

	ΙB	. Tec	ch. – I		Semest						20CY	2001)						
Lectures	:				rs/Week								nt	:	30			
Final Exam	:	:3 Hours/WeekContinuous Assessment:30:3 HoursFinal Exam Marks:70									70							
<b>Pre-Requisite</b>	: None	е.																
Course Objec	Course Objectives: The student should be conversant:																	
v		With the principles of water characterization and treatment of water for industrial																
1.	purposes and methods of producing water for potable purposes.																	
2	-					-	-			-		-		ot of co	orrosion			
2.			ontrol.			2			1	0.		0						
2	W	ith t	the co	nven	tional	energ	y so	urces	s, so	lid, l	iquid	and	gase	ous Fi	uels &			
3.					cking a								0					
4	W	ith a	im to	gain	good kr	nowle	dge (	of org	ganic	react	ions,	plastic	cs, co	nductir	ng			
4.	pc	lymo	ers & l	biode	gradabl	e poly	ymers	5.										
<b>Course Outco</b>	mes: S	Stud	ents w	ill be	able to	)												
CO-1	D	evelo	op inno	ovativ	ve meth	ods t	o pro	duce	soft	water	for i	indust	rial u	se and	potable			
0-1	wa	ater a	at chea	per c	ost.		_								_			
CO-2	A	oply	their	know	ledge i	n co	nverti	ing v	ariou	s ene	rgies	of di	fferen	t syste	ems and			
0-2	nr																	
CO 2		<ul><li>protection of different metals from corrosion.</li><li>Have the capacity of applying energy sources efficiently and economically for</li></ul>																
CO-3	Ĥ				various needs.													
CO-3	Ha va	riou	s needs	s.														
	Ha va De	riou: esigr	s needs	s. omica	ally and	new	meth	nods	of or	ganic	synth	esis a	nd su	bstitute	e metals			
CO-3 CO-4	Ha va Do wi	rious esign th c	s needs n econo onduct	s. omica ting p	ally and polymer	new	meth 1 also	nods	of or	ganic	synth	esis a	nd su	bstitute				
	Ha va Do wi	rious esign th c	s needs n econo onduct	s. omica ting p	ally and	new	meth 1 also	nods	of or	ganic	synth	esis a	nd su	bstitute	e metals			
CO-4	Ha va De wi ree	rious esigr th c duce	s needs n econo onduct enviro	s. omica ting ponme	ally and polymer ntal pol	new s and lutior	meth 1 also 1.	nods o pro	of or oduce	ganic cheaj	synth per b	iesis a iodegi	nd su radabl	bstitute e poly	e metals			
CO-4 Mapping of	Ha va De wi ree	rious esigr th c duce	s needs n econo onduct enviro	s. omica ting ponme	ally and polymer ntal pol	new s and lutior	meth 1 also 1. <b>utcon</b>	nods o pro	of or oduce	ganic cheaj	synth per b	iesis a iodegi	nd su radabl	bstitute e poly	e metals mers to			
CO-4	Ha va Do wi rea	rious esign th c duce se Ou	s needs n econo onduct enviro utcome	s. omica ting 1 onmer es with	ally and polymer ntal pol h <b>Progr</b>	new s and lutior am O PO'	meth d also n. <b>utcon</b> s	nods o pro nes &	of or oduce	ganic cheaj gram	synth per b <b>Speci</b>	iesis a iodegi fic Ou	nd su radabl	bstitute e poly es PSO <sup>3</sup>	e metals mers to			
CO-4 Mapping of CO	Cours	rious esigr th c duce se Ou	s needs n econo onduct enviro utcome	s. omica ting p onmer es with 4	ally and polymer ntal pol	am O PO' 6	meth d also a. <b>utcon</b> s 7	nods o pro	of or oduce	ganic cheaj	synth per b	iodegr fic Ou	nd su radabl tcomo	bstitute e poly	e metals mers to			
CO-4 Mapping of CO CO-1	Have the second	rious esign th c duce se Ou 2 3	s needs n econo onduct envirc utcome 3 2	s. omica ting p onmer es with 4 3	ally and polymer ntal pol h <b>Progr</b>	am O PO' 2	meth d also n. <b>utcon</b> s 7 3	nods o pro nes &	of or oduce	ganic cheaj gram	synth per b <b>Speci</b>	fic Ou	nd su radabl	bstitute e poly es PSO <sup>3</sup> 2	e metals mers to			
CO-4 Mapping of CO CO-1 CO-2	Cours 1 2 2 2	rious esign th c duce se Ou 2 3 3	s needs n econd onduct enviro utcome 3 2 2	s. omica ting p onmer es with 4 3 3	ally and polymer ntal pol h <b>Progr</b>	am O PO' 6 2 2	meth d also a. <b>utcon</b> s 7 3 3	nods o pro nes &	of or oduce	ganic cheaj gram	synth per b <b>Speci</b>	fic Ou 12 3 3	nd su radabl tcomo	bstitute e poly es PSO 2 2 2	e metals mers to			
CO-4 Mapping of CO CO-1 CO-2 CO-3	Have the second	rious esign th c duce se Ou 2 3 3 3	s needs n econo onduct envirc utcome 3 2	s. omica ting p onmer es with 4 3	ally and polymer ntal pol h <b>Progr</b>	am O PO' 2	meth 1 also 1. <b>utcon</b> <b>s</b> 7 3 3 3 3	nods o pro nes &	of or oduce	ganic cheaj gram	synth per b <b>Speci</b>	fic Ou	nd su radabl tcomo	bstitute e poly es PSO <sup>3</sup> 2	e metals mers to			
CO-4 Mapping of CO CO-1 CO-2	Cours 1 2 2 2	rious esign th c duce se Ou 2 3 3	s needs n econd onduct enviro utcome 3 2 2	s. omica ting p onmer es with 4 3 3	ally and polymer ntal pol h <b>Progr</b>	am O PO' 6 2 2	meth d also a. <b>utcon</b> s 7 3 3	nods o pro nes &	of or oduce	ganic cheaj gram	synth per b <b>Speci</b>	fic Ou 12 3 3	nd su radabl tcomo	bstitute e poly es PSO 2 2 2	e metals mers to			
CO-4 Mapping of CO CO-1 CO-2 CO-3	Ha va Do wi rea Cours 1 2 2 2	rious esign th c duce se Ou 2 3 3 3	s needs n econo onduct enviro utcome 3 2 2 2 2	s. omica ting ponmer es with 4 3 3 3	ally and polymer ntal pol h <b>Progr</b>	am O PO' 6 2 2 2	meth 1 also 1. <b>utcon</b> <b>s</b> 7 3 3 3 3	nods o pro nes &	of or oduce	ganic cheaj gram	synth per b <b>Speci</b>	fic Ou 12 3 3 3	nd su radabl tcomo	bstitute e poly es PSO <sup>3</sup> 2 2 3	e metals mers to			
