COURSE TITLE	**EXPERIMENTAL LABORATORY-III**
COURSE CODE	**02MB0205**
COURSE CREDITS	**3**

Objective:

1 To enable students with practical skills of Microbial Physiology, Microbial Biochemistry and allied subject like Chemistry or Physics.

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

1 Students will learn different media preparation and learn pure culture isolation technique.

2 Students will be able to learn enzyme activity studies.

3 Students will be able to learn different practical techniques of Biology, Chemistry and Physics.

4 Students will be able to analyze, interpret and record the experimental results.

Pre-requisite of course: Not applicable

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
0	0	6	0	0	0	50	50

Contents : Unit	Topics	Contact Hours
Total Hours		

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Microbial Physiology** • Preparation of Liquid media • Preparation of Solid media • Qualitative analysis of milk • Isolation of bacteria by Streak plate method • Isolation of bacteria by Spread plate method • Isolation of bacteria by Serial dilution and Spread plate method • Growth curve of bacteria • Effect of various physical parameters on growth of bacteria • Effect of various chemical parameters on growth of bacteria • Effect of various antibiotics on growth of bacteria	2

DR. GAURAV VINODBHAI SANGHVI
Digitally signed by (Name of HOD)

DR. KANTHA DEVI ARUNACHALAM
Digitally signed by (Name of Dean/ Principal)

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
2	**Microbial Biochemistry** • Preparation of Minimal, crude and defined media. • Triple Sugar–Iron Agar Test • IMViC Test • Urease Test • Nitrate Reduction Test • Catalase Test • Oxidase Test • Utilization of Amino Acids: Part A: Decarboxylase Test; Part B: Phenylalanine Deaminase Test • Enzyme Substrate Reaction/ Enzyme activity (Primary demonstration of Enzyme activity) • Effect of substrate and inhibitors on enzyme activity.	2
3	**General Chemistry-III** • Qualitative analysis of given unknown organic compound. [Monofunctional, compound, 1] • Qualitative analysis of given unknown organic compound. [Monofunctional, compound, 2] • Qualitative analysis of given unknown organic compound. [Monofunctional, compound, 3] • Qualitative analysis of given unknown organic compound. [Monofunctional, compound, 4] • Qualitative analysis of given unknown inorganic salt. [Two radicals, 1] • Qualitative analysis of given unknown inorganic salt. [Two radicals, 2] • Qualitative analysis of given unknown inorganic salt. [Two radicals, 3] • Qualitative analysis of given unknown inorganic salt. [Two radicals, 4]	2
4	**Modern Physics and Optics** • To study of polarization of light by reflection and thus verify Brewster's law. • To construct a zener diode regulator using diode and check zener regulation. • To determine the width of the slit by diffraction. • To determine knee voltage given PN junction diode. • To determine the numerical aperture and acceptance angle of the given optical fibre. • To verify inverse square law using inverse square law kit. • To Determine the Wavelength of Laser Light with a Diffraction Grating. • To study plateau region of GM Counter. • To determine the dispersive power of the material of the prism forviolet and yellow • colour of the mercury light with the help of a spectrometer. • To study the Dead time of GM Counter. • To determine of Resistivity and band Gap of Semiconductor by Four Probe method at different temperatures. • To study the operational amplifier as frequency response inverting & non-inverting amplifier. (V. Lab)	2
Total Hours		**8**

Textbook :

1 Microbial Physiology, 4th Ed., Moat, A.G. and Foster, S.W., John Wiley and Sons, New York., 2004

2 General Microbiology, 5th Edition., Stanier, R.Y., Iingraham, J.L., Wheelis, M.L., Painter, R.K., MacMillan Press Ltd., London., 1987

3 Microbiology, 5th Edition., Pelczar, M.J., Chan E.C.S., Krieg, N.R., Tata McGraw Hill Publication Co. Ltd. New Delhi., 1993

4 A Textbook of Physical Chemistry, Arthur W. Adamson, Academic Press, 1973

Textbook :

5 A Textbook of Physical Chemistry, S. C. Anand and A. S. Negi, New Age International (P) Ltd Publishers, 1985

6 A Textbook of Organic Chemistry, Bahl, S Chand Publishing, 2005

7 A text book in Electrical Technology, B.L. Theraja, S. Chand & Co., 2008

References:

1 Solid State Physics Lattice Dynamics of Ionic Solids: Lattice Dynamics of Ionics Solids, Solid State Physics Lattice Dynamics of Ionic Solids: Lattice Dynamics of Ionics Solids, G.K. Upadhyaya, Laxmi Publications, 2008

2 Advanced Practical Physics for students, Advanced Practical Physics for students, B.L. Flint, H.T. Worsnop, Asia Publishing House., 1971

3 A Laboratory Manual of Physics for Undergraduate Classes, A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal, Vani Publication, 1985

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**
20.00	30.00	25.00	15.00	10.00	0.00

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, MOOCs etc.

2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory.

3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

5 Use of hazardous/toxic chemicals should be avoided as far as possible in laboratory.

6 All students in the laboratory must wear lab coats during lab session.

7 During practical and experimental section student must wear shoes to avoid accidents cause by spilling or rush handling of acidic chemicals (Especially during inorganic estimation experiments).

Supplementary Resources:

1 http://nptel.ac.in/course.php?disciplineId=104

2 http://ocw.mit.edu/courses/chemistry/

3 http://vlab.amrita.edu/index.php?sub=2

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Supplementary Resources:

4	http://www.vlab.co.in/ba_labs_all.php?id=9
5	https://archive.nptel.ac.in/courses/115/101/115101003/
6	https://archive.nptel.ac.in/courses/108/108/108108122/
7	https://onlinecourses.nptel.ac.in/noc22_ph32/preview
8	https://www.youtube.com/user/TMPChem
9	https://www.youtube.com/playlist?list=PL166048DD75B05C0D
10	https://www.youtube.com/channel/UCqk-dmk3AOFtikaFDpsZorg
11	https://www.youtube.com/user/PradeepKshetrapal