APPLIED CHEMISTRY
(Common to CSE, CSE (AI & ML), CSE (DS), IT, ECE, EEE, BME, AI & DS)

Regulation	Year-Sem	Course Code	Category	Periods/ Week			Credits	Maximum Marks		
				L	T	P	C	CIA	SEE	Total
R20A	I – I	A51N5	BS	3	-	-	3	30	70	100

Course Objectives: The course will enable the student to:

1. Understand the construction and applications of various batteries
2. Identify the nano materials and liquid crystals
3. Educate the students about chemistry of Polymers
4. Know nature of water and treatment methods
5. Summarize analysis of fuels and mechanism of lubricants

Unit-I-Electrochemistry and Batteries (10 Periods)

Conductance, Specific conductance, Equivalent conductance, Molar conductance, Effect of dilution on conductance, numerical Problems. Electro chemical Cell-Galvanic Cell - construction –cell Representation, **EMF**- Types of electrodes (Hydrogen Electrode and calomel electrode) -Nernst equation and its applications. **Batteries**- Primary Batteries - Secondary Batteries- (Pb- acid battery, Lithium ion batteries), **Fuel cells** – H_2-O_2 fuel cell– Methanol-Oxygen fuel cell, Applications and advantages of fuel cells. Solar energy – Solar Cells- Photovoltaic cells.

Unit-II-Nano Materials & Liquid Crystals (8 Periods)

Nano materials: Definition, properties - synthesis of nanomaterial – Sol-gel, Thin film preparation by Chemical vapor deposition method, carbon nanotubes (CNTs) – properties, applications of CNTs.

Liquid crystals – Types (thermo - tropic and lyo –trophic), properties, applications.

Unit-III-Polymers (10 Periods)

Polymer- classification of polymers, types of polymerization (Mechanism of Addition polymerization)- Plastics-thermo plastics, thermo setting plastics- Preparation, properties and applications of Teflon, Bakelite – Compounding and fabrication of Plastics- Compression & Injection Moulding.

Rubbers – Natural rubber and Vulcanization, Synthetic rubber-BUNA-S, Thiokol rubber. Conducting Polymers – types (intrinsic & extrinsic)-methods of conduction – applications of conducting polymers, Bio-Degradable Polymers— (Preparation, properties and applications of Lactic acid.

Unit-IV-Water and its treatment (10 Periods)

Hardness of water: Causes of hardness, expression of hardness – units – types of hardness and - numerical problems, Estimation of temporary and permanent hardness of water by EDTA method –Boiler troubles-scale &sludge, boiler corrosion, priming & foaming. Treatment of boiler feed water–Internal Treatment methods (Phosphate, colloidal and Calgon conditioning) – External Treatment method - zeolite process and Ion exchange process, desalination of water By reverse osmosis, Potable water – Its specifications – steps involved in treatment of potable water – Disinfection of water by chlorination (break-point chlorination) and ozonisation.

Unit-V-Fuels and Lubricants (10 Periods)

Fuels-Definition and classification, Characteristics of a good fuel, Coal – Types of Coal – Proximate and Ultimate analysis of coal and its significance. Liquid fuels – Petroleum- Extraction – Fractional distillation-Knocking-cracking-Moving bed catalytical cracking, Octane and cetane rating. Calorific value (HCV and LCV) of a fuel-Determination of calorific value by Junkers calorimeter. **Lubricants**-Definition and classification, Characteristics of a good lubricant, Mechanism of lubrication (Thick film, thin film and Extreme pressure), properties of lubricant – Viscosity, Flash and Fire point, Pour and Cloud point.

Course Outcomes: After completing the course the students should be able to:

1. Classify batteries and draw construction and explain functioning of batteries
2. Understand the synthesis of nano materials and applications
3. Summarize Preparation of polymers and recognize the application of polymers
4. Identify the nature of water and its associated problems and select appropriate treatment method
5. Apply the knowledge of fuels in fuel analysis and the process capabilities are introduced.

Text Books:

1. A Text book of Engineering Chemistry by R P Mani B.Ramadevi. S.Chand& Company Ltd., 14thEdn., 2018.
2. Text book of Engineering Chemistry by Jain & Jain. DhanpatRai Publishing Company, 16thEdn., 2015.

Reference Books:

1. A Text book of Physical Chemistry by P.W. Atkins
2. A text book of Engineering Chemistry by Rath, Rama Devi, Reddy, Cengage Learning Indian pvt Ltd
3. A Text book of Engineering Chemistry fundamentals and applications by Shikha Agarwal, Cambridge Publications, Edn. 2015.
4. A Text book of Engineering Chemistry-I by Dr. Jyotsna Cherukuri, V.G.S Book publications, 2nd Edition, 2014
5. Principles of physical chemistry by Puri Sharma & patania, vishal publishing Company, 47th edition, 2016.