CO-4 Mapping of CO CO-1 CO-2 CO-3 CO-4	Hailer         Va         Va         Will         re         Course         1         2	rious esign th c duce se Ou 3 3 3 3 3	s needsa econdonductenviroatcome32223	s. omica ting ponmer es with 4 3 3 3 3	ally and polymer ntal pol h <b>Progr</b>	am O PO' 6 2 2 2 2 2	meth 1 also 1. <b>utcon</b> <b>s</b> 7 3 3 3 3 3	nods o pro nes &	of or oduce	ganic cheaj gram	synth per b <b>Speci</b>	fic Ou 12 3 3 3 3	ind su radabl itcome 1 2	bstitute e poly es PSO? 2 2 2 3 2 2	e metals mers to			
CO-4 Mapping of CO CO-1 CO-2 CO-3 CO-4	Hi           Va           Da           wi           re           Cours           1           2           2           2           2           2           2           2           2           2           2           2           2           2	rious esign th c duce se Ou 3 3 3 3 3	s         needs           n         econo           onduct         enviro           utcome         3           2         2           2         2           3         2.25	s. omica ting ponmer es with 4 3 3 3 3 3 3	ally and polymer ntal pol h Progra	am O PO' 6 2 2 2 2 2	meth 1 also 1. <b>utcon</b> <b>s</b> 7 3 3 3 3 3	nods o pro nes &	of or oduce	ganic cheaj gram	synth per b Speci 11	fic Ou 12 3 3 3 3 3 3 3 3	ind su radabl itcome 1 2 2	bstitute e poly es PSO? 2 2 2 3 2 2	e metals mers to			
CO-4 Mapping of CO CO-1 CO-2 CO-3 CO-4 Average	Hi va Do wi re Cours 1 2 2 2 2 2 2 2 2 2 2 2 2 2	rious essign th c duce 2 3 3 3 3 3 3 3 3 3 3	s         needs           n         econo           onduct         enviro           atcome         3           2         2           2         3           2.25         1	s. omica ting p onmer es with 4 3 3 3 3 3 UNIT	ally and polymer ntal pol h Progra	am O PO' 6 2 2 2 2 2	meth 1 also 1. <b>utcon</b> <b>s</b> 7 3 3 3 3 3	nods o pro nes &	of or oduce	ganic cheaj gram	synth per b Speci 11	fic Ou 12 3 3 3 3	ind su radabl itcome 1 2 2	bstitute e poly es PSO? 2 2 2 3 2 2	e metals mers to			
CO-4 Mapping of CO CO-1 CO-2 CO-3 CO-4 Average	Ha va Do wi re Cours 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	rious essigr th c duce <b>se Ou</b> <b>2</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>4</b> <b>4</b> <b>4</b>	s needs n econo onduct enviro atcome 3 2 2 2 2 3 2.25	s. omica ting p onmer es with 4 3 3 3 3 3 UNIT rame	ally and polymer ntal poli h Progra 5 5	new rs and lutior <b>am O</b> <b>PO'</b> <b>6</b> 2 2 2 2 2 2 2 2 2	meth d also a. <b>utcon</b> s 7 3 3 3 3 3 3 <b>3</b> 3	nods o pro	of or oduce z Prog 9	ganic cheaj gram 10	synth per b Speci 11 (12	fic Ou 12 3 3 3 3 2 Hour	ind su radabl itcome 1 2 2 2 (rs)	bstitute e poly es PSO? 2 2 2 3 2 2	e metals mers to			
CO-4 Mapping of CO CO-1 CO-2 CO-3 CO-4 Average	Have value of the second secon	rious essigr ith c duce <b>se Ou</b> <b>2</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>4</b> <b>4</b> <b>4</b> <b>2</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b>	s needs n econo onduct envirc utcome 3 2 2 2 2 3 2.25 1 ity pa ity, Ha	s. omica ting p onmer es with 4 3 3 3 3 3 UNIT rametardnes	ally and polymer ntal poli h Progra 5 5 	am O PO' 6 2 2 2 2 2 2 2 2 2	meth d also a. <b>utcon</b> <b>s</b> <b>7</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b>	nods o pro	of or oduce 2 Prog 9	ganic cheaj gram 10	synth per b Speci 11 (12 cal pro	fic Ou fic Ou 12 3 3 3 3 3 2 Hour oblem	ind su radabl itcomo 1 2 2 (rs) s,	bstitute e poly es PSO' 2 2 3 2 2.25	e metals mers to			
CO-4 Mapping of CO CO-1 CO-2 CO-2 CO-3 CO-4 Average	Hi         Va	rious esigr ith c duce <b>se Ou</b> <b>2</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b>	s needs n econo onduct envirc itcome 3 2 2 2 3 2.25 3 2.25 Ulty pa ity, Ha es, Sca	s. omica ting ponment onment es with 4 3 3 3 3 3 UNIT rametales, 0	Ally and polymer ntal poli h Progra 5 5 	am O PO' 6 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	meth d also a. <b>utcon</b> <b>s</b> 7 3 3 3 3 3 <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b>	nods o pro	of or oduce 2 Prog 9	ganic cheaj gram 10	synth per b Speci 11 (12 cal pro	fic Ou fic Ou 12 3 3 3 3 3 2 Hour oblem	ind su radabl itcomo 1 2 2 (rs) s,	bstitute e poly es PSO' 2 2 3 2 2.25	e metals mers to			
