INSTITUTE	**FACULTY OF SCIENCE**
PROGRAM	**BACHELOR OF SCIENCE (CHEMISTRY)**
SEMESTER	**3**
COURSE TITLE	**LABORATORY - III**
COURSE CODE	**02CY0205**
COURSE CREDITS	**3**

Objective:

1 To equip students with the necessary skills to conduct experiments, analyse data, and interpret results accurately and to demonstrate the practical application of theory covered within the scope of the Chemistry and allied subject like Microbiology or Physics.

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

1 To maintain a safe working environment, students will follow safety protocols and procedures, recognizing potential dangers, reducing risks, and reacting appropriately to crises.

2 Students will be able to learn and develop different practical skills in Chemistry, Biology or Physics.

3 Students will use the theoretical knowledge they have learned in lectures to plan experiments, evaluate information, and make decisions in a lab setting.

Pre-requisite of course: Students having a background in the science stream with a focus on chemistry, physics, or biology.

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		

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Chemistry Experiments** 1. Qualitative analysis of given unknown organic compound. [Monofunctional, compound, 1] 2. Qualitative analysis of given unknown organic compound. [Monofunctional, compound, 2] 3. Qualitative analysis of given unknown organic compound. [Monofunctional, compound, 3] 4. Qualitative analysis of given unknown organic compound. [Monofunctional, compound, 4] 5. Qualitative analysis of given unknown inorganic salt. [Two radicals, 1] 6. Qualitative analysis of given unknown inorganic salt. [Two radicals, 2] 7. Qualitative analysis of given unknown inorganic salt. [Two radicals, 3] 8. Qualitative analysis of given unknown inorganic salt. [Two radicals, 4] 9. Estimation of the amount of Cu2+ in the given CuCl2.2H2Osolution using 0.01 M EDTA solution. 10. Estimation of the amount of Ni2+ in the given NiSO4.7H2Osolution using 0.01 M EDTA solution. 11. Estimation of the amount of Zn2+ in the given ZnCl2 solution using 0.01 M EDTA solution. 12. To determine the specific reaction rate of the hydrolysis of methyl acetate/ Ethyl acetate catalysed by H+ ion at room temperature. 13. To study the rate of reaction between K2S2O8 and KI. 14. To study adsorption of given organic acid on activated charcoal. 15. To study the partition co-efficient of benzoic acid between water and benzene / kerosene and hence study the molecular condition of benzoic acid in the solution.	20
2	**Microbial Biochemistry Experiments** 1. Preparation of Minimal, crude and defined media. 2. Triple Sugar–Iron Agar Test 3. IMViC Test 4. Urease Test 5. Nitrate Reduction Test 6. Catalase Test 7. Oxidase Test 8. Utilization of Amino Acids: Part A: Decarboxylase Test; Part B: Phenylalanine Deaminase Test 9. Enzyme Substrate Reaction/ Enzyme activity (Primary demonstration of Enzyme activity) 10. Effect of substrate and inhibitors on enzyme activity.	20
3	**Modern Physics and Optics Experiments** 1. To study of polarization of light by reflection and thus verify Brewster's law. 2. To construct a zener diode regulator using diode and check Zener regulation. 3. To determine the width of the slit by diffraction. 4. To determine knee voltage given PN junction diode. 5. To determine the numerical aperture and acceptance angle of the given optical fibre. 6. To verify inverse square law using inverse square law kit. 7. To Determine the Wavelength of Laser Light with a Diffraction Grating. 8. To study plateau region of GM Counter. 9. 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. 10. To study the Dead time of GM Counter. 11. To determine of Resistivity and band Gap of Semiconductor by Four Probe method at different temperatures. 12. To study the operational amplifier as frequency response inverting & Non - inverting amplifier. (V. Lab)	20
Total Hours		**60**

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Textbook :

1 Vogel's Textbook of Practical Organic Chemistry, A.I. Vogel, A.R. Tatchell, Prentice Hall, 1989

2 Textbook of quantitative chemical analysis, G. H. Jeffery J. Bassett J. Mendham R C. Denney, John Wiley & Sons, 1989

3 An Advanced Course in Practical Chemistry, A. K. Nad, B. Mahapatra and A. Ghoshal, New Central Book Agency (P) Ltd, 2022

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

5 Experimental Physical Chemistry: A Laboratory Textbook, 5. Arthur Halpern and George McBane, W.H. Freeman & Co Ltd, 2006

References:

1 Vogel's Qualitative Inorganic Analysis (7th Edition), Vogel's Qualitative Inorganic Analysis (7th Edition), G. Svehla, Dorling Kindersley (India) Pvt. Ltd, 2009

2 Practical in Physical Chemistry, Practical in Physical Chemistry, P S Sindhu, Macmillan, 2005

3 Experiments In Microbial Physiology And Biochemistry, Experiments In Microbial Physiology And Biochemistry, Gerald Robert Seaman & Jody De Mary , Literary Licensing, LLC, 2012

4 Microbial Physiology and Biochemistry Laboratory, Microbial Physiology and Biochemistry Laboratory, David White and George D. Hegeman, Oxford University Press, 1997

5 Experiments in Modern Physics, Experiments in Modern Physics, Adrian C. Melissinos & Jim Napolitano , Academic Press Inc, 2003

6 Optics Experiments and Demonstrations for Student Laboratories, Optics Experiments and Demonstrations for Student Laboratories, Stephen G Lipson, IOP Publishing, 2020

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**
20.00	30.00	25.00	15.00	10.00	0.00

Instructional Method:

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

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

3 The evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

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

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Supplementary Resources:

1. http://ocw.mit.edu/courses/chemistry/
2. https://www.youtube.com/watch?v=FUo428guKt0
3. https://www.youtube.com/watch?v=bw2h4nrYldE
4. https://www.youtube.com/watch?v=qPjGbrd4nJw
5. https://www.youtube.com/watch?v=3WvrzQceIso
6. https://www.youtube.com/watch?v=HMP3xDHO204
7. https://www.youtube.com/watch?v=8jVyyT8t-AE
8. https://www.youtube.com/watch?v=E4a8g1o72AM
9. https://www.youtube.com/watch?v=HGcWYjrin1Q