INSTITUTE	**FACULTY OF SCIENCE**
PROGRAM	**MASTER OF SCIENCE (CHEMISTRY)**
SEMESTER	**1**
COURSE TITLE	**PRACTICALS - I**
COURSE CODE	**02CY0411**
COURSE CREDITS	**6**

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 organic, analytical, physical and inorganic chemistry

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 organic, analytical, physical and inorganic 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:N/A

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
0	0	12	0	0	0	100	100

Contents : Unit	Topics	Contact Hours
Total Hours		

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Physical Chemistry** 1) To determine the specific & molecular rotation of cane sugar & hence intrinsic rotation. 2) To determine the concentration and amount of Co2+ in the given solution by colorimetry. 3) To determine the conductance of a strong electrolyte and hence verify Onsager equation. 4) To determine the rate constant of ethyl acetate catalysed by acid (HCl) and also energy of activation. 5) To determine the normality of HCl and CH3COOH in a mixture with the help of 0.1N NaOH solution by potentiometer. 6) To determine the hydrolysis constant of sodium acetate in water. 7) To determine the order of the reaction between K2S2O8 and KI by colorimetric method. 8) To determine the normality and dissociation constant of xN oxalic acid by potentiometric titration. 9) To study the inversion of sucrose to determine the rate constant for the inversion of sucrose. 10) To determine the concentration of strong and weak acid in a given mixture by conductometry. 11) To determine the normality and dissociation constant of weak acid by pH metry. 12) Determination of surface tension of a liquid by drop method (stalagmometer method)	30
2	**Inorganic Chemistry** 1) To determine the amount of Ni+2 ion in an unknown solution of NiCl2 by back titration method. 2) Synthesis of tetraamminecopper (II) sulphate [Cu(NH3)4]SO4.H2O and estimation of copper in the synthesized complex 3) Synthesis of sodium trioxalatoferrate(III) Na3[Fe(C2O4)3] and estimation of iron in the synthesized complex. 4) Synthesis of hexaamminecobalt(II) chloride [Co(NH3)6]Cl2 and estimation of cobalt in the synthesized complex. 5) Synthesis of tristhioureacopper(I) sulphate [Cu(NH2CSNH2)3]2SO4.H2O and estimation of copper in the synthesized complex. 6) Synthesis of tristhioureacopper(I) chloride [Cu(NH2CSNH2)3]Cl and estimation of copper in the synthesized complex. 7) Synthesis of hexaamminenickel(II) chloride [Ni(NH3)6]Cl2 and estimation of nickel in the synthesized complex 8) Synthesis of hexathioureaplumbus nitrate [Pb(NH2CSNH2)6](NO3)2 and estimation of lead in the synthesized complex. 9) Synthesis of potassium trioxalatochromate(III) K3[Cr(C2O4)3] and estimation of chromium in the synthesized complex. 10) Synthesis of potassium trioxalatoaluminate (III) K3[Al(C2O4)3] and estimation of aluminium in the synthesized complex. 11) Preparation of Prussian blue Fe4[Fe(CN)6]3 12) Preparation of trans-bis(glycinato)copper (II) chloride	30

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
3	**Organic Chemistry** Synthesis: 1) To prepare acetanilide from aniline. (Acetylation) 2) To prepare p-nitro acetanilide from acetanilide. (Nitration) 3) To prepare benzoic acid from benzaldehyde. (Oxidation) 4) Synthesis of diazoaminobenzene from aniline. (Diazotization) Qualitative Organic Analysis of Bifunctional Compounds: 1) Anthranilic acid 2) p-amino benzoic acid 3) m-nitro benzoic acid 4) Resorcinol 5) o/m/p-nitro aniline 6) o-chloro benzoic acid At least FOUR unknown samples to be performed during lab session.	30
4	**Analytical Chemistry** 1) Preparation and standardization of 0.1N HCl, 0.1N HNO3, 0.1N H2SO4 against 0.1N NaOH, find the mean deviation and standard deviation. 2) Preparation and standardization of 0.1N and 0.5 N NaOH solution against succinic acid, find the mean deviation and standard deviation. 3) Preparation and standardization of 0.1N I2 solution against 0.1N and 0.1M Na2S2O3 solution. 4) To determine the % purity of phthalic anhydride in the given sample. 5) To determine purity of sodium bicarbonate in the given sample by direct titration method. 6) To determine the amount of H2SO4 in the given sample. 7) To determine the volume strength of H2O2. 8) To determine the amount of total reducing sugar in the given sample of honey. 9) To determine the crude fiber in the given sample of ginger powder. 10) To determine the amount of iodine in the given sample of salt. 11) To determine the turbidity of waste water sample. 12) To determine the % purity of maleic anhydride in the given sample.	30
Total Hours		**120**

Textbook :

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

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

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

References:

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

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

3 Compendious Practical Organic Chemistry : Preparations, Isolation, and Chromatography, Compendious Practical Organic Chemistry : Preparations, Isolation, and Chromatography, Basavarajaiah S M , Notion Press, 2021

4 Practical Manual Of Analytical Chemistry, Practical Manual Of Analytical Chemistry, Neelam Singla (, Pharmamed Press, 2012

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References:

5 Practical Inorganic Chemistry, Practical Inorganic Chemistry, Gs Turpin, Palala Press, 2015

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	25.00	25.00	10.00	10.00

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 safety goggles and lab coats during lab session.
3 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.
4 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Supplementary Resources:

1 https://www.youtube.com/watch?v=yhLFR4JZ0HI&list=PLP2rTr-GgPLifg5vYjhVo7u6HBp1uYcdm
2 https://www.youtube.com/watch?v=ru8fOk2f9G0&list=PLDT2d3qkCdHQ_Dkjz9Ak29AL4AYgdaAAg
3 https://www.youtube.com/watch?v=qPjGbrd4nJw&t=1s
4 https://www.youtube.com/watch?v=ZwqLCX-TN8c&list=PLybg94GvOJ9Gn1tz2WIe-75UuZSL3wSJK
5 https://www.youtube.com/watch?v=QqKO0jCT5wg

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