CO-4 Mapping of CO CO-1 CO-2 CO-3 CO-4 Average	HiVa <td>rious esigr ith c duce <b>2</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b></td> <td>s needs n econo onduct envirc utcome 3 2 2 2 2 3 2.25 1 1 1 1 1 2 2 3 2.25</td> <td>s. omica ting p onmer es with 4 3 3 3 3 3 3 3 UNIT rametardnes ales, 0 ate, c</td> <td>Ally and polymer ntal pol h Progra 5 5 </td> <td>am O PO' 6 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2</td> <td>meth d also a. <b>utcon</b> s 7 3 3 3 3 3 3 3 3 0 n &amp; ittlen arbon</td> <td>nods o pro</td> <td>of or, oduce 2 Prog 9 9</td> <td>ganic cheaj gram 10 </td> <td>synth per b Speci 11 (12 cal pro-</td> <td>fic Ou fic Ou 12 3 3 3 3 3 3 3 2 Hour oblem , Prin</td> <td>tcome 1 2 2 rs) s, ning a</td> <td>bstitute e poly es PSO<sup>3</sup> 2 2 2 3 2 2 2.25 nd foa</td> <td>e metals mers to</td>	rious esigr ith c duce <b>2</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b>	s needs n econo onduct envirc utcome 3 2 2 2 2 3 2.25 1 1 1 1 1 2 2 3 2.25	s. omica ting p onmer es with 4 3 3 3 3 3 3 3 UNIT rametardnes ales, 0 ate, c	Ally and polymer ntal pol h Progra 5 5 	am O PO' 6 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	meth d also a. <b>utcon</b> s 7 3 3 3 3 3 3 3 3 0 n & ittlen arbon	nods o pro	of or, oduce 2 Prog 9 9	ganic cheaj gram 10 	synth per b Speci 11 (12 cal pro-	fic Ou fic Ou 12 3 3 3 3 3 3 3 2 Hour oblem , Prin	tcome 1 2 2 rs) s, ning a	bstitute e poly es PSO <sup>3</sup> 2 2 2 3 2 2 2.25 nd foa	e metals mers to			
CO-4 Mapping of CO CO-1 CO-2 CO-3 CO-4 Average Introduction: Characteristic Boiler Troubl Internal cond External cond	HiVa <td>rious essigr th c duce se Ou 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3</td> <td>s needs n econo onduct enviro utcome 3 2 2 2 2 3 2.25 1 1 1 1 1 2 2 3 2.25 1 1 1 1 2 2 3 2 2 3 2.25 1 1 1 2 1 2 3 1 2 2 3 1 2 2 3 1 2 2 3 1 2 2 3 1 2 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1</td> <td>s. omica ting p onmer es with 4 3 3 3 3 3 3 UNIT rametardnes ales, 0 ate, c xchar</td> <td>Ally and polymer ntal poli h Progra 5 5 5 7-1 ters ss - Est Caustic calgon a nge proc</td> <td>am O PO' 6 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2</td> <td>meth d also a. <b>utcon</b> s 7 3 3 3 3 3 3 3 3 0 n &amp; ittlen arbon</td> <td>nods o pro</td> <td>of or, oduce 2 Prog 9 9</td> <td>ganic cheaj gram 10 </td> <td>synth per b Speci 11 (12 cal pro-</td> <td>fic Ou fic Ou 12 3 3 3 3 3 3 3 2 Hour oblem , Prin</td> <td>tcome 1 2 2 rs) s, ning a</td> <td>bstitute e poly es PSO<sup>3</sup> 2 2 2 3 2 2 2.25 nd foa</td> <td>e metals mers to</td>	rious essigr th c duce se Ou 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	s needs n econo onduct enviro utcome 3 2 2 2 2 3 2.25 1 1 1 1 1 2 2 3 2.25 1 1 1 1 2 2 3 2 2 3 2.25 1 1 1 2 1 2 3 1 2 2 3 1 2 2 3 1 2 2 3 1 2 2 3 1 2 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	s. omica ting p onmer es with 4 3 3 3 3 3 3 UNIT rametardnes ales, 0 ate, c xchar	Ally and polymer ntal poli h Progra 5 5 5 7-1 ters ss - Est Caustic calgon a nge proc	am O PO' 6 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	meth d also a. <b>utcon</b> s 7 3 3 3 3 3 3 3 3 0 n & ittlen arbon	nods o pro	of or, oduce 2 Prog 9 9	ganic cheaj gram 10 	synth per b Speci 11 (12 cal pro-	fic Ou fic Ou 12 3 3 3 3 3 3 3 2 Hour oblem , Prin	tcome 1 2 2 rs) s, ning a	bstitute e poly es PSO <sup>3</sup> 2 2 2 3 2 2 2.25 nd foa	e metals mers to			
CO-4 Mapping of CO CO-1 CO-2 CO-3 CO-4 Average Introduction: Characteristic Boiler Troubl Internal cond	Hi         Va         Da         Wi         rea         1         2	rious essigr ith c duce <b>2</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b>	s needs n econo onduct enviro utcome 3 2 2 2 2 3 2.25 1 ity pa ity, Ha es, Sca ohosph Ion ez on, Fil	s. omica ting p onmer es with 4 3 3 3 3 3 3 3 3 4 UNIT rametardnes ales, c ate, c xchar tratio	Ally and polymer ntal poli h Progra 5 5 5 	imatic am O PO' 6 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	meth d also a. <b>utcon</b> s 7 3 3 3 3 3 3 3 3 3 3 3 2 5 0 n & ittlen arbon & Zei	simpnent, ate n	of or oduce 2 Prog 9 9	ganic cheaj gram 10 meric er corr ds. ess W	synth per b Speci 11 (12 cal pro-	fic Ou fic Ou 12 3 3 3 3 3 3 3 2 Hour oblem , Prin	tcome 1 2 2 rs) s, ning a	bstitute e poly es PSO <sup>3</sup> 2 2 2 3 2 2 2.25 nd foa	e metals mers to			
CO-4 Mapping of CO CO-1 CO-2 CO-2 CO-3 CO-4 Average Introduction: Characteristic Boiler Troubl Internal cond External cond Sedimentation,	Hi         Va	rious esigr ith c duce <b>2</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b> <b>3</b>	s needs n econo onduct enviro itcome 3 2 2 2 2 3 2.25 1 ity pa ity, Ha es, Sca bhosph Ion ez on, Fil Chlorin	s. omica ting ponmer es with 4 3 3 3 3 3 3 3 UNIT rame ales, 0 ate, c xchar tration	Ally and polymer ntal poli h Progra 5 5 5 	am O lutior PO' 6 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	meth d also a. <b>utcon</b> s 7 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	nods p pro nes & 8 simp nent, ate n olite	of or oduce 2 Prog 9 9 0 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0	ganic cheaj gram 10 umeric r corr ds. ess W nent.	synth per b Speci 11 (12 cal pro- cosion HO C	fic Ou fic Ou 12 3 3 3 3 3 3 3 3 3 3 5 4 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	ind su radabl itcome 1 2 2 (rs) s, ning a ines,	bstitute e poly es PSO <sup>3</sup> 2 2 2 3 2 2 2.25 nd foa	e metals mers to			



