

PSG Institute of Advanced Studies Coimbatore-641 004

Course Plan (2016-2017) SEM – I

1. Programme : BE/BS Mechanical Engineering

2. Course Title : Chemistry

3. Course Code : 15IGAM/UFM/UHM103

4. Faculty : Dr. R. Sivasubramanian

5. Pre-requisite:

The students are expected to have prior knowledge on the following

a. Basic idea on the chemical bonding

b. Fundamental concepts on thermodynamics, kinetics and electrochemistry

6. Course Objective

The aim of this course is to provide a fundamental understanding on the concepts of physical chemistry in a much detailed perspective. The course covers a basic overview on the nature of chemical bonding between molecules and various theories proposed to establish the structure and properties of chemical compound. Also, the heat changes that occur in a chemical reaction will be studied in terms of thermodynamics; prediction of reaction rate in terms of order of the reaction will be focused. Additionally a comprehensive view on surface chemistry of the heterogeneous chemical reaction will be given. Further, basic knowledge on the electrochemical principles will be introduced.

7. Course Outcome

- A detailed understanding on the concept of chemical bonding, thermodynamics, kinetics and electrochemistry.
- To develop problem solving ability.
- To employ the concepts in terms of engineering principles.

8. Session Plan

Week	Topics Planned	Assignment/Test
1	Types of chemical bond-bond polarity-dipole moment-partial ionic character-consequences of weak interactions.	
2	Hydrogen bond-vanderwall forces-Influence of properties of matter- MOT theory	

3	Bonding in metals, semiconductors and insulators-gas laws and avagadro law and its applications	
4	Laws of thermodynamics-Hess's Law-kirchoff equation-Joule Thomson effect	
5	Second law of thermodynamics-entropy changes in ideal gas	
6	Gibbs-Helmholtz equation-chemical potential and Applications	Assignment 1
7	Phase rule-definition- Clsius Clapeyron equation-one component system	
8	Two component system-solubility of gas in liquids	
9	Distribution law-principles of extraction-fractional distillation-azeotropic mixtures	
10	CA 1	
11	Integrated rate laws-kinetics of complex reactions-chain reaction mechanism	
12	Kinetics of combustion of hydrogen and hydrocarbons	
13	Adsorption isotherms-Fraundlich, Langmuir and BET	
14	Surface area of catalyst-application of adsorption	Assignment 2
15	Colloidal systems-critical micelle concentration	
16	CA 2	
17	Electrodes types-EMF series-Nernst equation	
18	Galvanic and concentration cells-potentiometric titrations-overpotential	Assignment 3
19	Electrolytic conductance-strong and weak electrolyte-conductometric titration	
20	Electropolishing-electromachining-electrophoretic painting-anodizing	
21	CA 3	

9. Text Book

- a. Peter Atkins and Julio de paula, 'Physical Chemistry' oxford university press, New York, 2010.
- b. B.R. Puri, L.R. Sharma and M.S. Pathania, 'Principles of Physical Chemistry', Vishal Publishing Company, Delhi, 2010.

10. References

- a. R. Gopalan, 'Text book of Engineering Chemistry', Vikas Publishing House, Ltd, New Delhi. 2006.
- b. B.K. Sharma, 'Engineering Chemistry'., Krishna Prakashan Media Ltd, Meerut, 2005.

c. Shashi Chawla, ' A Text book of Engineering Chemistry', Dhanpat Rai & Co, New Delhi, 2005.

11. Web Link

1. <http://www.chem1.com/acad/webtext/chembond/>
2. <http://www.leka.lt/sites/default/files/dokumentai/engineering-thermodynamics.pdf>
3. <http://www.csus.edu/indiv/m/mackj/chem142/kinetics.pdf>
4. http://www.engr.uconn.edu/~jmfent/CHEG320_electrochemistry%20lectures.pdf