MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR
DEPARTMENT OF CHEMISTRY

Engineering Chemistry

All branches I/II Semester B.Tech (Core course)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CYT101	Engineering Chemistry	3	2	1	0	0

Course Description:

- Students will learn the basic and advanced knowledge of chemistry concerning the applications of the basics of chemistry in different fields and branches of engineering.
- To function very efficiently and know how to build connections over the exploration/use of a modern work environment to run or lead those as professionals.

COURSE CONTENTS

Lecture Plan (Hrs.)	Course Content
Unit 1 (8 L)	**Water and its treatment:** Hardness, types of hardness, Units of hardness, and methods of estimation of hardness. **Removal of Hardness (Softening Methods):** Lime Soda process, Permutit or Zeolite process and Deionization or Demineralization process. **Municipal Water Supply:** Purification of water by various methods, Detailed study of methods of Disinfection, Removal of heavy metals from industrial wastewater.
Unit 2 (2 L)	**Lubricants:** Introduction of lubricants and lubrication. Types of the mechanism of lubrication, Uses, and properties of lubricants viz. Viscosity & Viscosity index.
Unit 3 (4 L)	**Fuels and Combustion:** Classification and Properties of fuels, Calorific value, Petroleum: refining and fractional distillation of crude petroleum, Cracking, Synthetic petrol, Knocking, Anti-knocking Agents, octane and cetane numbers. Gaseous fuels and hydrogen fuels.

Unit 4 (3 L)	**New Engineering Materials:** Organic/hybrid photovoltaic materials, Conducting Polymers, Introduction to nanotechnology and nanomaterials (fullerenes and quantum dots).
Unit 5 (4 L)	**Corrosion:** Introduction, theory, and mechanism of Corrosion, galvanic and differential aeration corrosion, various preventive measures to control Corrosion.
Unit 6 (3 L)	**Advanced electrochemical systems:** Introduction to Energy Storage devices, Li-ion batteries, redox flow batteries, Fuel cells, H_2-O_2 fuel cells.
Unit 7 (4 L)	**Spectroscopy:** Introduction, Classification, and Applications. Ultraviolet-Visible, Infra-Red, and Nuclear Magnetic Resonance Spectroscopy.
Recommended Text Books	1. Engineering chemistry: A Text book by P.C. Jain, Dhanpat Rai & Sons. 2. A Text book of Engineering chemistry by Shashi Chawla, Dhanpat Rai and Sons. 3. Engineering chemistry: A Text book by S.S. Dara, S. Chand & Co. 4. Solid State Chemistry and its Applications by Anthony R. West, Wiley 2014 5. Modern Batteries by C.A. Vincent and B. Scrosati, Elsevier 1997. 6. P. S. Kalsi, Spectroscopy of Organic Compounds, New Age International (P) Ltd. Publishers 7. Fundamentals of molecular spectroscopy by Colin Banwell and Elaine McCash, Tata McGraw Hill Education Pvt. Ltd.

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CYP102	B.Tech. Engineering Chemistry Laboratory	2	0	0	2	0

PREREQUISITE

Basic knowledge about inorganic salts and chemical analysis

Course Description:

- To impart the knowledge of the processes of chemical analysis.
- Identification of product purities/impurities

S. No.	Name of the Experiment
1.	To determine the percentage of available chlorine in given sample of bleaching powder.
2.	To determine hardness of Water by EDTA method.
3.	To determine the total alkalinity of water.
4.	To determine the amount of various oxidizing agents iodometrically.
5.	Analysis of ores and alloys a) Estimation of copper in brass, b) Estimation of iron in plain carbon steel, c) Estimation of iron in hematite ore.
6.	Preparation of bakelite polymer.
7.	Synthesis of Nylon-6,6.
8.	Synthesis of Urea-Formaldehyde Resin.
9.	Determination of viscosity of oil by Redwood viscometer.
10.	To carry out conductometric titration.
11.	To estimate the iodine in iodized common salt using iodometry.
12.	Synthesize of Thiocol rubber.
13.	To determine the dissolved oxygen content of given water sample by Winkler's method.
14.	To determine total moisture content, volatile matter, ash content and fixed carbon in a given coal sample by proximate analysis.
15.	To determine the flash point and fire point of given oil by Penskey-Marten's apparatus.
16.	Extraction of caffeine from tea leaves.
17.	Determination of coefficient of viscosity of unknown liquid by Ostwald viscometer.
Reference Books	1. Laboratory Manual on engineering chemistry by S.K. Bhasin & Sudha Rani, Dhanpat Rai Publishing Company, New Delhi. 2. A text book of Practical chemistry by K. D. Gupta & K.K. Saxena University Press, Jaipur.