CH112	PHYSICAL CHEMISTRY	L	T	P	C	Int	Ext
		3	-	-	3.0	30	70

Semester I [First Year]

COURSE OBJECTIVES:

1. To develop scientific concepts, principles, problem solving skills, attitudes, appreciations and interests.
2. To know the importance of Thermodynamics, Electrochemistry and solve problems related to solutions & gas laws.
3. To make them know the terms associated with phase rule, kinetics, Chemical equilibrium and understand the mechanisms of catalysis.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. apply the gaseous laws in solving industrial problems.
2. evaluate molar heat capacities know the importance of Batteries and prepare solutions of required concentrations
3. arrive at the number of phases, components, degree of freedom and know the importance of chemical Equilibrium.
4. calculate rate of reaction and select suitable catalysts for reactions.

UNIT I [CO:1] **(12)**

Gas Laws: Definition, mathematical representation, graphical representation and simple problems on Boyle's Law, Charles law, Gay lussac -Charles law, ideal gas equation, Avogadro's law, Dalton's law of partial pressures.

Critical Phenomena: Vander Waal's gas equation, Derive Tc, Pc and Vc from Vander Waal's gas equation and, Andrew's isotherms of carbon dioxide - Critical phenomena.

UNIT II [CO:2] **(12)**

Principles of Thermodynamics & Electrochemistry: Definition of Terms used in Thermodynamics, definition and units of work and heat, First law of thermodynamics.

Introduction of Electrochemistry: Electrode potential, Electrochemical cell, electrochemical series and significance.

Batteries: BatteriesPrimary (Dry cell) and secondary (Lead acid), Fuel cell (H_2 - O_2 cell) and their advantages.

Solutions: Solution, Expression of concentration of solutions (Molarity, Normality, Molality and Mole fraction) Relative lowering of vapour pressure and Raoult's law, derivation and limits of Raoult's law and simple problems.

UNIT III [CO:3] **(12)**

Chemical Equilibrium: Introduction, types of equilibrium - Homogenous equilibrium, Heterogeneous equilibrium with examples, Law of mass action, Kp, Kc and Kx - interrelation, Le-Chatelier-Braun principle to chemical equilibrium and its applications.

Phase rule: Definition, explanation of the terms - Phase, component, degrees of freedom with examples, Phase diagram of one component system (water system), eutectic system, two component system Pb-Ag. Application of eutectics.

UNIT IV [CO:4] **(12)**

Kinetics of chemical reactions: Order, Molecularity, Specific reaction rate, derivations of first order and second order reactions. Half-life period (simple problems), Effect of temperature on reaction rate, methods to determine order of reactions.

Catalysis: Introduction, types of catalysis Homogeneous and Heterogeneous catalysis, Characteristics of Catalyst, promoter, negative catalyst, catalytic poison, adsorption theory of catalysis.

LEARNING RESOURCES:

TEXT BOOK:

Essentials of Physical Chemistry, Bahl.B.S and Tuli, 18th edition, 2010, S.Chand & Co., Delhi.

REFERENCE BOOK(s):

1. Engineering chemistry by Jain and Jain, 15th edition, 2008, Dhanpat Rai Publishing company, Delhi.
2. Principles of Physical Chemistry, B.R Puri, L.R Sharma, Madan.S.Pathania, 46th edition, 2013, Vishal publications, Jalandhar

WEB RESOURCES:

1. http://www.chem.arizona.edu/~salzmanr/103a004/nts004/nts004.
2. http://www.cdeep.iitb.ac.in/nptel/Core%20Science/
3. http://www.wiziq.com/tutorial/
4. http://www.powerstream.com/BatteryFAQ.html#lec