APPLIED CHEMISTRY

I B.Tech : ECE, EEE, IT, CSE, CSC, CSD, CSM, CSIT

Course Code:	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A5BS11	BSC	4	0	0	4	30	70	100
Contact Classes:50	Tutorial Classes: 0	Practical Classes: 0				Total Classes: 50		

Course Objectives:

The course should enable the students to:

1. Impart knowledge on soft and hard water types and softening methods.
2. Introduce the basic concepts to develop electrochemical cells.
3. Familiarize the redox principle in batteries and fuel cells.
4. Enhance knowledge on corrosion and its significance.
5. Expose on polymer, nano and smart materials.

Course Outcomes:

At the end of the course students will be able to:

1. **Illustrate** the types of hard and soft water, treatment of drinking and industrial water.
2. **Demonstrate** the basic principles of Electrochemistry in electrochemical cells.
3. **Impart** knowledge on the basic concepts of battery, biosensors and sources of renewable energy.
4. **Apply** the methods of metal finishing in solving corrosion related problems.
5. **Identify** the significance of polymers, nano and smart materials.

UNIT-I	WATER AND ITS TREATMENT	Classes: 10

Introduction - Hardness of water- Causes and effects of hardness - Expression and Units of Hardness - Determination of hardness by complex metric method- Numerical problems – Treatment of water by Ion exchange process - Potable water and its specifications – steps involved in treatment of potable water: screening, aeration, sedimentation, coagulation, filtration and sterilisation of water by Chlorination. Desalination of water by Reverse Osmosis.

UNIT-II	ELECTROCHEMISTRY AND ITS APPLICATIONS	Classes:10

Electro chemical cells – electrode potential - standard electrode potential - Nernst Equation -Types of electrodes - SHE, Calomel, Quinhydrone and Glass electrode -Electrochemical series, and its application- Numerical Problems. Potentiometric: acid- base and redox titration.

UNIT-III	BATTERIES AND SENSORS	Classes: 10

Batteries - battery characteristics- classification of batteries: primary, secondary, solar batteries- Applications – Construction and Functioning of Primary batteries - Li/MnO_2 cell, lithium cells, Secondary batteries- Lead acid storage battery and Lithium ion battery- Advantages of battery. Solar cells – advantages of solar cells. Sensors - Biosensors their application and advantages.

UNIT-IV	**CORROSION AND ITS CONTROL**	**Classes: 10**

Introduction-causes and effects-Chemical and Electrochemical corrosion – Mechanism of electrochemical corrosion- factors affecting rate of corrosion- corrosion control methods - cathodic protection and Protective coatings – Metallic coatings- Methods of metallic coatings – Hot dipping methods: Galvanizing, Tinning, cementation (sherardizing) - electroplating (Copper), electroless plating (nickel). Organic coating - Paints (constituents and functions).

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UNIT-V	**ENGINEERING MATERIALS**	**Classes: 10**

Polymers -Polymeric materials – characteristics of Plastics, fibres and elastomers - thermoplastic and thermosetting resins - Conducting polymers – Preparation, properties and application of Polyacetylene and polyaniline (Polyaniline) - Biodegradable polymers – Advantages- Applications of Polylactic acid and poly glycolic acid.

Nanomaterials - characteristics - synthesis (Sol- gel method) – application and Advantages of Nano materials.

Smart materials - Introduction - Types of smart materials and applications.

Text Books:

1. P.C. Jain and M. Jain, Engineering Chemistry, 15/e, Dhanapat Rai & Sons, Delhi, 2014.
2. O G Palanna, Engineering Chemistry, Tata McGraw Hill, 2009.

Reference Books:

1. Sashichawla, A Textbook of Engineering Chemistry, Dhanapath Rai and sons, 2003.
2. Engineering Chemistry (NPTEL Web-book), 11th edition by B.L. Tembe, Kamaluddin and M.S. Krishnan.
3. B.S Murthy and P. Shankar, A Text Book of NanoScience and NanoTechnology, University Press, 2013

Web References:

1. https://www.scribd.com/document/23180395/Engineering-Chemistry-Unit-I-Water-Treatment
2. https://chem.pg.edu.pl/documents/175289/4235721/Electrochemistry-supplement%20text.pdf
3. https://www.nano.gov/you/nanotechnology-benefits
4.

E-Text Books:

1. http://www.freebookcentre.net/Chemistry/Chemistry-Books-Online.html
2. http://www.freebookcentre.net/Chemistry/ElectroChemistry-Books-Download.html
3. http://www.freebookcentre.net/Chemistry/Materials-Chemistry-Books.html
4. http://www.freebookcentre.net/Chemistry/Polymer-Chemistry-Books.html
5. http://www.freebookcentre.net/chemistry-books-download/Engineering-Chemistry-by-Bharath-Institute-of-Science-and-Technology.html

MOOCs Course

1. http://nptel.ac.in/courses/122101001/34
2. https://ocw.mit.edu/courses/chemistry/