

INSTITUTE	FACULTY OF SCIENCE
PROGRAM	BACHELOR OF SCIENCE (MICROBIOLOGY)
SEMESTER	6
COURSE TITLE	EXPERIMENTAL LABORATORY - VI
COURSE CODE	02MB0360
COURSE CREDITS	6

Objective:

- 1 To gain practical expertise in microbial genetics, fermentation technology, immunology, and medical microbiology for biomedical and industrial applications.

Course Outcomes: After completion of this course, student will be able to:

- 1 Perform microbial genetics and genomics techniques to study mutations, gene transfer, and genome organization.
- 2 Optimize fermentation processes for microbial growth and metabolite production in industrial applications.
- 3 Conduct immunological techniques to detect antigen-antibody interactions and assess immune responses.
- 4 Utilize diagnostic methods to identify infectious diseases and study microbial pathogenicity in medical microbiology.

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
0	0	12	0	0	0	50	50

Contents : Unit	Topics	Contact Hours
Total Hours		

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Fermentation Technology 1. Isolation of antibiotic producing microorganisms from soil 2. Isolation of enzyme producing microorganisms from soil 3. Isolation of organic acid producing microorganisms from soil 4. Strain improvement by Physical mutagenesis 5. Strain improvement by chemical mutagenesis 6. Production of amylase enzyme by submerged fermentation. 7. Production of Alcohol 8. Production of Citric acid	40
2	Basics of Immunology 1 To perform the Total RBC count using Heamocytometer 2 To perform the differential count of WBC. 3 To perform the identification of blood group using agglutination. 4 To determine the blood clotting time using capillary method. 5 To perform the Single Radial Immunodiffusion assay. 6 To perform the Ouchterlony double diffusion assay. 7 To perform the Widal test to identify the strain of Salmonella typhi in the given sample.	30
3	Medical Microbiology: 1. Identify bacteria (E. coli, Salmonella, Pseudomonas) using laboratory strains on the basis of cultural, morphological and biochemical characteristics: IMViC, TSI, nitrate reduction, urease production and catalase tests. 2. Identify bacteria (Staphylococcus, Bacillus) using laboratory strains on the basis of cultural, morphological and biochemical characteristics: IMViC, TSI, nitrate reduction, urease production and catalase tests. 3. Study of composition and use of important selective media for identification of bacteria. 4. Study of composition and use of important differential media for identification of bacteria: EMB Agar, McConkey agar, Mannitol salt agar, Deoxycholate citrate agar, TCBS. 5. Study of bacterial flora of skin by swab method. 6. Perform antibacterial sensitivity by Kirby-Bauer method. 7. Determination of minimal inhibitory concentration (MIC) of an antibiotic. 8. Study symptoms of the diseases with the help of photographs: Polio, anthrax, herpes, chicken pox, HPV warts, AIDS (candidiasis), dermatomycoses (ring worms).	40
4	Microbial Genetics and Genomics 1. Preparation of Master and Replica Plates 2. Study the effect of chemical (HNO ₂) and physical (UV) mutagens on bacterial cells 3. Study survival curve of bacteria after exposure to ultraviolet (UV) light 4. Isolation of Plasmid DNA from E.coli 5. Study different conformations of plasmid DNA through Agarose gel electrophoresis. 6. Demonstration of Bacterial Conjugation 7. Demonstration of AMES test	30
Total Hours		140

Textbook :

- 1 Practical Handbook of Microbiology, Lorrence H Green, Emanuel Goldman, CRC Press, 2021

References:

- 1 Manual of Industrial Microbiology and Biotechnology, Manual of Industrial Microbiology and Biotechnology, Alan T. Bull, Beth Junker, Leonard Katz, Lee R. Lynd, Prakash Masurekar, Christopher D. Reeves, Huimin Zhao, Willey International, 2010

Suggested Theory Distribution:

The suggested theory distribution as per Bloom’s taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
5.00	10.00	30.00	30.00	20.00	5.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by white board may also use any of tools such as demonstration, role play, Quiz, brainstorming, etc.
- 2 The internal evaluation will be done based on continuous evaluation of students in the classroom in the form of attendance, assignments, presentations, verbal interactions etc.
- 3 Students will use supplementary resources such as online videos, ebooks, ppts etc.

Supplementary Resources:

- 1 https://www.youtube.com/watch?v=Dxa9I_bmUf0