**Thermodynamic functions:** energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications.

 **Corrosion:** Types of corrosion - Chemical or dry corrosion, Electrochemical or wet corrosion; Galvanic, stress, pitting and differential aeration corrosion; Factors effecting corrosion, Corrosion control – Cathodic protection, and electro plating (Au) & electrodes Ni plating.

 **UNIT-3** (12 Hours)

Fuels: Classification of fuels; Calorific value of fuels (lower, higher)

**Solid fuels**: Determination of calorific value (Bomb Calorimeter) & related problems, Coal ranking. **Liquid Fuels**: Petroleum refining and fractions, composition and uses. Knocking and anti- knocking Agents, Octane number and Cetane number; Bio fuels- Biodiesel, general methods of preparation and advantages

Gaseous fuels: CNG and LPG,

Flue gas analysis – Orsat apparatus.

UNIT-4
--------

(12 Hours)

Organic reactions and synthesis of a drug molecule

Introduction to reactions involving substitution  $(SN^1, SN^2)$ , addition (Markownikoff's and anti-Markwnikoff's rules), elimination  $(E_1\& E_2)$ , Synthesis of a commonly used drug molecule.(Aspirin and Paracetamol)

**Polymers:** Conducting polymers: Classification, Intrinsic and Extrinsic conducting polymers and their applications. Plastics: Thermoplasts and thermosetting plastics, Bskelite and PVC.

Bio degradable polymers: types, examples-Polyhydroxybuterate (PHB), Polyhydroxybuterate-co- $\beta$ -hydroxyvalerate (PHBV), applications.

Text Books :	1. P.C. Jain and Monica Jain, "Engineering Chemistry" DhanpatRai Pub,
	Co., New Delhi 17th edition (2017).
	2. SeshiChawla, "Engineering Chemistry" DhanpatRai Pub, Co LTD, New
	Delhi 13 th edition, 2013.
<b>References</b> :	1. Essential of Physical Chemistry by ArunBahl, B.S. Bahl, G.D.Tuli, by
	ArunBahl, B.S. Bahl, G.D.Tuli, Published by S Chand Publishers, 12th
	Edition, 2012.
	2. Engineering Chemistry by C.P. Murthy, C.V. Agarwal, A. Naidu B.S.
	Publications, Hyderabad (2006).
	3. Engineering Chemistry by K. Maheswaramma, Pearson publishers 2015.



