

**Department of Applied Chemistry**  
**Course completion unit plan**  
**CH 91105: PHYSICAL CHEMISTRY**

Lecture No.	Date	Topic to be taught	Reference/ Remark
<b>Unit 1 : Symmetry and Group Theory</b>			
1		Introduction to Symmetry elements	Group theory by F. A. Cotton
2		Symmetry operations	-
3		Mathematical group, Classes, Subgroup	-
4		Multiplication Table	-
5		Construction multiplication table for C <sub>2v</sub> point group	
6		Applications of multiplication table	
7		Symmetry Transformations	-
8		Point groups and their applications	-
<b>Unit 2 : Chemical Kinetics and mechanisms of chemical reactions</b>			Gurdeep Raj, Advanced Physical Chemistry
9		Rate equation, rate constant, order and molecularity of various reactions, factors affecting rate of a reaction	-
10		Methods of determining order of a reaction, mechanism of various reactions	-
11		Theories of reaction rates	-
12		Comparison of different theories.	
13		Discussions of numerical problems	
14		Evaluation of thermodynamic parameters, Reactions in solutions and reactions in flow systems	-
15		Kinetics of fast reactions. Flow methods, pulse methods	-
16		Introduction to molecular reactions, dynamics, applications	-
<b>Unit 3 : Surface chemistry</b>			
17		Concept of adsorption, Langmuir and Freundlich theories for adsorption	Bajpai D.N., Advanced Physical Chemistry
18		Gibbs adsorption isotherm	-
19		Multilinear adsorption- B.E.T theory	-
20		Numericals based on Gibbs adsorption isotherm and B.E.T theory	
21		surface active agents, classification, micellization and Critical Micell Concentration (CMC)	-
22		Factors affecting CMC, Solubilization	-
23		Types of micelles and applications of adsorbent and micelles	-
24		Applications of CMC	
<b>Unit 4 : (a) Electro chemistry</b>			
25		Introduction, electrode potential, chemical and concentration cell	Bajpai D.N., Advanced Physical Chemistry

26		EMF, its applications and measurements	-
27		Ion selective electrodes, sensors	-
28		Numericals	
29		<b>(b) Solid State Chemistry</b>	<b>Physical chemistry by Patahniya</b>
30		Crystals, Laws of Symmetry: Miller and Wise indices, Crystal lattices	-
31		Crystals and X-rays, Xray spectroscopy, Crystal Structure	-
32		Defects in stoichiometric & non-stoichiometric crystals, applications	-
<b>Unit 5: Thermodynamics</b>			
33		First and Second laws of thermodynamics, derivations based upon them	<b>Glasstone S., Thermodynamics for Chemist</b>
34		Numerical discussions based on first and second law	
35		Reversible and irreversible processes	-
36		Gibbs-Helmholtz equation and its various applications	-
37		Molecular dynamics	-
38		Statistical thermodynamics- Maxwell-Boltzmann	-
39		Fermi-Dirac and Monte-Carlo	-
40		Applications of all statistical thermodynamics	