

## ENGINEERING CHEMISTRY LABORATORY

<b>I Semester: CSE / IT / EEE   II Semester: AE / ECE / ME / CE</b>																														
Course Code	Category	Hours / Week			Credit	Maximum Marks																								
AHSB09	Foundation	L	T	P	C	CIA	SEE	Total																						
		-	-	3	1.5	30	70	100																						
<b>Contact Classes: Nil</b>	<b>Tutorial Classes: Nil</b>	<b>Practical Classes: 42</b>			<b>Total Classes: 42</b>																									
<p><b>I. COURSE OVERVIEW:</b>                      The aim of this Engineering Chemistry laboratory is to develop the analytical ability of the students by better understanding the concepts experimental chemistry. The experiments carried out like preparation of aspirin, Thiokol rubber, conductometry, potentiometer, physical properties like viscosity and surface tension of liquids. The volumetric analytical experiments like determination of hardness of water, dissolved oxygen and copper in brass can be carried out in the laboratory.</p> <p><b>II. OBJECTIVES:</b>  <b>The course should enable the students to:</b></p> <p>I The basic principles involved in chemical analysis and mechanism of synthetic organic reactions. Processes.</p> <p>II The need and importance of quality of water for industrial and domestic use.</p> <p>III The measurement of physical properties like surface tension and viscosity.</p> <p>IV The knowledge on existing future upcoming devices, materials and methodology.</p> <p><b>III. COURSE OUTCOMES:</b>  <b>After successful completion of the course, students should be able to:</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%;">CO 1</td> <td style="width: 75%;">Identify Explain the mechanism of chemical reactions for synthesizing drug molecules. for making a desired product with given work piece.</td> <td style="width: 20%;">Understand</td> </tr> <tr> <td>CO 2</td> <td>Determine Identify the total hardness, dissolved oxygen in water by volumetric analysis for finding the hardness causing salts in water. to demonstrating proficiency with hand tools common in fitting.</td> <td>Apply</td> </tr> <tr> <td>CO 3</td> <td>Create Make use of conduct metric and potentiometric titrations for finding the concentration of unknown solutions. To convert given shape into useable elements using basic blacksmith techniques.</td> <td>Apply</td> </tr> <tr> <td>CO 4</td> <td>Organize the molding techniques along with suitable tools Choose different types of liquids for finding the surface tension and viscosity of lubricants.</td> <td>Apply</td> </tr> <tr> <td>CO 5</td> <td>Develop Explain the preparation of synthetic rubbers for utilizing in industries and domestic purpose. for manufacturing the tin boxes, cans, funnels, ducts etc., from a flat sheet of metal.</td> <td>Understand</td> </tr> <tr> <td>CO 6</td> <td>Compare various electrical circuits by using conduit system of wiring Relate the importance of different types of materials for understanding their composition and applications.</td> <td>Understand</td> </tr> </table> <p><b>IV. SYLLABUS:</b></p> <p style="text-align: center;"><b>LIST OF EXPERIMENTS</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"><b>Week-I</b></td> <td><b>INTRODUCTION TO CHEMISTRY LABORATORY</b></td> </tr> <tr> <td colspan="2">Introduction to chemistry laboratory. Do's and Don'ts in chemistry laboratory.</td> </tr> </table>									CO 1	Identify Explain the mechanism of chemical reactions for synthesizing drug molecules. for making a desired product with given work piece.	Understand	CO 2	Determine Identify the total hardness, dissolved oxygen in water by volumetric analysis for finding the hardness causing salts in water. to demonstrating proficiency with hand tools common in fitting.	Apply	CO 3	Create Make use of conduct metric and potentiometric titrations for finding the concentration of unknown solutions. To convert given shape into useable elements using basic blacksmith techniques.	Apply	CO 4	Organize the molding techniques along with suitable tools Choose different types of liquids for finding the surface tension and viscosity of lubricants.	Apply	CO 5	Develop Explain the preparation of synthetic rubbers for utilizing in industries and domestic purpose. for manufacturing the tin boxes, cans, funnels, ducts etc., from a flat sheet of metal.	Understand	CO 6	Compare various electrical circuits by using conduit system of wiring Relate the importance of different types of materials for understanding their composition and applications.	Understand	<b>Week-I</b>	<b>INTRODUCTION TO CHEMISTRY LABORATORY</b>	Introduction to chemistry laboratory. Do's and Don'ts in chemistry laboratory.	
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<b>Week-2</b>	<b>PREPARATION OF ORGANIC COMPOUNDS</b>
Synthesis of Aspirin.	
<b>Week-3</b>	<b>VOLUMETRIC ANALYSIS</b>
Estimation of Total hardness of water by complexometric method using EDTA.	
<b>Week-5</b>	<b>INSTRUMENTATION</b>
Estimation of an HCl by conductometric titrations.	
<b>Week-6</b>	<b>INSTRUMENTATION</b>
Estimation of HCl by potentiometric titrations.	
<b>Week-7</b>	<b>INSTRUMENTATION</b>
Estimation of Acetic acid by Conductometric titrations.	
<b>Week-8</b>	<b>INSTRUMENTATION</b>
Estimation of Fe <sup>2+</sup> by Potentiometry using KMnO <sub>4</sub> titrations.	
<b>Week-9</b>	<b>VOLUMETRIC ANALYSIS</b>
Determination of chloride content of water by Argentometry.	
<b>Week-10</b>	<b>PHYSICAL PROPERTIES</b>
Determination of surface tension of a given liquid using Stalagmometer.	
<b>Week-11</b>	<b>PHYSICAL PROPERTIES</b>
Determination of viscosity of a given liquid using Ostwald's viscometer.	
<b>Week-12</b>	<b>PHYSICAL PROPERTIES</b>
Verification of freundlich adsorption isotherm-adsorption of acetic and on charcoal.	
<b>Week-13</b>	<b>ANALYSIS OF ORGANIC COMPOUNDS</b>
Thin layer chromatography calculation of R <sub>f</sub> values .Eg: ortho and para nitro phenols.	
<b>Week-14</b>	<b>REVISION</b>
Revision.	
<b>Reference Books:</b>	
1. Vogel's, "Quantitative Chemical Analysis", Prentice Hall, 6 <sup>th</sup> Edition, 2000. 2. Gary D. Christian, "Analytical Chemistry", Wiley India, 6 <sup>th</sup> Edition, 2007.	
<b>Web References:</b>	
<a href="http://www.iare.ac.in">http://www.iare.ac.in</a>	

**LIST OF EQUIPMENT REQUIRED FOR A BATCH OF 30 STUDENTS:**

<b>S. No</b>	<b>Name of the Apparatus</b>	<b>Apparatus Required</b>	<b>Quantity</b>
1	Analytical balance	04	100 gm
2	Beaker	30	100 ml
3	Burette	30	50 ml
4	Burette Stand	30	Metal
5	Clamps with Boss heads	30	Metal
6	Conical Flask	30	250 ml
7	Conductivity cell	10	K=1
8	Calomel electrode	10	Glass
9	Digital Potentiometer	10	EI
10	Digital Conductivity meter	10	EI
11	Digital electronic balance	01	RI
12	Distilled water bottle	30	500 ml
13	Funnel	30	Small
14	Glass rods	30	20 cm length
15	Measuring Cylinders	10	10 ml
16	Oswald Viscometer	30	Glass
17	Pipette	30	20 ml
18	Platinum Electrode	10	PP
19	Porcelain Tiles	30	White
20	Reagent bottle	30	250 ml
21	Standard Flask	30	100 ml
22	Stalagmo meter	30	Glass
23	TLC Plates	40	--
24	UV Chamber	02	--