ENGINEERING CHEMISTRY LAB         Practicals       :       3 Hours/Week       Continuous Assessment       :       30         Final Exam       :       3 Hours/Week       Continuous Assessment       :       30         Pre-Requisite: None.				E	NGIN	EER	ING	CHE	MIST	RY	LAB						]	
Practicals       :       3 Hours/Week       Continuous Assessment       :       30         Final Exam       :       3 Hours       Final Exam Marks       :       70         Pre-Requisite:       None.       :       70         Course Objectives:       The course consists of experiments related to the principles of chemistry required for engineering student. The student should know:       :       70         1.       The basics of chemistry lab to carry out the qualitative and quantitative analysis of any given sample.       .       .       .         2.       Sait.       To determine the percentage purity of washing soda bleaching powder and given salt.       .       .       .       .         3.       The measurement of quality parameters of water to check its suitability for domestic and industrial purpose       .       .       .       .         4.       To estimate the characteristic properties of oil for its use at various level       .       .       .       .         5.       To synthesize the Soap, Resin and Aromatic Ester followed by their applications       .       .       .       .         6.       Course Outcomes:       Students will be able to       .       .       .       .       .       .       .       .       .       .       .       .       .	I	B.Te	ech –									CYL01	1)					
Pre-Requisite: None.         Course Objectives: The course consists of experiments related to the principles of chemistry required for engineering student. The student should know:         1.       The basics of chemistry lab to carry out the qualitative and quantitative analysis of any given sample.         2.       To determine the percentage purity of washing soda bleaching powder and given salt.         3.       The measurement of quality parameters of water to check its suitability for domestic and industrial purpose         4.       To estimate the characteristic properties of oil for its use at various level         5.       To synthesize the Soap, Resin and Aromatic Ester followed by their applications         6.       The use and utility of some instruments like PH meter, Conductometer and Potentiometer for various applications         Course Outcomes: Students will be able to         CO-1       Familiar with fundamental basics of Chemistry lab         CO-2       Estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.         CO-3         Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.         CO-4         Program Specific Outcomes         Coint conse with Program Outcomes & Program Specific Outcomes         CO-1         2		:											/	:		30		
Course Objectives: The course consists of experiments related to the principles of chemistry required for engineering student. The student should know:         1.       The basics of chemistry lab to carry out the qualitative and quantitative analysis of any given sample.         2.       To determine the percentage purity of washing soda bleaching powder and given salt.         3.       The measurement of quality parameters of water to check its suitability for domestic and industrial purpose         4.       To estimate the characteristic properties of oil for its use at various level         5.       To synthesize the Soap, Resin and Aromatic Ester followed by their applications         6.       Potentiometer for various applications         CO-1       Familiar with fundamental basics of Chemistry lab         CO-2       Estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.         CO-3       Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.         CO-4       Prepare high polymers and soap & Instrumentation technics         Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes         CO-1       2       2         CO-1       2       2       2         CO-3       2       2       2         CO-4       2       2       2         CO-4 </td <td>Final Exam</td> <td>:</td> <td>3 Ho</td> <td>ours</td> <td></td> <td></td> <td>Final</td> <td>Exan</td> <td>n Mar</td> <td>`ks</td> <td></td> <td></td> <td></td> <td>:</td> <td></td> <td>70</td> <td></td>	Final Exam	:	3 Ho	ours			Final	Exan	n Mar	`ks				:		70		
required for engineering student. The student should know:         1.       The basics of chemistry lab to carry out the qualitative and quantitative analysis of any given sample.         2.       To determine the percentage purity of washing soda bleaching powder and given salt.         3.       The measurement of quality parameters of water to check its suitability for domestic and industrial purpose         4.       To estimate the characteristic properties of oil for its use at various level         5.       To synthesize the Soap, Resin and Aromatic Ester followed by their applications         6.       Potentiometer for various applications         Course Outcomes: Students will be able to         CO-1       Familiar with fundamental basics of Chemistry lab         CO-2       Estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.         CO-3       Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.         CO-4       Prepare high polymers and soap & Instrumentation technics         Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes         CO-1         CO-1       2         CO-3       3       4       5       6       7       8       9       10       11       12       1       2	Pre-Requisite:																	
1.       The basics of chemistry lab to carry out the qualitative and quantitative analysis of any given sample.         2.       To determine the percentage purity of washing soda bleaching powder and given salt.         3.       The measurement of quality parameters of water to check its suitability for domestic and industrial purpose         4.       To estimate the characteristic properties of oil for its use at various level         5.       To synthesize the Soap, Resin and Aromatic Ester followed by their applications         6.       The use and utility of some instruments like PH meter, Conductometer and Potentiometer for various applications         Course Outcomes:       Students will be able to         CO-2       Estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.         CO-3       Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.         CO-4       Prepare high polymers and soap & Instrumentation technics         Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes         CO-1       2       2       2         CO-1       2       2       2       2         CO-2       2       2       2       2         CO-3       Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.       2																		
1.       any given sample.         2.       To determine the percentage purity of washing soda bleaching powder and given salt.         3.       The measurement of quality parameters of water to check its suitability for domestic and industrial purpose         4.       To estimate the characteristic properties of oil for its use at various level         5.       To synthesize the Soap, Resin and Aromatic Ester followed by their applications         6.       The use and utility of some instruments like PH meter, Conductometer and Potentiometer for various applications         Course Outcomes:       Students will be able to         CO-1       Familiar with fundamental basics of Chemistry lab         CO-2       Estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.         CO-3       Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.         CO-4       Prepare high polymers and soap & Instrumentation technics         Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes         CO-1       2       2         CO-1       2       2         CO-2       2       2       2         CO-3       2       2       2         CO-4       2       2       2         CO-1       2       2 <td< td=""><td>required for engi</td><td>ineeri</td><td>ng stu</td><td>ıdent.</td><td>The s</td><td>studer</td><td>nt sho</td><td>uld kr</td><td>iow:</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	required for engi	ineeri	ng stu	ıdent.	The s	studer	nt sho	uld kr	iow:									
