.</p> <p>Unit 3: Food preservation & analysis Principles of food preservation. Physical methods of food preservation: High temperature (Pasteurization, Appertization), Low temperature, Drying, Irradiation, Hydrostatic pressure, microwave processing and packaging. Chemical methods of food preservation: Organic acids and their salts, sulfites, nitrates and nitrites, ethylene oxide, salts and sugars, antibiotics and bacteriocins. MBRT, SPC, Alkaline Phosphatase test.</p> <p>Unit 4: Fermented foods Fermented foods: Definition and types, Dairy starter cultures, fermented dairy products: yogurt and dahi, kefir and koumiss, cheese. Fermented foods: Soy sauce, sauerkraut. Probiotics (Types of microorganisms, health benefits, probiotic foods in the market).</p> <p>Unit 5: Food borne diseases Food infections: <i>Bacillus cereus</i>, <i>Escherichia coli</i>, Salmonellosis, Shigellosis, <i>Vibrio parahaemolyticus</i>, Food intoxications: <i>Staphylococcus aureus</i>, <i>Clostridium botulinum</i> and mycotoxins (Causative agents, symptoms, foods involved and preventive measures of each).</p> <p>Unit 6: Quality control of food HACCP and FSSAI</p> <p>Unit 7: Culture based and rapid detection methods of food borne pathogens in foods.</p>

	<p>Nucleic-acid-based methods, immunological methods, and biosensor-based methods. AI based predictive microbiology a via machine learning for food preservation.</p> <p>PRACTICAL</p> <ol style="list-style-type: none"> 1. Isolation of any food borne bacteria from food products. 2. Isolation of spoilage microorganisms from spoiled vegetables/fruits. 3. Isolation of spoilage microorganisms from bread. 4. MBRT of milk samples and their standard plate count. 5. Alkaline phosphatase test to check the efficiency of pasteurization of milk. 6. Detection of adulteration in food. 7. Estimation of ascorbic acid in food samples. 8. Detection of food borne pathogens/microbial contamination by ELISA technique.
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<p>Learning Outcomes</p>	<ul style="list-style-type: none"> • To learn how our food may become food for microbes. • To know about microbial spoilages, preservation and analysis of food and milk. • To learn about different fermented foods • To study about food borne diseases. • To know about food safety and regulations and predictions based on AI
<p>Reading/Reference Lists</p>	<ol style="list-style-type: none"> 1. Adams MR and Moss MO. (1995). Food Microbiology. 4th edition, New Age International (P) Limited Publishers, New Delhi, India. 2. Banwart JM. (1987). Basic Food Microbiology. 1st edition. CBS Publishers and Distributors, Delhi, India. 3. Davidson PM and Brannen AL. (1993). Antimicrobials in Foods. Marcel Dekker, New York. 4. Dillion VM and Board RG. (1996). Natural Antimicrobial Systems and Food Preservation. CAB International, Wallingford, Oxon. 5. Frazier WC and Westhoff DC. (1992). Food Microbiology. 3rd edition. Tata McGraw-Hill Publishing Company Ltd, New Delhi, India. 6. Gould GW. (1995). New Methods of Food Preservation. Blackie Academic and Professional, London. 7. Jay JM, Loessner MJ and Golden DA. (2005). Modern Food Microbiology. 7th edition, CBS Publishers and Distributors, Delhi, India.

	<p>8. Lund BM, Baird Parker AC, and Gould GW. (2000). The Microbiological Safety and Quality of Foods. Vol. 1-2, ASPEN Publication, Gaithersberg, MD.</p> <p>9. Tortora GJ, Funke BR, and Case CL. (2008). Microbiology: An Introduction. 9th edition. Pearson Education.</p>	
Evaluation	<p>Theory 60 (45+15) CIA-10+3+2</p>	<p>Practical 40 CA (38+2)</p>
Paper Structure for Theory Semester Exam	<p>Full Marks: 45</p> <p>Short questions: 5 (each 1 mark) from 7 (5x1=5)</p> <p>Long questions: 4 (each 10 marks) from 6 (4x10=40)</p>	