DEPARTMENT OF MICROBIOLOGY				*CLASS: I M.Sc. Microbiology*				
Sem	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/week**	**CIA**	**Ext**	**Total**
I	Major Practical -I	21P1RMP1	Lab in Microbial Taxonomy and Biochemistry	4	4	40	60	100

Nature of Course				
Knowledge and skill			Employability oriented	
Skill oriented	✓		Entrepreneurship oriented	

Course Objectives

1. To recall the basic techniques in microbiology.
2. To explore methods of cultivation of microbes
3. To partially characterize the microorganisms.
4. To understand various microbial staining techniques.
5. To quantify various biomolecules.

Course Learning Outcomes

On successful completion of the programme, the students will be able to

1. Recall the fundamental techniques in the field of microbiology.
2. Analyze the morphology of microorganisms under microscope.
3. Determine physiological characteristics of microorganisms.
4. Estimate the quantity of carbohydrates and proteins.
5. Measure the quantity of DNA.

S.No.	Experiments
1.	Pure culture technique: Streak plate, pour plate, spread plate, decimal dilution.
2.	Motility demonstration: Hanging drop preparation, wet mount, semi-solid agar.
3.	Staining techniques : Smear preparation, Simple staining, Gram's staining, Acid fast staining, Spore staining, Capsule Staining (positive and negative)
4.	Physiological characteristics - IMVIC test, H_2S production, Oxidase, Catalase, Urease test, Gelatin liquefaction. Carbohydrate fermentation.
5.	Qualitative and quantitative analysis of Carbohydrates (glucose, fructose and starch)
6.	Qualitative and quantitative analysis of Proteins and DNA
7.	Separation of amino acids by paper chromatography and thin layer chromatography
8.	Pure culture technique: Streak plate, pour plate, spread plate, decimal dilution.
9.	Motility demonstration: Hanging drop preparation, wet mount, semi-solid agar.
10.	Staining techniques : Smear preparation, Simple staining, Gram's staining, Acid fast staining, Spore staining, Capsule Staining (positive and negative)

Books for study:

1. Cappuccino, J.H. and Sherman, N. (2007). Microbiology- A Lab Manual. 7th Edition. The Benjamin Publishing Company, Singapore.
2. Gunasekaran, P. (2008). Laboratory Manual in Microbiology. New Age International (P) Ltd. Publishers, New Delhi.
3. Jayaraman, J. **(**2011). Laboratory Manual in Biochemistry. 2nd Edition. New Age International (P) Ltd. Publishers, New Delhi.
4. Kannan, N. (1996). Laboratory Manual in General Microbiology. 1st Edition, Palani Paramount Publications, Tamil Nadu.

Books for Reference

1. Madigan, M.T. and Martinko, J.M. (2014). Brock Biology of Microorganisms. 14th Edition. Prentice Hall International Inc., USA.
2. Aneja, K.R. (2003). Experiments in Microbiology: Plant Pathology and Tissue Culture. Wishwa Prakashan, New Delhi.
3. Plummer, D.T. (1987). An introduction to Practical Biochemistry. 3rd Edition. Tata McGraw Hill, New Delhi.
4. Work, T.S. and Work, E. (1978). Laboratory Techniques in Biochemistry and Molecular Biology. North-Holland Publishing Company, Holland.
5. Khan, N.A. (2014). Laboratory Manual of Biochemistry. Daya Publishing House, Daryaganj.
6. Pierce, B.E. and Leboffe, M.J. (2010). Microbiology: Laboratory Theory & Application. 3rd Edition. Morton Pub. Co., USA.

Web Resources

1. https://microbiologyinfo.com/category/basic-microbiology/
2. https://microbiologyinfo.com/category/staining-techniques/
3. https://microbiologyinfo.com/category/culture-media/
4. https://microbiologyinfo.com/category/biochemistry/
5. https://www.youtube.com/watch?v=zqaxWR1DT0Y
6. https://www.youtube.com/watch?v=rhTh8LYYBcQ

Rationale for nature of the course

Student become competent in the application of techniques associated with molecular biology. Identifying various physiological processes and molecular characterization of microorganisms. The taxonomical position of microbes can be determined based on the morphological and biochemical characteristics. The goal of this course is to understand the basic building blocks of living organisms, introduce the structure and properties of various biomolecules and to emphasize on the association between structure and function of various biomolecules.

Activities having direct bearing on skill development/ employability/entrepreneurship

Able to isolate and analyse the genomic DNA from prokaryotes and eukaryotes. Knowledge gained could be applied for further studies.
Classify microorganisms based on its morphology and cultural characteristics.
Providing knowledge on biomolecules, and their significance in the metabolism
Exploring the structure of biomolecules found in cells, to determine their structures.

Pedagogy

Demonstration and practical session.

Course Learning Outcomes (CLO)

On the completion of the course the student will be able to

CLOs	Course Learning Outcome	Knowledge Level
CLO1	Recall the fundamental techniques in the field of microbiology.	Up to K2
CLO2	Analyze the morphology of microorganisms under microscope.	Up to K4
CLO3	Determine physiological characteristics of microorganisms.	Up to K4
CLO4	Estimate the quantity of carbohydrates, DNA and proteins.	Up toK2
CLO5	Separation of amino acids by chromatography technique	Up to K4

K1 –Remembering and recalling facts with specific answers
K2 – Basic understanding of facts and stating main ideas with general answers
K3 – Application oriented – Solving Problems
K4 – Examining, analyzing, presentation and make interferences with evidences

Mapping of Course Learning Outcome with Programme Specific Outcome

	PSO1	PSO2	PSO3	PSO4	PSO5
CLO1	2	3	2	1	3
CLO2	2	3	3	2	3
CLO3	2	3	3	1	3
CLO4	2	3	3	2	3
CLO5	2	3	3	2	3

Advance application–3 Intermediate level –2 Basic level –1

Mapping of Course Outcome with Programme Outcome

	PO1	PO2	PO3	PO4	PO5
CLO1	2	2	2	2	3
CLO2	2	2	2	2	3
CLO3	2	3	3	2	3
CLO4	2	2	2	2	3
CLO5	2	2	2	2	3

Advance application–3 Intermediate level –2 Basic level –1

Course designers

1. Mrs. K. Rajeswari

2. Mrs. N. Sumathy