any given sample.         2.         To determine the percentage purity of washing soda bleaching powder and given salt.         3.         The measurement of quality parameters of water to check its suitability for domestic and industrial purpose         4.         To synthesize the Soap, Resin and Aromatic Ester followed by their applications         6.         The use and utility of some instruments like PH meter, Conductometer and Potentiometer for various applications         Course Outcomes: Students will be able to         CO-1         Familiar with fundamental basics of Chemistry lab         CO-2         CO-3         Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.         CO-4         PO's         PSO's         CO-1         Course Outcomes with Program Outcomes & Program Specific Outcomes         Coo-2         CO-1         PSO's         PSO's         Coo-2         Q         Q       Q	1	The	basic	s of c	hemis	stry la	ib to c	carry o	out th	e qual	litative	e and o	quantit	ativ	e ana	alysis	of	
2.       salt.       Salt.       Salt.         3.       The measurement of quality parameters of water to check its suitability for domestic and industrial purpose         4.       To estimate the characteristic properties of oil for its use at various level         5.       To synthesize the Soap, Resin and Aromatic Ester followed by their applications         6.       The use and utility of some instruments like PH meter, Conductometer and Potentiometer for various applications         Course Outcomes: Students will be able to         CO-1       Familiar with fundamental basics of Chemistry lab         CO-2       Estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.         CO-3       Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.         CO-4       Prepare high polymers and soap & Instrumentation technics         Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes         CO-1       2       2         CO-1       2       2       2         CO-1       2       2       2         CO-2       2       2       2         CO-3       Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.         CO-4       Prepare high polymers	1.	any	giver	i samj	ple.													
salt.         3.       The measurement of quality parameters of water to check its suitability for domestic and industrial purpose         4.       To estimate the characteristic properties of oil for its use at various level         5.       To synthesize the Soap, Resin and Aromatic Ester followed by their applications         6.       The use and utility of some instruments like PH meter, Conductometer and Potentiometer for various applications         Course Outcomes: Students will be able to         CO-1       Familiar with fundamental basics of Chemistry lab         CO-2       Estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.         CO-4       Prepare high polymers and soap & Instrumentation technics         Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes         CO-1       2       2       2         CO-1       2       PO's       PSO's         OUTCOMES       Co-1       2       2         CO-4       Prepare high polymers and soap & Instrumentation technics         Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes	2	То	detern	nine t	he pei	centa	ige pu	rity o	f was	hing s	soda b	leachi	ng pov	wder	and	give	n	
5.       and industrial purpose         4.       To estimate the characteristic properties of oil for its use at various level         5.       To synthesize the Soap, Resin and Aromatic Ester followed by their applications         6.       The use and utility of some instruments like PH meter, Conductometer and Potentiometer for various applications         Course Outcomes: Students will be able to         CO-1       Familiar with fundamental basics of Chemistry lab         CO-2       Estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.         CO-3       Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.         CO-4       Prepare high polymers and soap & Instrumentation technics         Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes         CO-1       2       2         CO-1       2       2         CO-2       2       2       2         CO-4       Prepare high polymers and soap & Instrumentation technics         Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes         CO-1       2       2       2         CO-2       2       2       2       2         CO-1       2       2       2       2	۷.	salt																
and industrial purpose         4.       To estimate the characteristic properties of oil for its use at various level         5.       To synthesize the Soap, Resin and Aromatic Ester followed by their applications         6.       The use and utility of some instruments like PH meter, Conductometer and Potentiometer for various applications         Course Outcomes: Students will be able to         CO-1       Familiar with fundamental basics of Chemistry lab         CO-2       Estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.         CO-3       Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.         CO-4       Prepare high polymers and soap & Instrumentation technics         Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes         CO-1       2       2         CO-1       2       2       2         CO-1       2       P SO's         PO's       P SO's         CO-1       2       2       2       2       2 <th co<="" td=""><td>3</td><td>The</td><td>meas</td><td>urem</td><td>ent of</td><td>quali</td><td>ity pa</td><td>ramet</td><td>ers of</td><td>wate</td><td>r to ch</td><td>eck it</td><td>s suita</td><td>bilit</td><td>y for</td><td>dom</td><td>estic</td></th>	<td>3</td> <td>The</td> <td>meas</td> <td>urem</td> <td>ent of</td> <td>quali</td> <td>ity pa</td> <td>ramet</td> <td>ers of</td> <td>wate</td> <td>r to ch</td> <td>eck it</td> <td>s suita</td> <td>bilit</td> <td>y for</td> <td>dom</td> <td>estic</td>	3	The	meas	urem	ent of	quali	ity pa	ramet	ers of	wate	r to ch	eck it	s suita	bilit	y for	dom	estic
4.       To synthesize the Soap, Resin and Aromatic Ester followed by their applications         5.       To synthesize the Soap, Resin and Aromatic Ester followed by their applications         6.       The use and utility of some instruments like PH meter, Conductometer and Potentiometer for various applications         Course Outcomes: Students will be able to         CO-1       Familiar with fundamental basics of Chemistry lab         CO-2       Estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.         CO-3       Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.         CO-4       Prepare high polymers and soap & Instrumentation technics         Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes         CO-1       2       2         CO-1       2       2         CO-2       2       2       2         CO-4       Prepare bigh polymers and soap & Instrumentation technics       PSO's         1       2       3       4       5       6       7       8       9       10       11       12       1       2         CO-1       2       2       2       2       2       2       2       2         CO-2       2	5.																	
5.       To synthesize the Soap, Resin and Aromatic Ester followed by their applications         6.       The use and utility of some instruments like PH meter, Conductometer and Potentiometer for various applications         Course Outcomes: Students will be able to         CO-1       Familiar with fundamental basics of Chemistry lab         CO-2       Estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.         CO-3       Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.         CO-4       Prepare high polymers and soap & Instrumentation technics         Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes         CO-1       2       2         CO-1       2       2       2         CO-2       PO's       PSO's         1       2       3       4       5       6       7       8       9       10       11       12       1       2         CO-1       2       2       2       2       2       2       2       2         CO-4       Prepare high polymers       0       1       1       12       1       2       2       2       2       2       2<	4	То	estima	ate the	e char	acteri	stic p	ropert	ties of	f oil fo	or its u	ise at v	variou	s lev	vel			
