



BAPATLA ENGINEERING COLLEGE:: BAPATLA
(Autonomous)
DEPARTMENT OF CHEMISTRY

ENGINEERING CHEMISTRY																
I B. Tech. – I & II Semesters, All Branches, (Code: 20CY001)																
Lectures	:	3 Hours/Week	Continuous Assessment	:	30											
Final Exam	:	3 Hours	Final Exam Marks	:	70											
Pre-Requisite: None.																
Course Objectives: The student should be conversant:																
1.	With the principles of water characterization and treatment of water for industrial purposes and methods of producing water for potable purposes.															
2.	To understand the thermodynamic concepts, energy changes, concept of corrosion & its control.															
3.	With the conventional energy sources, solid, liquid and gaseous Fuels & knowledge of knocking and anti-knocking characteristics															
4.	With aim to gain good knowledge of organic reactions, plastics, conducting polymers & biodegradable polymers.															
Course Outcomes: Students will be able to																
CO-1	Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.															
CO-2	Apply their knowledge in converting various energies of different systems and protection of different metals from corrosion.															
CO-3	Have the capacity of applying energy sources efficiently and economically for various needs.															
CO-4	Design economically and new methods of organic synthesis and substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.															
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	3	2	3		2	3					3	2			
CO-2	2	3	2	3		2	3					3		2		
CO-3	2	3	2	3		2	3					3		3		
CO-4	2	3	3	3		2	3					3		2		
Average	2	3	2.25	3		2	3					3	2	2.25		
UNIT-1																
														(12 Hours)		
Introduction: water quality parameters																
Characteristics: Alkalinity, Hardness - Estimation & simple numerical problems,																
Boiler Troubles - Sludges, Scales, Caustic embrittlement, boiler corrosion, Priming and foaming;																
Internal conditioning- phosphate, calgon and carbonate methods.																
External conditioning - Ion exchange process & Zeolite process WHO Guidelines, Potable water, Sedimentation, Coagulation, Filtration.																
Disinfection methods: Chlorination, ozonization and UV treatment.																
Salinity – Treatment of Brackish water by Reverse Osmosis and Electrodialysis.																
UNIT-2																
														(12 Hours)		



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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-Markownikoff'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- β -hydroxyvalerate (PHBV), applications.	
Text Books :	<ol style="list-style-type: none">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.
References :	<ol style="list-style-type: none">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.



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ENGINEERING CHEMISTRY LAB														
I B.Tech – I & II Semesters, All Branches (Code: 20CYL01)														
Practicals	:	3 Hours/Week	Continuous Assessment										:	30
Final Exam	:	3 Hours	Final Exam Marks										:	70
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	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	
CO-2	2	2	2	2		2						2	2	
CO-3	2	2	2	2		2						2	2	
CO-4	2	2	2	2								2		
Average	2	2	2	2		2						2	2	
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:														



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<p>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.</p> <p>4. Estimation of properties of oil: a. Estimation of Acid Value b. Estimation of Saponification value.</p>	
<p>5. Preparations: a. Preparation of Soap b. Preparation of Urea-formaldehyde resin c. Preparation of Phenyl benzoate.</p>	
<p>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.</p>	
Text Books :	<ol style="list-style-type: none">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.
References :	<ol style="list-style-type: none">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.