Kerala Technological university KTU First year B.tech Syllabus for **CY100ENGINEERING CHEMISTRY**

Course No. : CY100

Course Name: ENGINEERING CHEMISTRY

L-T-P-Credits: 3-1-0-4

Year of Introduction: 2015

Course Objectives:

To enable the students to acquire knowledge in the concepts of chemistry for engineering applications and to familiarize the students with different application oriented topics like new generation engineering materials, storage devices, different instrumental methods etc. and to develop abilities and skills that are relevant to the study and practice of chemistry.

Syllabus:

Spectroscopy - Principles and Applications, Electrochemistry - Electrodes, Electrochemical series and applications, Nernst Equation, Potentiometric titration and application, Cells, Instrumental Methods- Thermal Analysis, Chromatography; Conductivity, Chemistry of Engineering Materials, Copolymers, Conducting Polymers, Advanced Polymers, Nanomaterials, Fuels and Calorific value; Lubricants and their properties, Water Technology - Hardness, Water softening methods, Sewage water Treatment.

Expected outcome:

The student will be able to apply the knowledge of chemistry and will be equipped to take up chemistry related topics as part of their project works during higher semester of the course.

Text Book:

1. Engineering Chemistry (ISBN-9788126519880) - Wiley India
2. Jain and Jain, Engineering Chemistry, Dhanpat Rai Publishers

References:

1. Engineering Chemistry, Shashi Chawla, Dhanpat Rai Publishers
2. Engineering Chemistry, Dara and Dara, S Chand Publishers
3. Chemistry of Engineering Materials - C P Murthy, C V Agarwal & A Naidu - BS Publications
4. Engineering Chemistry - M M Lippal & SC Bhatia, Khanna Publishers
5. Seymour RB. Introduction to Polymer Chemistry, Mc Graw Hill
6. Engineering Chemistry, Sesha Maheswaramma, Pearson (ISBN 9788131774519)

Module 1 Contents

Spectroscopy:
Introduction, Beer Lamberts Law (problems to be worked out),
UV-visible spectroscopy – Principle, Instrumentation and applications; IR spectroscopy – Principle and applications;
1H NMR spectroscopy – Principle, chemical shift – spin-spin splitting and applications including MRI.

Module 2 Contents

Electrochemistry:
Types of electrodes - SHE, Calomel electrode, Glass electrode,Electrochemical series and its applications including Decomposition potential and Overvoltage,Nernst equation- Derivation and application
Potentiometric titration – Acid-base and redox titration, Lithium ion cell and Fuel cell.

Module 3 Contents

Instrumental Methods
Thermal analysis-Principle, instrumentation and applications of TGA and DTA. Chromatographic methods - Basic principles,column,TLC. Instrumentation and principles of GC and HPLC. Conductivity - Measurement of conductivity

Module 4 Contents

Chemistry of Engineering Materials
Copolymers - BS, ABS - Structure and Properties.Conducting Polymers - Polyaniline, Polypyrrole - Preparation, Structure and Properties.OLED – Preparation, Structure and Properties.Advanced Polymers – Kevlar, Polybutadiene rubber and silicone rubber.– Preparation, Structure and Properties.Nanomaterials – Definition, Classification, Chemical methods of preparation (Any 2 methods),
Properties and Applications – Carbon Nano Tubes and fullerenes.

Module 5 Contents

Fuels and Lubricants
Fuels - Calorific Value, HCV and LCV - Determination of calorific valueof a solid and liquid fuel by Bomb calorimeter - Dulongs formula and Numericals. Liquid fuel - Petrol and Diesel - Octane number & Cetane number - Biodiesel - Natural gas. Lubricant - Introduction, solid, semisolid and liquid lubricants. Properties of lubricants - Viscosity Index, Flash point, Fire point, Cloud point, Pour point and Aniline point.

Module 6 Contents

Water Technology

Types of hardness, Estimation of Hardness - EDTA method,Water softening methods - Ion exchange process - Principle. Polymer ion exchange - Reverse Osmosis - Disinfection method by chlorination and UV Dissolved oxygen, BOD and COD.Sewage water Treatment - Trickling Filter and UASB process.