

Year (Semester)	Course Title	Course Code	L-T-P-Credits
1 st Year (1 st and 2 nd Semester)	Engineering Chemistry	CHT-101	3-1-0-3
Evaluation Policy	Mid-Term	InternalAssessment	End-Term
	26 Marks	24 Marks	50 Marks

Pre-requisites: None.

Course Outcomes: At the end of the course, the student will be able to:

CO1	Analyze the properties and use of polymeric and nanomaterials.
CO2	Learn the basic concepts of water treatment.
CO3	Gain knowledge about fuels and their applications.
CO4	Develop insight into the fundamentals of lubricants and corrosion.

Detailed Syllabus:

Module No.	Contents	Hours
Module 1	<p>Engineering materials</p> <p>Polymers: Introduction, classification, types of polymerization, mechanisms of polymerization (free radical, cationic, anionic), coordination polymerization and its mechanism, synthesis and applications of some important engineering polymers (Polyethylene, PVC, Teflon, Terylene, Nylon-6, Nylon-6,6), Conducting polymers; classifications, properties and applications in engineering field.</p> <p>Nanomaterials: Introduction, Classification of nanomaterials based on their size, Approaches for nanomaterials synthesis (Bottom-up approach: Sol-gel synthesis, Hydrothermal growth and chemical vapor deposition. Top-down approach: Ball Milling and Micro-fabrication), Applications of nanotechnology in various fields.</p>	12
Module 2	<p>Water treatment</p> <p>Introduction, Impurities in water, Hard water, Determination of hardness and alkalinity, Softening of hard water (Lime-Soda process, Zeolite process and Ion Exchange process), municipal treatment of water for drinking purposes; removal of suspended, dissolved and biological impurities-Sterilization by chlorination (Effective and break-point chlorination). Numerical problems based on hardness, alkalinity and LS process.</p>	10
Module 3	<p>Fuels</p> <p>Introduction, Classification, Calorific value (HCV and LCV), Determination of calorific value using Bomb calorimeter, Numerical problems based on Dulong's formula. Biofuels: Classification of biofuels; first, second, third and fourth generation biofuels. Properties and characteristics of liquid biofuels (bioethanol, biobutanol and biodiesel).</p>	10
Module 4	<p>Lubricants and Corrosion</p> <p>Lubricants: Introduction, mechanisms of lubrication, hydrodynamic, boundary and extreme pressure lubrication, classification of lubricants: liquid, semi solid and solid lubricants. Lubricating oils; fatty oils, mineral oils, blended oils, synthetic oils, properties of lubricating oils with special reference to flash point, aniline point, viscosity and viscosity index.</p> <p>Corrosion: Introduction, types of corrosion: Dry and wet corrosion (pitting corrosion, crevice corrosion, and stress corrosion), corrosion prevention and control by proper design and material selection, cathodic protection, anodic protection, protective coatings.</p>	10

Books Recommended:

1. Jain P.C., Jain M., Engineering Chemistry, Dhanpat Rai Publishing Company, 17th Edition, 2019.
2. Dara S.S., Umare S.S., A Text Book of Engineering Chemistry, S. Chand Publication, 1st Edition, 2004.
3. Viaram S., Engineering Chemistry, Wiley Publication, 1st Edition, 2017.

4. Rao M.S.R., Singh S., Nanoscience and Nanotechnology: Fundamentals to Frontiers, Wiley Publication, 1st edition, 2014.
5. Roussak O.V., Gesser H.D., Applied Chemistry: For Engineers and Technologist, 2nd Edition, 2013.
6. Gowariker V.R., Viswanathan N.V., Sreedhar J., Polymer Science, New Age International Publisher, 3rd Edition, 2019.
7. Agarwal C.V., Murthy C.P., Naidu A., Chemistry of Engineering Materials, B.S. Publication, 9th Edition, 2018.
8. Cademartiri L., Ozin G. A., Lehn J. M., Concepts of Nanochemistry, Wiley-VCH Publication, 1st Edition, 2009.

Year (Semester)	Course Title	Course Code	L-T-P-Credits
1 st Year (1 st and 2 nd Semester)	Chemistry Laboratory	CHL 101	0-0-2-2
Evaluation Policy	Continuous Assessment		End-Term
	60 Marks		40 Marks

Pre-requisites: None.

Course Outcomes: At the end of the course, the student will be able to:

CO1	Acquire practical knowledge of determination of various parameters of water
CO2	Experimentally learn about synthesis of polymeric materials.
CO3	Gain the knowledge about analysis of fuels and lubricants.
CO4	Use instrumental methods for chemical analysis.

Detailed Syllabus:

Module No.	Contents	Hours
Module 1	1. To determine the total, permanent and temporary hardness of water by EDTA method. 2. To determine alkalinity of given water samples/alkali mixtures by warder's Method. 3. To estimate percentage of available chlorine (free chlorine) in bleaching powder/water.	08
Module 2	1. Synthesis of Urea formaldehyde resin. 2. Synthesis of Phenol formaldehyde resin. (Demonstration)	04
Module 3	1. Proximate analysis of coal. 2. To determine the acid value of given lubricating oil. 3. To determine the aniline point of given lubricating oil. 4. Estimation of viscosity of lubricating oil by viscometer.	10
Module 4	1. Estimation of strength of HCl by pH Meter. (Demonstration) 2. To verify Beer-Lambert law for coloured solution and to determine the concentration of a given unknown solution. (Demonstration).	06

Books Recommended:

1. Dara S.S., A Textbook on Experiments and Calculations in Engineering Chemistry, S Chand & Company Publication, 9th Edition, 2015
2. Mangla B., Sachdeva R., Sethi B., Engineering Practical Chemistry, Manakin Press, 1st Edition, 2018.
3. Rattan S., Theory and Practicals of Engineering Chemistry, S.K. Kataria and Sons publication, 1st Edition 2013.
4. Jaspal D., Malviya A., Engineering Chemistry Practical Book, Alpha science International Ltd., 1st Edition, 2015.
5. Thakur A., Practical Engineering Chemistry, Narosa Publication, 1st Edition, 2018.