

Course: MICROBIOLOGY PG

Semester	2
Paper Number	MMCB4213
Paper Title	FOOD & INDUSTRIAL MICROBIOLOGY
No of credits	6
Non composite/composite	Composite
No. of periods assigned	6
Course description/objective	<ul style="list-style-type: none"> • To know the microorganisms in food spoilage and food preservation • To know the industrial process of fermentation technology • To know the isolation and characterization techniques of industrially important microorganisms and their applications
Reference List	<p>Prescott and Dunn (2005) Industrial Microbiology. CBS Publishers. M. O. Moss and M. R. Adams (1995). Food Microbiology William C. Frazier, Dennis C. Westhoff . Food Microbiology, 5th Edition Paperback 2017 Gary Higton, Michael J. Waites, John S. Rockey, Neil L. Morgan Industrial Microbiology: An introduction.</p>
Evaluation	<p>Theory: 70 (60 End sem + 10 CIA) Practical: 30 (10 End sem + 20 CIA) Question Paper format: theory end semester Module 1: 30 marks SHORT QUESTION: FROM 7 QTNS ANSWER 5 (EACH 2 MARKS) = 5X2=10 LONG QUESTION: FROM 6 QTNS ANSWER 4 (EACH 5 MARKS)= 4X5=20 Module 2: 30 marks SHORT QUESTION: FROM 7 QTNS ANSWER 5 (EACH 2 MARKS) = 5X2=10 LONG QUESTION: FROM 6 QTNS ANSWER 4 (EACH 5 MARKS)= 4X5=20 Viva: End sem 10 marks</p>

FOOD & INDUSTRIAL MICROBIOLOGY

THEORY 70MARKS

❖ **Module 1: Food Microbiology(35 MARKS)**

Microorganisms important in food microbiology: molds, yeast and bacteria –general characteristics, classification and importance. Factors influencing microbial growth in food: Extrinsic and intrinsic factors. Sources of microorganisms in milk and types of microorganisms in milk. Microbiological examination of milk (standard plate count, direct microscopic count, reductase, and phosphatase test).

Microorganisms as source of food: Single Cell Protein (SCP), fermented milks, fermented vegetables, fermented meat and fish.

Microbiological examination of food: Sample collection, preparation and analysis techniques- cultural and non cultural techniques, Rapid methods of detection and Laboratory Accreditation.

Microbiology of Food Preservation – Heat processing, high pressure processing, irradiation, low temp. storage, chemical preservatives control of water activity.

Bacterial agents of food borne illness – Food infection and intoxication by bacteria

Non- bacterial agents of food borne illness – protozoa, Helminths and nematodes, Toxigenic algae and fungi, Mycotoxins, food borne viruses.

the microbiological quality of food – Control at source, HACCP system, quality systems like ISO 9000 series. (DD+MM)

❖ **Module 2: Industrial microbiology(35MARKS)**

Industrial important strains of bacteria, fungi and actinomycetes. Novel microbes for future industry. Isolation and screening of the industrially important strain from diverse ecosystem. Method of strain improvement.

Fermentation technology : Principles of fermentation, Idea of fermentation, metabolism, cell growth and regulation. Fermenters and bioreactors:

Fermenter and bioreactors & monitoring and control of parameters.

Different fermentative systems: Batch & continuous fermentation, submerged, surface & solid state fermenters.

Fermentation Raw materials .

Downstream processing.

Concepts of immobilized enzymes & cell. (DD)

Industrial production of Solvent – Glycerol, Acetone, Butanol. Microbial production of interferons, insulin, flavours and fragrances. Microbial production of polymers;

Dextran and Xanthan. Microbial transformation – steroid biotransformation. (MM)

Industrial ethanol production, wine making. (DD)

Production of antiviral nucleoside, amino acid, lipids and fatty acids, amino acid. (AKM)

Probiotics: Definition and Properties

PRACTICAL:30 MARKS

Industrial microbiology (MM+DD)

1. Isolation of amylase producing microorganisms from Soil
2. Isolation of cellulase and pectinase producing microorganisms from vegetable and fruit waste.
3. Isolation of lipase producing microorganisms from butter.
4. To isolate antibiotic producing microorganisms from soil
5. To isolate *Penicillium* species producing penicillin.
6. Wine making
7. Characterization of certain microbial contaminants in fruits and vegetables (AKM)

Food Microbiology Practicals (MM+DD)

1. Detection of adulterants in spices, pulses, sugar, tea.
2. Determination of quality of milk sample by methylene blue reductase test. Alkaline phosphatase test
3. Detection of number of bacteria in milk by SPC.
4. Detection of adulterants in milk and milk products
5. Isolation of microorganisms from spoiled food.
6. To demonstrate role of yeast in bread-making.
7. Contaminating microbes in food and their control

Reference:

Prescott and Dunn (2005) Industrial Microbiology. CBS Publishers.

M. O. Moss and M. R. Adams (1995). Food Microbiology

William C. Frazier, Dennis C. Westhoff. Food Microbiology, 5th Edition Paperback 2017

Gary Higton, Michael J. Waites, John S. Rockey, Neil L. Morgan Industrial Microbiology: An introduction. Peter F. Stanbury, Allan Whitaker 1984.

Principles of Fermentation Technology.

Gerald Reed. Prescott and Dunn's Industrial Microbiology