S.       The use and utility of some instruments like PH meter, Conductometer and Potentiometer for various applications         Course Outcomes: Students will be able to       CO-1         CO-1       Familiar with fundamental basics of Chemistry lab         CO-2       Estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.         CO-3       Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.         CO-4       Prepare high polymers and soap & Instrumentation technics         Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes         CO-1       2       2       2         CO-1       2       2       2       2         CO-4       2       2       2       2         CO-1       2       2       2       2         CO-2       2       2       2       2         CO-4       Prepare high polymers and soap & Instrumentation technics       PSO's         CO-1       2       0       1       1       2       2         CO-2       2       2       2       2       2       2         CO-1       2       2       2       2       2       2       2         C		То	synthe	eize t	he Sc	an R	esin a	and A	romat	ic Fet	er foll	lowed	by the	ir ai	onlic	ation	c	
6.       Potentiometer for various applications         Course Outcomes: Students will be able to         CO-1       Familiar with fundamental basics of Chemistry lab         CO-2       Estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.         CO-3       Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.         CO-4       Prepare high polymers and soap & Instrumentation technics         Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes         CO-1       2       PSO's         1       2       3       4       5       6       7       8       9       10       11       12       1       2         CO-1       2       2       2       2       2       2       2         CO-1       2       2       2       2       2       2       2         CO-1       2       2       2       2       2       2       2         CO-2       2       2       2       2       2       2       2       2         CO-1       2       2       2       2       2       2       2       2       2       2       <	5.																3	
Potentiometer for various applications         Course Outcomes: Students will be able to         CO-1       Familiar with fundamental basics of Chemistry lab         CO-2       Estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.         CO-3       Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.         CO-4         Prepare high polymers and soap & Instrumentation technics         Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes         CO         PO's       PSO's         Outcomes with Program Outcomes & Program Specific Outcomes         CO-1       2 <th< td=""><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>e PH</td><td>meter</td><td>, Con</td><td>ductor</td><td>neter</td><td>r and</td><td>l</td><td></td></th<>	6									e PH	meter	, Con	ductor	neter	r and	l		
CO-1Familiar with fundamental basics of Chemistry labCO-2Estimate purity of washing soda, bleaching powder and quantityof Iron and other salts.CO-3Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.CO-4Prepare high polymers and soap & Instrumentation technicsMapping of Course Outcomes with Program Outcomes & Program Specific OutcomesCOPO'sCO-12CO-12CO-222	0.	Pote	ention	neter	for va	rious	appli	catior	IS									
CO-1Familiar with fundamental basics of Chemistry labCO-2Estimate purity of washing soda, bleaching powder and quantityof Iron and other salts.CO-3Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.CO-4Prepare high polymers and soap & Instrumentation technicsMapping of Course Outcomes with Program Outcomes & Program Specific OutcomesCOPO'sCO-12CO-12CO-222			. 1		1 1	11 /												
CO-2Estimate purity of washing soda, bleaching powder and quantity of Iron and other salts.CO-3Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.CO-4Prepare high polymers and soap & Instrumentation technicsMapping of Course Outcomes with Program Outcomes & Program Specific OutcomesCOPO'sCO-12CO-12CO-22CO-3222CO-3222CO-4222<								6	<u> </u>	•	1 1							
salts.       CO-3       Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.       CO-4       Prepare high polymers and soap & Instrumentation technics       Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes       CO     PO's       Quarter of the polymers and soap & Instrumentation technics       CO-1     2     2       CO-1     2     2       CO-2     2     2       CO-3     2												1		C T		1 /	1	
CO-3Gain the knowledge regarding the quality parameters of water & oil like salinity, hardness, alkalinity saponification and iodine value.etc.CO-4Prepare high polymers and soap & Instrumentation technicsMapping of Course Outcomes with Program Outcomes & Program Specific OutcomesCOPO'sCOPSO'sCO-12CO-12CO-2222CO-3222CO-4222 </td <td>CO-2</td> <td></td> <td></td> <td>purity</td> <td>of w</td> <td>ashin</td> <td>g soda</td> <td>a, blea</td> <td>aching</td> <td>g pow</td> <td>der an</td> <td>id qua</td> <td>ntity</td> <td>of It</td> <td>on a</td> <td>nd ot</td> <td>her</td>	CO-2			purity	of w	ashin	g soda	a, blea	aching	g pow	der an	id qua	ntity	of It	on a	nd ot	her	
salinity, hardness, alkalinity saponification and iodine value.etc.CO-4Prepare high polymers and soap & Instrumentation technicsMapping of Course Outcomes with Program Outcomes & Program Specific OutcomesCOPO'sPSO'sCOPO'sPSO's0PO'sPSO'sCO-122CO-122CO-122CO-122CO-122CO-122CO-122CO-122CO-222CO-122CO-222CO-222CO-322CO-322CO-322CO-322CO-322CO-422CO-422 <td><u> </u></td> <td></td> <td></td> <td>I1</td> <td>1.1</td> <td></td> <td>1</td> <td>1</td> <td>- 1:4</td> <td></td> <td></td> <td>- <b>f</b> (</td> <td></td> <td>1 11</td> <td></td> <td></td> <td></td>	<u> </u>			I1	1.1		1	1	- 1:4			- <b>f</b> (		1 11				
CO-4       Prepare high polymers and soap & Instrumentation technics         Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes         CO       PO's       PSO's         1       2       3       4       5       6       7       8       9       10       11       12       1       2         CO-1       2       2       2       2       2       2       2       2       2         CO-2       2       2       2       2       2       2       2       2       2         CO-3       2       2       2       2       2       2       2       2       2         CO-4       2       2       2       2       2       2       2       2         CO-4       2       2       2       2       2       2       2       2       2	0-3													011 111	ke			
Inspire high polyhols and socp & instantation technics       Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes       CO     PO's     PSO's       1     2     3     4     5     6     7     8     9     10     11     12     1     2       CO-1     2     2     2     2     2     2     2       CO-2     2     2     2     2     2     2       CO-3     2     2     2     2     2     2       CO-4     2     2     2     2     2     2 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>· ·</td> <td></td>							· ·											
CO       PO's       PSO's         1       2       3       4       5       6       7       8       9       10       11       12       1       2         CO-1       2       2       2       2       2       2       2       2       2         CO-2       2       2       2       2       2       2       2       2         CO-3       2       2       2       2       2       2       2       2         CO-4       2       2       2       2       2       2       2       2				<b>U</b>			-											
1       2       3       4       5       6       7       8       9       10       11       12       1       2         CO-1       2       2       2       2       2       2       2       2       2       2       2       2         CO-2       2																		
CO-1       2       2       2       2         CO-2       2       2       2       2       2       2         CO-3       2       2       2       2       2       2       2         CO-3       2       2       2       2       2       2       2       2         CO-4       2       2       2       2       2       2       2       2												S	-					
CO-2       2       2       2       2       2       2       2         CO-3       2       2       2       2       2       2       2       2         CO-4       2       2       2       2       2       2       2       2		-	4	3	4	Э	0	/	ð	<u>у</u>	10	11	14	-	2			
CO-3       2       2       2       2       2       2       2         CO-4       2       2       2       2       2       2       2       2			2	2	2		2						2					
CO-4         2			_	_														
							2							2				
		_					2							2				
	Average	4	4	4	4		4						4	4				
		L														<u> </u>	<u>і                                    </u>	

