FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: **Bachelor of Technology (Food Processing Technology)**

Semester: **IV**

Course Code: **202070401**

Course Title: **Food & Industrial Microbiology**

Course Group: **Professional Core Course**

Course Objectives: To develop insight in pivotal role of microorganisms in food and industrial microbiology, including preservation of industrial microorganisms, microbial spoilage of foods and its prevention, production of microbial metabolites of industrial use.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
3	0	2	4	50/18	50/17	25/9	25/9	150/53

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Role of microorganisms in spoilage of vegetables and fruit juices: Microbiology of Fruits and Vegetables, Fruit juices, Beverages and Carbonated drinks: Sources, incidence and types of microbes, microbial spoilage and methods of control	05
2	Role of microorganisms in spoilage of dairy products: Microbiology of Milk and Milk Products: Normal and abnormal flora of milk, sources of contamination, pasteurization of milk and defects in milk and milk products.	04
3	Role of microorganisms in spoilage of canned foods: Microbiology of Canned Foods Causes of spoilage, types of aerobic and anaerobic microbial spoilage.	04
4	Antimicrobial mechanism of antibiotics and Biocides	04
5	Prevention of microbial food spoilage by chemicals and radiation: Food Preservation by use of Chemicals and Radiation: Types of chemical preservatives, mode of action and industrial applications.	04
6	Prevention of microbial food spoilage by use of high and low temperature: Food Preservation by use of Low Temperature, High temperature and Drying: Types of low temperature preservation	04
7	Food Borne Diseases and Food Poisoning: Food borne pathogens, Food infections and Food Intoxications. Mechanism of toxin (endotoxin and AB type) action	05

8	Isolation and Screening of microorganisms and cultivation at industrial scale: Isolation techniques, screening methods for industrial applications (Exopolysaccharide, amylase and beta-galactosidase). Structure of fermenter.	**04**
9	Recovery and purification of microbial metabolite: Procedure and techniques for recovery and purification of fermentation products based on their size, polarity, solubility, and binding. 1-D and 2-D electrophoresis.	**06**
10	Metabolite and biomass production: Production details of Ethyl Alcohol, Citric acid, Single Cell Protein, glutamic acid	**05**
	Total	**45**

List of Practicals / Tutorials:

1	To determine quality of milk by methylene blue reduction test
2	Microbiological examination of foods
3	Preparation of Sauerkraut
4	Sterilization of microbial growth media using different methods
5	To identify the fungal contamination in given food sample
6	To study the sugar utilization patterns by microorganisms
7	To determine starch hydrolytic activity of microorganisms
8	To determine β-galactosidase activity of microorganisms
9	To determine thermal death point of microorganisms
10	To determine thermal death time of microorganisms

Reference Books:

1	Modern Food Microbiology, James M. Jay, CBS Publishers & Distributors, Delhi.
2	Food Microbiology, W C Frazier and D C Westhoff, McGraw Hill Book Company, NY.
3	Industrial Microbiology, S C Prescott and C G Dunn, McGraw Hill Book Co.
4	Industrial Microbiology, A H Patel Mac Millan Press

Supplementary learning Materials:	
1	http://highered.mcgraw-hill.com/sites/0072556781/student_view0/chapter12/animation_quiz_4.html
2	http://bio-alive.com/animations/biology.htm
3	http://users.ugent.be/~avierstr/principles/pcrani.html
4	http://www.bluffton.edu/courses/TLC/MontelA/Montel/Alternative_Energy_Website/biomass.htm

Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Interactive methods
- Industrial/ Field visits
- Course Projects

Internal Evaluation:
The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. where individual component weightage should not exceed 20%.

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
20%	30%	20%	15%	15%	0%	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understand the role of microorganisms in reducing shelf life of foods	**15**
CO-2	Understand and optimize the storage and processing treatment of foods to reduce the microbial load	**20**
CO-3	Mechanism and types of foodborne diseases	**15**
CO-4	Isolate and screen microorganism with potential to produce particular metabolite	**15**
CO-5	Enhance the efficiency of microorganisms to produce particular metabolite and produce the same at largescale.	**15**
CO-5	Processes involved in production of microbial metabolite	**20**

Curriculum Revision:	
Version:	2
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	
Next Review on (Month-Year):	June-2025