SRM UNIVERSITY

DEPARTMENT OF CHEMISTRY
SRM UNIVERSITY
KATTANKULATHUR

LESSON PLAN

Academic year 2017 – 18

Program : M. Sc. II
Subject Title : PHYSICAL CHEMISTRY-III
Subject Code : PCY15303

Total No. of hours: 60
Semester : III

UNIT No. & Title	TOPICS	LECTURE NO.	REFERENCE BOOKS
UNIT I Photochemistry	Physical properties of the electronically excited molecules: Introduction to basic phenomenon	1	Rohatgi -Mukherjee, K. K (1986): Fundamentals of Photochemistry. New Age International, New Delhi
	exited state dipole moments, pk_a and redox potentials	2,3	
	photo physical processes in electronically excited molecules	4	
	Fluorescence, phosphorescence and non-radiative processes	5	
	Stern–Volmer equation and its applications	6,7	
	electronic energy transfer mechanisms	8	
	photosensitization and chemiluminescence	9	
UNIT II Applications of Quantum Mechanics-I	Particle in a one dimensional box - quantisation of energy	10	1. Chandra, A. K (2002): Introductory quantum chemistry, 4th edition, Tata McGraw – Hill Publishing Company Limited, New Delhi.
	normalisation of wave function - orthogonality of the particle in a one-dimensional box wave functions	11,12	
	average position and average momentum of a particle in a one-dimensional box	13	
	illustration of the uncertainty principle and correspondence principle with reference to the particle in a one-dimensional box	14	2. Prasad, R. K. (2010): Quantum chemistry, 4th edition, New Age International Publishers.
	Schrodinger wave equation for a particle in a three dimensional box and the concept of degeneracy of energy levels	15,16	
	Schrodinger wave equation for linear harmonic oscillator	17,18	
	solution by polynomial method	19	3. Ira. N. Levine (2013): Quantum chemistry, 7th edition, Prentice Hall of India Pvt. Ltd.
	zero point energy and its consequence	20	
UNIT III Applications of Quantum Mechanics-II	Solving of Schrodinger wave equation for Rigid rotator	21-23	
	energy of rigid rotator	24	
	space quantization	25	
	Schrodinger wave equation for hydrogen atom	26,27	
	separation of variable in polar spherical coordinates and its solution	28,29	
	principal, azimuthal and magnetic quantum numbers and the magnitude of their values	30,31	
	probability distribution function	32,33	
	radial distribution function and shape of atomic orbitals (s, p & d)	34,35	

UNIT IV Molecular Spectroscopy – I	**Time–Dependent States and Spectroscopy:** Absorption and Emission of radiation-Selection rules	36	1. Banwell, C. N. (1983): Fundamentals of molecular Spectroscopy, 3rd ed., TMH, New Delhi. 2. Gurudeep Raj (2006): Advanced Physical chemistry, 32th edition, Goel Publishing House, Krishna Prakashan Media (P) Ltd. 3. Principles of Physical Chemistry, by Puri, Sharma and Pathania, Vishal Publishing Co. Jalandhar.
	Line shapes and widths- Fourier Transform spectroscopy	37	
	Rotation and Vibration of Diatomic Molecules: Rigid Rotor and harmonic oscillator wave functions and energies	38,39	
	Selection rules-A review of MW and IR spectroscopy	40	
	Diatomic molecule wave functions	41	
	Symmetry properties and nuclear spin effects	42	
	Raman effect	43	
	Rotational and vibration-rotational transitions	44,45	
	Polarization of Raman lines	46	
	Vibration of polyatomic molecules- normal coordinates	47	
UNIT V Molecular Spectroscopy II	**Electronic Spectroscopy:** Electronic spectroscopy of diatomic molecules	48	
	Franck-Condon factor	49	
	Dissociation and pre-dissociation	50	
	Rotational fine structure	51	
	Lasers and Laser spectroscopy	52	
	XPS-PES	53	
	Spin Resonance Spectroscopy: Spin and an applied field	54	
	the nature of spinning particles	55	
	interaction between spin and magnetic field	56	
	Larmor precession, population of energy levels	57	
	Nuclear Magnetic Resonance Spectroscopy	58	
	Hydrogen Nuclei- The chemical shift-The coupling constant	59	
	Coupling between several nuclei-Analysis by NMR technique	60	

STAFF DETAILS

Name of the Staff : **Dr. Bhalchandra Kakade**
Department : **Research institute**
Designation : **Research Associate Professor**
Room No. : **R-32, 13th Floor**
Contact No. : **9952983671**

19/06/17

Name & Signature of the Staff

19/6/17

HOD/Chemistry

DEPARTMENT OF CHEMISTRY

FACULTY OF SCIENCE AND HUMANITIES
SRM UNIVERSITY
KATTANKULATHUR

LESSON PLAN

Academic year 2016-17

Program : M.Sc (Chemistry)
Subject Title : ANALYTICAL CHEMISTRY PRACTICAL — **Total No. of hours: 72**
Subject code : PCY15304 — **Semester: 3 rd sem**

S.NO	NAME OF THE EXPERIMENT	HOURS ALLOTED
1	Determination of Ferrous Ion with Dichromate by Potentiometry	6
2	Determination of Carbonate/Bicarbonate and Mixtures by Potentiometry	6
3	Determination of pKa of an Acid	6
4	Determination of Zinc with Ferrocyanide by Potentiometry	6
5	Determination of Sodium in Water Sample by Flame Photometry	6
6	Determination of Potassium in Water Sample by Flame Photometry	6
7	Determination of Calcium in Water Sample by Flame Photometry	6
8	Determination of Iron by Spectrophotometry	6
9	Repeat class	6
10	Repeat class	6
11	Model exam	6

STAFF DETAILS

Name of the Staff : **Dr.M.Arthanareeswari**

Designation : **Professor and Head**

Room No : **1217**

Contact No : **044-27417832**

Name and Signature of the Staff

HOD/Chemistry