

3-4-106

S.V. UNIVERSITY; TIRUPATI
SEMESTER IV (W.E.F. 2016-17)

Paper IV (SPECTROSCOPY & PHYSICAL CHEMISTRY)

60 hrs (4 h / w)

SPECTROSCOPY

30 hrs (2h / w)

UNIT-I

6h

General features of absorption - Beer-Lambert's law and its limitations, transmittance, absorbance, and molar absorptivity. Single and double beam spectrophotometers. Application of Beer-Lambert law for quantitative analysis of 1. Chromium in $K_2Cr_2O_7$
2. Manganese in Manganous sulphate

Electronic spectroscopy:

8h

Interaction of electromagnetic radiation with molecules and types of molecular spectra. Energy levels of molecular orbitals (σ , π , n). Selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation. Concept of chromophore and auxochrome.

UNIT-II

Infra red spectroscopy

8h

Different Regions in Infrared radiations. Modes of vibrations in diatomic and polyatomic molecules. Characteristic absorption bands of various functional groups. Interpretation of spectra-Alkanes, Aromatic, Alcohols Carbonyls, and amines with one example to each.

Proton magnetic resonance spectroscopy (1H -NMR)

8h

Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals - spin-spin coupling, coupling constants. Applications of NMR with suitable examples - ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate, toluene and acetophenone.

PHYSICAL CHEMISTRY

30 hrs (2h / w)

UNIT-III

Dilute solutions

10h

Colligative properties. Raoult's law, relative lowering of vapour pressure, its relation to molecular weight of non-volatile solute. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods of determination. Osmosis, osmotic pressure, experimental determination. Theory of dilute solutions. Determination of molecular weight of non-volatile solute from osmotic pressure. Abnormal Colligative properties- Van't Hoff factor.

UNIT-IV

Electrochemistry-I

10h

Specific conductance, equivalent conductance. Variation of equivalent conductance with dilution. Migration of ions, Kohlrausch's law. Arrhenius theory of electrolyte dissociation and its limitations. Ostwald's dilution law. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Definition of transport number, determination by Hittorfs method. Application of conductivity measurements- conductometric titrations.

UNIT-V

1. Electrochemistry-II

4h

Single electrode potential, sign convention, Reversible and irreversible cells Nernst Equation- Reference electrode, Standard Hydrogen electrode, calomel electrode, Indicator electrode, metal – metal ion electrode, Inert electrode, Determination of EMF of cell, Applications of EMF measurements - Potentiometric titrations.

2.Phase rule

6h

Concept of phase, components, degrees of freedom. Thermodynamic Derivation of Gibbs phase rule. Phase equilibrium of one component system - water system. Phase equilibrium of two- component system, solid-liquid equilibrium. Simple eutectic diagram of Pb-Ag system, simple eutectic diagram, desilverisation of lead., NaCl-Water system, Freezing mixtures.

List of Reference Books

1. Spectroscopy by William Kemp
2. Spectroscopy by Pavia
3. Organic Spectroscopy by J. R. Dyer
4. Modern Electrochemistry by J.O. M. Bockris and A.K.N.Reddy
5. Advanced Physical Chemistry by Atkins
6. Introduction to Electrochemistry by S. Glasstone
7. Elementary organic spectroscopy by Y.R. Sharma
8. Spectroscopy by P.S.Kalsi

VERIFIED AND FINALISED
BY BOS CHAIR PERSON
A.VENKATA RAJU

LABORATORY COURSE – IV
Practical Paper - IV Physical Chemistry and IR Spectral Analysis
(at the end of semester IV)

30 hrs (2 h / W)

Record-10, Experiment-40=Total 50

Physical Chemistry

20M

1. Critical Solution Temperature- Phenol-Water system
2. Effect of NaCl on critical solution temperature (Phenol-Water system)
3. Determination of concentration of HCl conductometrically using standard NaOH solution.
4. Determination of concentration of acetic acid conductometrically using standard NaOH Solution.

IR Spectral Analysis

20 M

5. IR Spectral Analysis of the following functional groups with examples
 - a) Hydroxyl groups
 - b) Carbonyl groups
 - c) Amino groups
 - d) Aromatic groups

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Sri Venkateswara University

Model Question paper for 4th semester of B.Sc degree course from the academic year 2016-17

Name of the Subject: **CHEMISTRY**

Max.Marks:75

Section-I

Answer any **Five** of the following:

5x5=25

1. Write notes on chromophores.
2. Write a note on finger print region.
3. What is coupling constant and explain its significance.
4. Explain the terms: (a) Absorbance (b) Transmittance.
5. Explain Raoult's law.
6. Explain molar conductivity and equivalent conductivity.
7. Write a note on calomel electrode.
8. Write short notes on eutectic point.

Section-II

Answer **All** the question:

5x10=50

9. a) What is chemical shift? Write the factors affecting chemical shift?
(OR)
b) Explain principles of IR spectroscopy.
10. a) State and explain Beer-Lambert's law. Explain any two of its applications.
(OR)
b) Explain different types of spectrophotometers with schematic diagrams.
11. a) Define osmotic pressure? How is it determined using Berkeley-Hartley method.
(OR)
b) How molecular weight can be determined by depression in freezing point using Beckmann's method
12. a) Explain Kohlraush law and its applications.
(OR)
b) Define transport number? How it can be determined by Hittorf's method.
13. a) Define phase rule? Explain the phase diagram of water system.
(OR)
b) Explain the terms involved in phase rule.