INSTITUTE	**FACULTY OF SCIENCE**
PROGRAM	**MASTER OF SCIENCE (CHEMISTRY)**
SEMESTER	**3**
COURSE TITLE	**PRACTICALS-IV**
COURSE CODE	**02CY1508**
COURSE CREDITS	**4**

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 Analytical Chemistry.

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

1 In order 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 Analytical Chemistry.

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 analytical chemistry.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
0	0	9	0	0	0	75	75

Contents : Unit	Topics	Contact Hours
Total Hours		

DR. SURANJANA VISHALBHAI MAYANI
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
1	**Essence of Chromatography Experiments** 1. Separation of plant pigments using Paper Chromatography. 2. Separation of plant pigments using Thin Layer Chromatography. 3. Separation and isolation of plant pigments using Column Chromatography. 4. Determine quantitatively the amino acids (Cysteine, Theonine, Valine) present in the given mixture by the technique of Ascending Paper Chromatography. 5. Determine quantitatively the amino acids (Cysteine, Glycine, Valine) present in the given mixture by the technique of Descending Paper Chromatography. 6. To determine the R f value of given amino acids (Cysteine, Glycine, Valine) by Ascending Paper Chromatography. 7. To determine the R f value of given amino acids (Cysteine, Theonine, Valine)) by Descending Paper Chromatography. 8. To determine the R f value of given amino acids (Alanine, Glycine, Valine) by Circular Paper Chromatography. 9. To determine the R f value of given amino acids (Cysteine, Theonine, Valine)) by Circular Paper Chromatography. 10. To determine the R f value of given inorganic cations (Co2+, Cu2+ and Ni2+) by Descending Paper Chromatography. 11. To determine the R f value of given inorganic cations (Co2+, Mn2+ and Zn2+) by Aescending Paper Chromatography. 12. Determine the Rf values of the inorganic cations (Co2+ , Cu2+and Ni2+) present in the given mixture by the technique of Circular Paper Chromatography. 13. Separation of amino acids by Thin Layer Chromatography. 14. Separation of dyestuffs by Thin Layer Chromatography. 15. Separation of KMnO4 and K2Cr2O7 by column chromatography.	30
2	**Industrial Analysis Experiments** 1. To determine the amount of calcium – gluconate in the given sample. 2. To determine the peroxide value in the given sample.. 3. To determine the saponification value of given oil sample. 4. To determine the amount of DCM in the given sample by using colorimeter. 5. To determine the amount of Aspirin in the given sample. 6. To determine the amount of chloride ion in the given sample. 7. To determine the amount of copper in the given sample. 8. To determine the acidity of the given sample of water. 9. To determine the alkalinity of the given sample. 10. To determine the amount of lead in the given sample by volumetric titration. 11. To determine the amount of paracetamol in the given sample assay by using UV- VIS spectrophotometry. 12. To perform QC testing or metformin by using UV-VIS spectrophotometer. 13. To determine Al 3+ amount in the given sample by back titration. 14. To determine the amount of Cu 2+ in the sample.	30

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Digitally signed by (Name of HOD)

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
3	**Selected Topics in Analytical Chemistry Experiments** 1. Estimation of Cu2+ from CuSO4 sample by using Electro gravimetric analysis. 2. Estimation of Ni2+ from NiSO4 sample by using Electro gravimetric analysis. 3. Operational SOP preparation for pH meter and Conductometer. 4. Operational SOP preparation for Potentiometer. 5. Operational SOP preparation for Refractometer. 6. Operational SOP preparation for polarimeter. 7. Estimation of Cu2+ in given CuSO4 sample solution by using Ion exchange chromatography. 8. Estimation of Ni2+ in given CuSO4 sample solution by using Ion exchange chromatography. 9. Separation of blue dextran and fluorescein by using gel permeation chromatography.	30
Total Hours		**90**

Textbook :

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

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

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

References:

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

2 Chromatography: A Laboratory Handbook of Chromatographic and Electrophoretic Methods, Chromatography: A Laboratory Handbook of Chromatographic and Electrophoretic Methods, Van Nostrand Reinhold, Erich Heftmann, 1975

3 Thin-Layer Chromatography A Laboratory Handbook, Thin-Layer Chromatography A Laboratory Handbook, Egon Stahl, Springer Berlin, Heidelberg, 2012

4 Chemistry An Industry-Based Laboratory Manual, Chemistry An Industry-Based Laboratory Manual, John Kenkel, CRC Press, 2003

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
10.00	20.00	30.00	30.00	10.00	0.00

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Digitally signed by (Name of HOD)

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Digitally signed by (Name of Dean/ Principal)

Instructional Method:

1. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.
2. Use of hazardous/toxic chemicals should be avoided as far as possible in laboratory.
3. All students in the laboratory must wear lab coats during lab session.
4. 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).
5. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Supplementary Resources:

1. http://ocw.mit.edu/courses/chemistry/
2. https://www.youtube.com/watch?v=FUo428guKt0
3. https://www.youtube.com/watch?v=qPjGbrd4nJw
4. https://www.youtube.com/watch?v=ltT8vr5Wmz8
5. https://www.youtube.com/watch?v=p1a3kctJuIs
6. https://www.youtube.com/@MicroChemsExperiments
7. https://www.youtube.com/watch?v=cp1O6LhbUEk
8. https://www.youtube.com/watch?v=dC61_u-pfvM

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