

## NIRMA UNIVERSITY

<b>Institute:</b>	Institute of Technology
<b>Name of Programme:</b>	B. Tech. (All)
<b>Course Code:</b>	XXXXX
<b>Course Title:</b>	Chemistry
<b>Course Type:</b>	Introductory
<b>Year of introduction:</b>	2022-2023

L	T	Practical component				C
		LPW	PW	W	S	
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### Course Learning Outcomes (CLOs):

At the end of the course, the student will be able to –

1. illustrate the basic fundamentals and defend their application in various fields of engineering (BL1)
2. classify the materials on the basis of their properties. (BL2)
3. select the appropriate experimental method of analysis and interpret its result (BL3)
4. identify and apply the principles of green chemistry in improving the existing technology (BL3)

### Syllabus:

**Total Teaching hours: 30**

Unit	Final Version of Syllabus	Teaching hours
<b>Unit I</b>	<b>Water and its Treatment:</b> Introduction, Sources of water impurities, Hardness of water, Softening of water, Desalination processes, Introduction to Waste-water treatments, Specifications for drinking water (BIS standards).	07
<b>Unit II</b>	<b>Fuel:</b> Calorific Value, Types of fuel, Selection of fuels, Analysis of coal:- Proximate and ultimate analysis, Flue gases: Orsat apparatus, Alternative fuels, Green hydrogen.	05
<b>Unit III</b>	<b>Lubricants:</b> Introduction, Classification and functions of lubricants, Mechanisms of Lubrication, Properties:- Lubricating oil and Greases, Selection of lubricants.	04
<b>Unit IV</b>	<b>Corrosion Science:</b> Introduction, Types of corrosion, Mechanism of corrosion, Factors Affecting Corrosion, Corrosion control and Preventions.	05
<b>Unit V</b>	<b>Green Chemistry:</b> Overview, Set of Principles of Green Chemistry, Importance and application of Green Synthesis.	04
<b>Unit VI</b>	<b>Engineering Materials:</b> High Temperature Polymers, Conducting Polymers, Foamed Plastics, Polymer Composites, Organic Electronic Materials, Explosives:- Introduction, Classification, Characteristics, Disarmament, Weapons of Mass Destruction (WMD), Peaceful uses of explosives, Fuel cells and Batteries.	05

**Self-Study:**

Self-study contents will be declared at the commencement of the semester. Around 10 % of the questions will be asked from the self-study contents.

**Laboratory Works:**

Laboratory work will be based on above syllabus with minimum 10 experiments to be incorporated.

**Suggested Readings/ References:**

1. P.C. Jain and Monika Jain, Textbook of Engineering Chemistry, Dhanpat Rai Publishing Co.
2. Shashi Chawla, Textbook of Engineering Chemistry, Dhanpat Rai Publishing Co.
3. S.S. Dara, Textbook of Engineering Chemistry, S. Chand and Company.
4. Mike Lancaster, Green Chemistry: An Introductory Text, Royal Society of Chemistry.
5. J.C. Kuriacose and J. Rajaram, Chemistry in Engineering and Technology, Tata Mc Graw Hill.
6. Prasanta Rath, Engineering Chemistry, Cengage Learning.
7. Sunita Rattan, A Textbook of Engineering Chemistry, S.K. Kataria & Sons.
8. O.G. Palanna, Engineering Chemistry, Tata Mc Graw Hill.

**Practical List**

<b>Sr.</b>	<b>Practical</b>
1	Estimation of temporary, permanent, and total hardness of water sample
2	Determination of strength of $\text{Na}_2\text{CO}_3$ and $\text{NaHCO}_3$ in water sample by using standard HCl solution
3	Determination of moisture content in coal sample
4	Preparation of Urea-formaldehyde resin
5	pH metric titration of strong acid with strong base
6	Conductometric titration of strong acid and strong base
7	Determination of penetration index of lubricating grease
8	Determination of viscosity of lubricating oil by Redwood viscometer
9	Determination of the flash point and fire point of a lubricant or fuel by Pensky-Marten's apparatus
10	Determination of aniline point of an oil sample
11	Redox titration of ferrous sulphate with potassium permanganate
12	Determination of the cloud point and pour point of a lubricant
13	Determination of the saponification number of an oil
14	Virtual Lab: Determination of hardness of various water samples
15	Virtual Lab: Determination of alkalinity of various water samples