ENGINEERING CHEMISTRY
(Common to CE,ME)

Course Code	23BS1204	**Year**	I	**Semester**	II
Course Category	Basic Sciences	**Branch**	ME	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	NIL
Continuous Internal Evaluation:	30	**Semester End Evaluation:**	70	**Total Marks:**	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	**Interpret** fundamental concepts of engineering chemistry. (L2)
CO2	**Apply** knowledge of water treatment methods, corrosion technology, electrochemical energy systems, and polymerization to solve problems. (L3)
CO3	**Utilize** knowledge of colloids, micelle formation, and nanomaterial's to design and develop new materials..(L3)
CO4	**Analyze** the characteristics and performance of water, corrosion controlling methods, polymers, and fuels to make informed decisions. (L4)
CO5	**Analyze** the applications of modern engineering materials .(L4)

Contribution of Course Outcomes towards achievement of Program Outcomes &Strength of correlations(3:High,2: Medium, 1:Low)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	**2**												**1**	
CO2	**3**												**1**	
CO3	**3**												**1**	
CO4		**3**							**1**	**1**			**1**	
CO5		**3**							**1**	**1**			**1**	

SYLLABUS		
Unit No.	**Contents**	**Mapped CO**
I	**Water Technology** Soft and hard water, Estimation of hardness of water by EDTA Method, Estimation of dissolved Oxygen - Boiler troubles –Priming, foaming, scale and sludge, Caustic embrittlement, Industrial water treatment – Specifications for drinking water, Bureau of Indian Standards (BIS) And World health organization (WHO) standards, Ion-exchange processes - desalination of Brackish water, reverse osmosis (RO) and electro-dialysis.	**CO1,CO2, CO4**
II	**Electrochemistry and Applications of Electrodes** Electrochemical cell, Nerns equation, cell potential calculations. Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad),and lithium ion batteries- working principle of the batteries including cell reactions; Fuel cells-Basic Concepts, the principle and working of hydrogen-oxygen Fuel cell. **Corrosion:** Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bedworth ratios and uses, Factors affecting the corrosion, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).	**CO1,CO2 CO4**
III	**Polymers and Fuel Chemistry** Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth polymerization. Fuels – Types of fuels, calorific value of fuels, numerical problems based on calorific value; Analysis of coal (Proximate and Ultimate analysis), Liquid Fuels, refining of petroleum, Octane and Cetane number- alternative fuels- propane, methanol, ethanol and bio fuel-bio diesel.	**CO1,CO2 CO4**
IV	**Modern Engineering Materials** **Composites**- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications **Refractories**- Classification, Properties, Factors affecting the refractory materials and Applications. **Lubricants**- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils **Viscosity**, Viscosity Index, Flash point, Fire point, Cloud point, saponification and Applications. **Building materials**- Portland Cement, constituents, Setting and Hardening of cement.	**CO1,CO3 CO5**
V	**Surface Chemistry and Nanomaterials** Introduction to surface chemistry, colloids, nano metals and nano metal oxides, micelle formation, synthesis of colloids (Braggs Method), chemical and biological methods of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and Longmuir), BET equation (no derivation) applications of colloids and nanomaterials – catalysis, medicine, sensors, etc.	**CO1,CO3 CO5**
Learning Resources		
Text Books:		
1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013. 2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.		
Reference Books:		