St. Aloysius' College (Autonomous) Jabalpur, M.P.
Department of Botany and Microbiology
B.Sc. I Semester Industrial Microbiology
Tools and techniques in Microbiology
Paper—Major / Minor
Format for Syllabus of Theory Paper

Part A- Introduction				
Program: Certificate		**Class: B.Sc.**	**Semester : I**	**Session: 2023-24**
Subject: Industrial Microbiology				
1	**Course Code**	**S1INMB1T**		
2	**Course Title**	**Tools and Technique in Industrial Microbiology**		
3	**Course Type (Core Course/Elective/Generic Elective/Vocational/…..)**	**Core Course**		
4	**Pre-requisite (If any)**	**To study this course, a student must have had the subject Biology in Class/12th/certificate/diploma.**		
5	**Course Learning Outcomes (CLO)**	On completion of this course, the learners will CO 1- be able to understand the relevance of microscopic approaches in life sciences. CO 2- develop skills to understand concept and applications of instruments used in life sciences. CO 3- develop scientific understanding of analytical techniques CO 4- be able to interpret the results of an experiment CO 5- demonstrate use of different tools and different modern techniques in the field of Industrial Microbiology.		
6	**Credit Values**	**4**		
7	**Total Marks**	Max. Marks: 40+60	Min. Passing Marks: 35	

Part B- Content of the Course		
Total No. of Lectures- Tutorials- Practical (in hours per week): 60 Hrs **L-T-P:**		
Unit	**Topics**	**No. of Lectures**
1	**Microscopy and Microscopic Techniques** Principle and application of light microscopy, dark field microscopy,	**12 Hrs**

	phase contrast microscopy, fluorescence microscopy, confocal microscopy, Electron Microscopy, scanning & transmission electron microscopy, AFM Atomic Force Microscopy, Micrometry, Camera Lucida software in Microscopy	
2	**Chromatography and Electrophoresis** ❖ Principle, application and affinity of paper chromatography (including 2-D & descending chromatography) ❖ Thin layer Chromatography – column packing & fraction collection ❖ Gel filtration chromatography and Ion Exchange Chromatography ❖ GLC and HPLC principle and application ❖ Principle and application of native polyacrylamide gel electrophoresis, SDS – polyacrylamide gel electrophoresis, 2D gel electrophoresis, isoelectric focusing, zymograph preparation, agarose gel electrophoresis	**12 Hrs**
3	**Spectrometry, Colorimetry, Turbidometry and Centrifugation** ❖ Principle and use of absorption spectra of biomolecules. Their analysis using UV and visible range. ❖ Principle and use of colorimetry ❖ Principle and use of turbidometry ❖ Principle and types of analytical centrifugation, RCF and sedimentation co-efficient, ultra centrifugation and types of gradient ❖ pH meter, autoclave, hot air oven, incubator and BOD incubator and Laminar Air Flow.	**12 Hrs**
4	**Culture Techniques** ❖ Culture media, preparation, types- define differential, selective and enrichment culture media ❖ Isolation techniques – pour plate, spread plate, streak plate, serial dilution method. ❖ Pure culture, enrichment culture and micromanipulator. ❖ Maintenance and preservation of pure microbial cultures. ❖ Lyophilization and cryopreservation.	**12 Hrs**
5	**Sterilization and Staining Techniques** ❖ Sterilization – Principle & method of sterilization, physical and chemical agents of sterilization. ❖ Disinfectants, antiseptics, phenol coefficient ❖ Nature of dyes, physical and chemical theories of staining ❖ Principle, procedure and application of simple staining, negative staining, differential staining. ❖ Study of Aseptic techniques – preparation of cotton plugs for test tubes and pipettes, wrapping of petri plates and pipettes.	**12 Hrs**
Keywords/Tags; Techniques, microscopy, chromatography, spectrophotometry, sterilization		
Part C- Learning Resources		
Text Books, Reference Books, Other resources		
Suggested Books:		

1. Tools & Techniques in Microbiology – Nath & Upadhyay
2. Principles & Techniques of Biochemistry and Molecular Biology Cambridge University Press – Wilson & Walker J 2010
3. Hand book of techniques in microbiology AS Karwa, MK Rai, HB Singh (A Laboratory guide to microbes)
4. Tools & Techniques of microbiology text book by Sundara S Rajan
5. Hand book of microbiology – PS Bisen and Kavita Verma
6. Practical Microbes A Laboratory Manual by B Senthil Kumar, Zothansganga, D Senbagam, N Senthil Kumar, G Gurusubramaniam (Paper Back – Kumar BS)

2. Suggestive digital platform web links

Suggested equivalent online courses:

http://nptel.ac.in/courses/104/104/104104066/ analytical methods

http://nptel.ac.in/courses/102/107/102107028/ techniques tools

Part D – Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100

Continuous Comprehensive Evaluation (CCE): 40 marks University Exam (UE): 60 marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE): 40	Class Test Assignment/Presentation	15 25
External Assessment: University Exam Section: 60 Time – 02:00 Hours	**Section (A):** Three Very Short Questions (50 words each) **Section (B):** Three Short Questions (200 words each) **Section (C):** Three Long Questions (500 words each)	**Total : 60**