

DEPARTMENT OF MICROBIOLOGY

Semester	IV
Course	2
Paper Code	MBOE4
Paper Title	Microbes and the food industry
Number of teaching hours per week	03
Total number of teaching hours per semester	42
Number of credits	03

Learning outcomes:

Microbes are those tiny living organisms which are invisible to human eyes without microscopes. Their roles in our lives expand from curd on our dinner plate to years of pandemic. As omnipresent as they are, microbes play a vital role in many major global industries like pharmaceutical, cosmetics, agriculture, waste management, and food. Unlike other industries where microbes gained recent attention, food industry has been benefiting from its understanding of microbes over ages.

This elective emphasizes the need of all of us to better understand the presence and utility of microbes in our diet and exploit the knowledge to our benefit. This elective will also create awareness about the negative impacts of microbes in food spoilage and our health. With today's dynamically changing world, this understanding is crucial for each and everyone.

UNIT – I	10
Introduction to microbes – size, types, and distribution	4
History of microbes in food sector – anecdotal story of eureka moment (Pasteurization; Germ theory of fermentation)	3
Traditional food preparations that used microbes – pickles, idli batter, fermented dough	3

UNIT-II	8
Current development in food industry	
Microbes in breweries – wine and beer	3
Microbes in dairy industry – yoghurt, curd, cheese	3
Role of yeast in baking industry – bread, cakes	2
UNIT-III	9
Gut - microbe interaction	
Role of microbes in maintaining healthy gut, mind-gut connection, harmful effects due to imbalance in gut microflora	6
Replenishing gut microflora - Probiotics for healthy gut, fecal microbiota transplantation (FMT)	3
UNIT - IV	9
Food spoilage and preservation	
Food spoilage due to microbes – bread mold, souring of milk, fruits, and vegetables, under cooked food.	3
Harmful effects of eating spoiled food – food borne illness	3
Methods of food preservation – traditional vs modern	3
UNIT - V	6
Advancements in food industry	
Single cell proteins – spirulina	1
Genetically Modified food – Ethics and challenges	2
Food Vaccines	1
Innovative foods and Fortification	2

REFERENCES:

1	Prajapati, J. B. (1995). Fundamentals of dairy microbiology. <i>Akta Prakashal Nadiad, Gujarat, India</i> , 4-45.
2	Frazier, W. C., & Westhoff, D. C. (1998). Food microbiology 4th ed. <i>International Edition McGraw Hill, Singapore</i> , 440-441.
3	Casida, Lester Earl (1968). <i>Industrial Microbiology</i> , Wiley Eastern Ltd., New Delhi.
4	Watson, R. R., & Preedy, V. R. (2015). <i>Genetically modified organisms in food: Production, safety, regulation and public health</i> . Academic Press.
5	Mayer, E. A., & Burns, T. (2016). <i>The mind-gut connection: How the hidden conversation within our bodies impacts our mood, our choices, and our overall health</i> . Blackstone Audio.
6	Power Unseen: How microbes rule the world. Bernard Dixon

BLUEPRINT:**Code number: MBOE4****Title of the Paper: Microbes and the food industry**

Chapter number	Number of Hrs	Total marks for which the questions are to be asked (including bonus questions)
Unit I	10	21
Unit II	8	17
Unit III	9	19
Unit IV	9	19
Unit V	6	12
	42	88
Maximum marks for the paper (Excluding bonus question) = 60		