

## Approval: 10<sup>th</sup> Senate Meeting

**Course Number:** CY-511 P

**Course Name:** Physical Chemistry Laboratory

**Credits:** 0-0-8-4

**Prerequisites:** Undergraduate level Physical Chemistry Laboratory

**Intended for:** M.Sc

**Distribution:** Core

**Semester:** Odd/Even

**Preamble:** This course intends to teach students the experiments on kinetics, catalysis, spectroscopy, photochemistry and determination of few physical properties of molecules. This course also gives an opportunity to the students to gain expertise on different instrumental techniques.

### **Course Modules:**

#### **Module -I**

1. Calibration of volumetric apparatus.

#### **Spectroscopy**

2. Analysis of the vibrational spectra of HCl, CCl<sub>4</sub>, small organic molecules.
3. Simultaneous Determination of chromium and manganese in a mixture by visible light spectroscopy

#### **Physical Property and Surface chemistry**

4. Determination of critical miceller concentration.
5. Determination of pK<sub>a</sub> of an amino acid by pHmeter

#### **Distribution Law**

6. Distribution coefficient of I<sub>2</sub> between two immiscible solvents.
7. Determination of the equilibrium constant of the reaction  $KI + I_2 = KI_3$  using the result from the previous experiment.

#### **Module -II**

#### **Electro-analytical Method**

8. The potentiometric titration of an acid mixture
9. Conductometric titrations of strong acid HCl using strong base NaOH
  
10. Conductometric titrations of weak acid  $\text{CH}_3\text{COOH}$  using strong base NaOH
  
11. Conductometric titration of a triple mixture of HCl,  $\text{NH}_4\text{Cl}$  and KCl by NaOH and  $\text{AgNO}_3$ .

### **Module -III**

#### **Phase**

##### **Equilibria**

12. Determination of phase diagram of a simple eutectic system (Naphthalene – Biphenyl, Naphthalene-Diphenyl amine)
13. Determination of phase diagram of a binary solid system forming a compound (e.g., Naphthalene – m-dinitrobenzene)

##### **Photochemistry**

14. Interaction of Interaction of protein- fluorescence of protein complex, Kinetic study of protein activity of *p*-nitro phenol acetate to *-p*-nitrophenol conversion, Fluorescence spectrum and stern-volmer quenching constant.

##### **Nanomaterials**

15. Synthesis of gold nanoparticles and characterization by UV-VIS, DLS techniques etc
  
16. Size Effect of Gold Nanoparticles in Catalytic Reduction of *p*-Nitrophenol with  $\text{NaBH}_4$

#### **Reference Books:**

1. Experimental physical chemistry, F. A. Bettelheim
2. Experimental physical chemistry, G. P. Matthews
3. Practical physical chemistry, by Alex. Findlay.
4. Experimental Physical Chemistry, D. P. Shoemaker, C. W. Garland, and J. W. Nibler
5. B. Viswanathan & R.S. Raghavan, Practical Physical Chemistry , Viva Books, 2009.
6. A. Ghosal, B. Mahapartra, A. K. Nad, An Advanced Course in Practical Chemistry, New Central Book Agency Pvt Ltd, Calcutta (2000).