SANKALCHAND PATEL UNIVERSITY
।। अथातो ज्ञानजिज्ञासा ।।

Faculty of Science

M.Sc. Chemistry (SEM-II)

In Effect from Academic Year 2016-17

SUBJECTCODE:1SC2030203	TITLEOF PAPER: PHYSICALCHEMISTRY-II
COURSETYPE: CORECOURSE	

Course Objective: To impart knowledge and training in chemistry at advanced level, make aware with recent analytical technique, use of reagent sand reactions in laboratory, synthesis and study of materials, the exploration of their properties and development of ways to use the mineral life.

Teaching scheme (hours) per week		Credit			Theory Marks		Practical Marks		Total
Theory	Practical	Theory	Practical	Total	Uni. Assessment	Cont. Assessment	Uni. Assessment	Cont. Assessment	
4	2	4	2	6	60	40	30	20	150

UNIT	DISCRIPTION IN DETAIL	WEIGHTAGE
I	**Statistical thermodynamics** Concepts of distribution of molecules, thermodynamic probability, permutations and combinations, Boltzmann's most probable distribution, partition function - translational, vibrational, rotational, electronic nuclear partition functions.	25%
II	**Electrochemistry** Debye-Hackle Theory (Mathematical Derivation), Thermodynamics of electrified interfaces Lipmann's Equation, Determination of dissociation constant of mono basic acids by conductometry and potentiometry, Gouy-Chapman Theory, Polarization and Overvoltage, Bulter-Volmer equation, Principle of polarography, Equation of polarographic wave, Ilkovic equation.	25%
III	**Surface Chemistry** Adsorption Surface tension, capillary action, pressure deference across curved surface (Laplaceequation), vapour pressure of droplets (Kelvin equation), Gibbs adsorption isotherm,estimation of surface area (BET equation), surface films on liquids. Surface active agents, classification of surface active agents, micellization, hydrophobic interaction, critical micellar concentration (CMS), factors affecting the CMC of surfactants, counter ion binding to micelles.	25%
IV	**Macromolecules** Polymer – definition, types of polymers, electrically conductiong, fire resistant, liquid crystal polymers, kinetics of free radical chain polymerzation, mechanism of polymerization. Molecular mass, number and mass average molecular mass, molecular mass determinations (osmometry, viscometry, diffusion and light scaffering methods), size of macromolecules	25%

Learning Outcome

To provide the basic knowledge of very important concepts of the physical chemistry (chemical thermodynamics, surface chemistry, macromolecules, electro chemistry and chemical dynamics).To provide overview of the applications of these concept in applied field to the students is also an objective.Students can learn the basic concepts and principles of physical chemistry effectively. To learn the applications of the subject in field.

PRACTICALS

Physical Chemistry

1. Chemical Kinetics
   a. To determine the temperature coefficient and energy of activation of the reaction between KBrO3 and KI. At two different temperature.
   b. To study the effect of concentration of reactants on the rate of hydrolysis of an ester.
   c. Determination of the effect of Change of concentration of reactants on the velocity constant of hydrolysis of an ester/Ionic reactions.
2. Distribution (Partition Coefficient)

To determine the distribution coefficient of Iodine (I2) between water (H2O) and Carbon tetra chloride (CCl4).

3. Viscosity
   a. To determination of molecular weight of high polymer by Viscosity method.
4. To determine the strength of strong and weak base in a given mixture using a pH meter.
5. Conductometry
   a. To determine the strength of strong and weak acids in a given mixture using a conductometer.
   b. Determination of the velocity constant, order of the reaction and energy of activation for sponificification of ethyl acetate by sodium hydroxide conductometrically.
6. Potentiometry
   a. To determine the strength of strong and weak acids in a given mixture using a potentiometer.
   b. To determine the solubility of the given salts, AgCl/AgBr/AgI using a potentiometer
7. Colourimetry
   a. To determine the concentration of nitrate (NO2-1) in the given solution.
   b. To study Beer's law and determine the concentration of an unknown solution of Cu+2 by ammonia complex method

LIST OF BOOKS:

1. B.R. Puri, L.R. Sharma, Madan S. Pathania, Principles of physical chemistry,
2. Vishal publishing-Jalandhar.
3. S. Glasstone, Themodynamics for chemistry.
4. S. Glasstone, An introduction to electrochemistry", Affiliated East-West press Pvt.Ltd.
5. B.S.Bahl, G.D.Tuli and ArunBahl, Essential of physical chemistry, S.Chand-New Delhi, Reprint, 2006.
6. V.R. Gowarikar, Polymerchemistry, New Age International(P) Ltd, Fifteen,Reprint, Sep.,1999.
7. Introduction to Quantum Chemistry, A. K. Chandra, Tata MacGraw Hill
8. Quantum Chemistry, Ira N. Levine, Prentice Hall
9. Quantum Chemistry by R. K. Prasad, New Age International Publishers (1985)
10. Elementary Quantum Chemistry by D. L. Pilar, McGraw Hill Book Co, New York (1968)
11. D. A. McQuarrie Quantum Chemistry, OUP 1983
12. M. W. Hanna, Quantum Mechanics in Chemistry, The Benjamin Pub.
13. Molecular Quantum Mechanics, Third Edition, P. W. Atkins and R.S. Friedman
14. Physical chemistry by P.W. Atkins ELBs
15. Chemical kinetics by K.L.Laidler, Magraw-Hill