GUJARAT TECHNOLOGICAL UNIVERSITY
B.E. SEMESTER : 3
ENVIRONMENTAL SCIENCE & TECHNOLOGY

Subject name : **PHYSICAL CHEMISTRY**

Sr. No.	Course contents
01.	Gaseous state : molecular diffusion & effusion, critical constants & liquefaction of gasses, equation of state, supercritical fluids & their applications.
02.	Kinetics & molecular reaction dynamics: significance of reaction kinetics, rate law, rate constants, order of reaction, reversible reactions & equilibrium, parallel & consecutive reactions, chain reactions, photochemical reactions, rate determining parameters. Chemical potential & chemical reactions. Effect of temperature on reaction rates, free energy of reaction, collision theory.
03.	Catalysis : Criteria for catalysis, Homogenous catalysis : Acid Base, Enzymatic & Catalysis by metal salts, Heterogenous catalysis, Concept of promoters, inhibitors & poisoning, Physiorption & Chemisorption
04.	Electrochemistry: equilibrium electrochemistry – electrochemical cells, half cell reactions, type of electrochemical cells, redox & concentration cells, free energy & EMF, Nernst equation, EMF measurements. Relevance of electrochemical reactions.
05.	Phase rule : Definition & various terms, Gibb's phase rule, Application of Phase rule to one component system : Water & Sulphur & two component system : Lead & Silver
06.	Three laws of thermodynamics, Helmoholtz – Gibbs equation. Thermodynamic systems of variable composition.
07.	Interfacial chemistry: surface free energy, capillary & surface tension, liquid – liquid interfaces, bubbles, droplets, Young Laplace & Kelvin equation, super saturation, solid – liquid interfaces, electrical phenomena at the interface, surface active agents, emulsions.

Reference Books:

1. Physical Chemistry , G.W.Castellan, Narosa Publishing Houses ,3rd Ed, 2002
2. Physical Chemistry , R.J.Silby & R.A.Alberty,John Wiley & Sons, 4th Ed.,2002
3. Physical Chemistry, K.J.Laidler & J.H.Meiser, CBS Publishers, 2nd Ed, 2000
4. Physical Chemistry : A molecular approach , D.A.Mcquarrie & J.D.Simon,1998
5. Surfaces, Interfaces & Colloids: Principles & applications, Drew Myers, Wiley VCH, 2nd Ed. ,1999
6. The Elements of Physical Chemistry , Peter Atkins, Oxford ,3rd Ed. ,2000
7. Introduction to Colloid & Surface Chemistry, Duncan J Shaw,Butterworth-Heinemann,5th Ed.,1992
8. Physical Chemistry of Surfaces, Arthur W. Adamson, Alice P. Gast, John Wiley & Sons, Indian Ed.,1997
9. Chemical Kinetics & Catalysis, Masel R.J., John Wiley & Sons, 1st Ed, 2001
10. Chemical Kinetics & Reaction Dynamics, Houston P.H., McGraw Hill Book Company, 2nd Ed, 2001
11. Elements of Physical Chemistry, Atkins P., Oxford Press, 3rd Ed., 2000
12. Catalytic Chemistry, Gates B.C., John Wiley & Sons,2nd Ed., 1992
13. Principles & Practice of Heterogeneous Catalysis, Thomas J.M. & Thomas W.J., John Wiley & Sons, 1996

APPROPRIATE NUMBER OF PRACTICALS WILL BE CONDUCTED AS PER THE THEORY SYLLABUS