#### LIST OF EXPERIMENTS

1. Introduction to Chemistry Lab (the teachers are expected to teach fundamentals like Calibration of Volumetric Apparatus, Primary, Secondary Solutions, Normality, Molarity, Molality etc. and error, accuracy, precision, theory of indicators, use of volumetric titrations).

#### 2. Volumetric Analysis:

a. Estimation of Washing Soda.

- b. Estimation of Active Chlorine Content in Bleaching Powder
- c. Estimation of Mohr's salt by permanganometry.
- b. Estimation of given salt by using Ion-exchange resin using Dowex-50.

#### 3. Analysis of Water:



- a. Determination of Alkalinity of Tap water.
- b. Determination of Total Hardness of ground water sample by EDTA method
- c. Determination of Salinity of water sample.

#### 4. Estimation of properties of oil:

- a. Estimation of Acid Value
- b. Estimation of Saponification value.

#### 5. Preparations:

- a. Preparation of Soap
- b. Preparation of Urea-formaldehyde resin
- c. Preparation of Phenyl benzoate.

## 6. Demonstration Experiments (Any two of the following):

- a. Determination of  $p^H$  of given sample.
- b. Determination of conductivity of given sample by conductometer.
- c. Potentiometric Determination of Iron.

Text Books :	1. Practical Engineering Chemistry by K.Mukkanti, Etal, B.S. Publicaitons, Hyderabad, 2009.
	2. Inorganic quantitative analysis, Vogel, 5th edition, Longman group Ltd.
	London, 1979.
<b>References</b> :	1. Text Book of engineering chemistry by R.n. Goyal and HarrmendraGoel.
	2. A text book on experiments and calculations- Engineering Chemistry.
	S.S. Dara.
	3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya
	Publications.