CHAUDHARY RANBIR SINGH UNIVERSITY, JIND

Undergraduate Programs

Course: CC-M3

Session 2024-25			
Part A – Introduction			
Subject	**Biotechnology**		
Semester	**III**		
Name of the course	**Techniques in Microbiology**		
Course Code	**B24-BTY-304**		
Course Type: (CC/MCC/MDC/CC-M/ DSEC /VOC/DSE/PC/AEC/VAC)	**CC-M3**		
Level of the course (As per Annexure-I	**300-399**		
Pre-requisite for the course (if any)	**NA**		
Course Learning Outcomes(CLO):	After completing this course the students will learn: 1. The basics of microbiology, including its history, cell structure, diversity, and applications. 2. About aseptic techniques, sterilization, and culture media preparation. They will also understand laboratory safety. 3. Techniques for isolating, identifying, and analyzing microorganisms. They will also learn about staining methods. 4. About microscopy and how to use microscopes to observe microorganisms. 5. Practical skills in microbiology, including aseptic techniques, culture media preparation, and staining. They will also analyze microbial growth.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks:100 **Internal Assessment Marks: 30 (20 Theory + 10 Practical)** **End Term Exam Marks:70 (50 Theory + 20 Practical)**		**Time: 3h (theory), 4h (practical)**	

Part B- Contents of the Course		
Units	**Topics**	**Contact Hours**
Unit 1	Introduction to Microbiology: History of microbiology, Scope and applications of microbiology, Basic concepts of microbial cell structure and function, bacterial groups based on shape, nutrition and flagella.	**12**
Unit 2	Aseptic Techniques: Principles of aseptic technique, Sterilization methods (physical and chemical), Disinfection and sanitization, Laboratory safety and biosafety measures. Culture Media and	**12**

	Cultivation: Types of culture media (solid, liquid, selective, differential), Media preparation and sterilization.	
Unit 3	Microbial Isolation and Identification: Streak plate technique, Pour plate technique, Colony morphology and characteristics, Microbial growth and its measurement, Enrichment techniques. Biochemical tests for microbial identification, Simple staining, Gram staining, acid fast staining, endospore staining and flagella staining.	**11**
Unit 4	Microscopy: Principles and applications of microscopy (bright-field, dark-field, phase-contrast, and fluorescence), Use of microscopes for microbial observation, Preparation of microbial smears.	**10**
Practical	Practicum: 1. Aseptic techniques: Sterilization of media and equipment, 2. Culture media preparation: Preparation of various types of culture media (Nutrient agar and nutrient broth). 3. Microbial isolation: Streak plate and pour plate techniques. 4. Colony morphology observation: Description of colony characteristics. 5. Gram staining: Staining of bacterial samples. 6. Endospore staining. 7. Inoculation of media with microorganisms. 8. Construct a growth curve to determine the growth phases.	30

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory-20** • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.:5 • Mid-Term Exam: 10 ➢ **Practicum -10** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc.:10 • Mid-Term Exam: NA	**End Term Examinations** 50 (Theory); 20 (Practical)- Evaluation of the practical skill will be done by an External examiner.

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Brock Biology of Microorganisms by Michael Madigan, John Martinko, Kelly Bender, and Brock Dreyer.
- Prescott's Microbiology by Joanne Willey, Linda Sherwood, and Christopher Woolverton.
- Laboratory Techniques in Microbiology by Michael J. Pelczar, Jr., Eugene C. Nester, and Gerard D. Chan.
- Biochemistry and Molecular Biology of Microorganisms by Albert L. Lehninger, David L. Nelson, and Michael M. Cox.
- Principles of Microbial Metabolism by Anthony J. F. Griffiths, Jeffrey D. Miller, David T.

Suzuki, Richard C. Lewontin, and William M. Gelbart.

- Molecular Genetics of Bacteria by David W. Low and Anthony J. F. Griffiths
- Environmental Microbiology by Paul R. Ehrlich and Richard E. Lenski
- Medical Microbiology by Patrick R. Murray, Ken S. Rosenthal, and Michael A. Pfaller
- Fundamentals of Food Microbiology by James M. Jay
- Industrial Microbiology by A. H. Waseda