

## LESSON PLAN

**Name of the Subject:** ENGINEERING CHEMISTRY (14BT1BS02)

**Class & Semester:** I B.Tech (common to all branches)

Sl. No.	Topic	No. of periods	Book(s) followed	Topics for self study
<b>UNIT-I: CHEMISTRY OF ENGINEERING MATERIALS</b>				
1.	Liquid crystal: Introduction, Chemical Structure	1	P.C.Jain & Monika Jain, <b>Engineering Chemistry</b>	Bio-Sensors, Nano composites.  Bio-degradable polymers.  Lyotropic liquid crystals.
2.	Classification of liquid crystals, Thermotropic liquid crystals	2		
3.	Engineering applications of liquid crystals	1		
4.	Conducting Polymers – Definition, Types of conducting polymers	1		
5.	Doped conducting polymers	1		
6.	Engineering applications	1		
7.	Composites – Introduction, Advantages of composites, applications	1		
8.	Constituents of composites	1		
9.	Types of composites-fibre-reinforced composites	1		
10.	Particulate -composites, layered composites	1		
11.	Introduction to sensors, Types of Sensors	1		
12.	Electrochemical Sensors,	2		
13.	Applications of Electrochemical Sensors	1		
14.	Insulators – Definition, characteristic properties of Insulators	1	K.N. Jayaveera, G.V. Subba Reddy & C. Ramachandraiah  <b>Engineering Chemistry</b>	
15.	Classification of Insulators, Electrical insulators	1		
16.	Thermal insulators	1		
<b>Total of periods required</b>		<b>18</b>		
<b>UNIT-II: WATER TECHNOLOGY</b>				

17.	Introduction, types of water	1	P.C.Jain & Monika Jain, <b>Engineering Chemistry</b>	Water harvesting methods, Purification of water by using advanced methods.
18.	Types of impurities and their consequences	1		
19.	Hardness of water- Temporary and permanent hardness, Units of hardness.	1		
20.	Disadvantages of hard water	1		
21.	Measurement of hardness by EDTA method	2		
22.	Softening methods: Ion exchange process	1		
23.	Zeolite process	1		
24.	Municipal water treatment	2		
25.	Boiler troubles	2		
26.	Desalination of Brackish water - Electro dialysis and Reverse Osmosis	2		
27.	Numerical problems on measurement of hardness of water	1		
<b>Total of periods required</b>		<b>15</b>		
<b>UNIT-III: ELECTROCHEMICAL CELLS AND CORROSION</b>				
28.	Introduction to Electrochemistry, electrode potential,	1	P.C.Jain & Monika Jain, <b>Engineering Chemistry</b>	Quantum batteries.  Advances in fuel cell technology.  Advanced methods in controlling of corrosion.
29.	Derivation of Nernst's equation	1		
30.	Electrochemical cells, EMF of an electrochemical cell	1		
31.	Reference electrodes- Standard Hydrogen Electrode (SHE), Calomel electrode.	2		
32.	Batteries: Introduction, Types of Batteries	1		
33.	Ni-Cd batteries	1		
34.	Lithium batteries. Applications	1		
35.	Fuel cells: Introduction, Hydrogen- Oxygen fuel cell	1		
36.	Phosphoric acid fuel cells, proton exchange membrane fuel cells	2		
37.	Solid oxide fuel cells.	1		
38.	Applications of fuel cells	1		
39.	Introduction, definition, Types of Corrosion	1		
40.	Galvanic corrosion, concentration cell corrosion	1		
41.	Control of corrosion – Electroplating method (Nickel electroplating).	2		

<b>Total of periods required</b>			<b>17</b>	
<b>UNIT-IV: LUBRICANTS AND FUEL TECHNOLOGY</b>				
42.	Lubricants: Definition, Functions of Lubricants	1	<b>P.C.Jain &amp; Monika Jain, Engineering Chemistry</b>	Bio-fuels. Renewable energy sources. Disadvantages of fossil fuels.
43.	Mechanism of Lubrication	1		
44.	Classification of Lubricants-Liquid, Semi solid lubricants	1		
45.	Solid lubricants	1		
46.	Properties of Lubricants – Viscosity, Viscosity Index	1		
47.	Measurement of viscosity by Redwood viscometer	1		
48.	Flash and fire points, Cloud and pour points, Aniline point, Neutralization number and mechanical strength	2		
49.	Fuel Technology: Introduction, classification of Fuels, Characteristics of a good fuel	2		
50.	Calorific value, Units , GCV, NCV	1		
51.	Liquid Fuels, petroleum, Refining of petroleum.	2		
52.	Knocking, Octane number, Cetane number, power alcohol	2		
53.	Synthetic petrol: Fischer-Tropsch process	1		
54.	Gaseous fuels, Important gaseous fuels- Natural gas ,producer gas,	1		
55.	Water gas, Coal gas, Biogas	1		
<b>Total of periods required</b>			<b>18</b>	
<b>UNIT-V: NANO CHEMISTRY AND GREEN CHEMISTRY</b>				
56.	Nano Chemistry: Introduction, classification of Nano materials	2	<b>A.K Bandyopadhyay, Hand book of Nanostructured materials and Nanotechnology</b>	Recent trends in Nano technology.
57.	Factors affecting the properties of Nano materials	1		Disadvantages of nanomaterials.
58.	Properties of Nano materials	1		Applications of principles of Green chemistry in
59.	Methods of synthesis – sol-gel process	1		
60.	Chemical Vapour Deposition (CVD)	1		
61.	Plasma Enhanced Chemical Vapour Deposition (PECVD)	1		
62.	Applications of Nano materials	2		

63.	Green Chemistry: Introduction	1	Paul T. Anastas, John C Warner, <b>Green Chemistry: Theory and practice</b>	engineering.
64.	Tools of Green Chemistry	1		
65.	Principles of green chemistry ,Examples of Green Chemistry	2		
66.	Principles of Green Engineering	2		
67.	Green computing, Green construction, Green manufacturing Systems	2		
	Total of periods required	<b>17</b>		
<b>Grand total of periods required</b>		<b>85</b>		

**TEXT BOOKS:**

**T1:** P.C.Jain & Monika Jain, **Engineering Chemistry**, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 17<sup>th</sup> edition, 2013.

**T2:** K.N. Jayaveera, G.V. Subba Reddy & C. Ramachandraiah **Engineering Chemistry**, Mc. Graw-Hill Higher Education, Hyderabad, 1<sup>st</sup> edition, 2013.

**REFERENCE BOOKS:**

**R1:** A.K Bandyopadhyay, **Hand book of Nanostructured materials and Nanotechnology**, New Age international publishers, 2<sup>nd</sup> edition, 2010.

**R2:** Paul T. Anastas, John C Warner, **Green Chemistry: Theory and practice** Oxford University Press, 2000.

**Signature of the faculty Member**

**Signature of the HOD**