Sangola Taluka Shetkari shikshan Prasarak Mandal's

VIDNYAN MAHAVIDYALA, SANGOLA

(Teaching Plan)

Department Of chemistry

Name of Faculty**: Mr. A. R. Ingawale** (Associate Professor)

Academic Year**: 2021 – 22**   Class: **B.Sc. III**   Semesters**: V**

Paper No. **: IX : DSE-1A**   Paper Name**: Physical Chemistry**

Sr.No.	Class	Month	Chapter Details
1	B.Sc. III	July	**3. Electromotive force. [25]** **(Convention : Reduction potentials to be used)** 3.1 Introduction 3.2 Thermodynamics of electrode potentials, Nernst equation for electrode and cell potentials in terms ofactivities. 3.3 Types of electrodes : Description in terms of construction, representation, half cell reaction and emfequationfor, i) Metal - metal ion electrode. ii) Amalgamelectrode. iii) Metal - insoluble salt electrode. iv) Gas -electrode. v) Oxidation - Reductionelectrode. 3.4 i) Reversible and Irreversiblecells. ii) Chemical cells withouttransference. iii) Concentrationcells a. Electrode concentrationcell I) Reversible tocation II) Reversible toanion b. Electrolyte concentration cells withouttransference 3.5 Equilibrium constant from cell emf, determination of the thermodynamic parameters such as ΔG, ΔH andΔS. 3.6 Applications of emf measurements: i) Determination of pH of solution using Hydrogenelectrode. ii) Solubility and solubility

			product of sparingly soluble salts (based on concentrationcell). 3.7 Numericalproblems.
2	B.Sc. III	August	**2. Phase Equilibria. [10]** 2.1 Introduction 2.2 Gibbs phase rule : Phase rule equation and explanation of terms involved in theequation. 2.3 Phase diagram, true and metastableequilibria. 2.4 One component systems : (i) Water system (ii) Sulphur system with explanation for polymorphism. 2.5 Two component systems : (i) Eutectic system : (Ag - Pb system); Desilverisationof lead (ii) Formation of compound with congruent melting point ($FeCl_3$ - H_2O)
3	B.Sc. III	September	**1. Introduction to Quantum Mechanics [10]** 1.1 Introduction 1.2 Failures of classical mechanics, origin of quantum mechanics 1.3 Black body radiation, Stefan-Boltzmann law 1.4 Planck's quantum theory of black body radiation distribution 1.5 Photoelectric effect, explanation on the basis of quantum theory 1.6 Compton effect 1.7 De-Broglie hypothesis 1.8 Heisenberg's uncertainty principle (statement explanation) 1.9 Schrodinger wave equation- (Derivation not expected) ψ and ψ 1.10 Physical significance of wave function ψ and ψ 2
4	B.Sc. III	October	**4. Photochemistry. [15]** 4.1 Introduction 4.2 Difference between thermal and photochemicalprocesses. 4.3 Laws of photochemistry :Grotthus - Draper law, Lambert law, Lambert - Beer's law (with derivation), Stark – Einsteinlaw. 4.4 Quantum yield, Reasons for high quantum yield (e.g. H_2 - Cl_2) and low quantum yield. (e.g. Decomposition of HI andHBr). 4.5 Photosensitized reactions - Dissociation of H_2,Photosynthesis. 4.6 Photodimerisationofanthracene. 4.7 Jablonski diagram depicting various processes occurring in the excited state : Qualitative description of fluorescence andphosphorescence.

			4.8 Chemiluminescence.4.9 Numericalproblems.

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Department Of Chemistry

Name of Faculty**: Mr. A. R. Ingawale (**Associate Professor)

Academic Year**: 2020 – 21**   Class: **B.Sc. III**   Semesters**: VI**

Paper No. **: XIII: DSE-IB**   Paper Name**: Physical Chemistry**

Sr.No.	Class	Month	Chapter Details
1	B.Sc. III	December	**4. Chemical Kinetics [15]** 4.1 Introduction, simultaneous reactions such as opposing reactions, side reactions, consecutive reactions and chain reactions. [Derivations of rate Equations for these reactions are notexpected.] 4.2 Effect of temperature on the rate ofreaction. 1. Temperaturecoefficient 2. Arrheniusequation 3. Energy ofactivation 4.3 Theories of reaction rate: 1. Collision theoryand 2. Transition statetheory 4.4 Third order reaction with equal concentration of all reactants, their characteristics and examples 4.5 Numericalproblems.
2	B.Sc. III	January	**1. Spectroscopy. [15]** 1.1 Introduction 1.2 Electromagnetic radiation. 1.3 Electromagnetic spectrum, Energy leveldiagram. 1.4 Rotational spectra of diatomic molecules : Rigid rotor model; moment of inertia (derivation not expected); energy levels of rigid rotor, selection rule; spectral intensity; distribution using population

			distribution (Maxwell - Boltzmann distribution), determination of bond length; isotope effect. Interaction of radiation with rotatingmolecule. 1.5 Vibrational spectra of diatomic molecules: Simple Harmonic oscillator model, Vibrational energies of diatomic molecules, Determination of force constant,zero point energy. The Anharmonic oscillator, overtones and hot band. Interaction of radiation with vibrating molecules. 1.6 Raman spectroscopy: Introduction, Rayleigh scattering. Raman Scattering, classicaltheory of Raman effect and quantum theories of Raman effect. Polarization of light and the Raman effect. Mutual exclusion principle. 1.7 Numerical problems.
3	B.Sc. III	February	**3. Thermodynamics. [15]** 3.1 Introduction 3.2 Free energy : Gibbs function (G) and Helmholtz function (A), Criteria for thermodynamic equilibrium andspontaneity. 3.3 Relation between G and H : Gibbs Helmholtzequation. 3.4 Phase equilibria :Clapeyron – Clausius equation. 3.5 Thermodynamic derivation of law of mass action, van't Hoff isotherm and isochore. 3.6 Fugacity and activityconcepts. 3.7 Numericalproblems.
4	B.Sc. III	March	**2. Solutions. [15]** 2.1 Introduction 2.2 Ideal solutions, Raoult's law, vapour pressure of ideal and non ideal solutions of miscible liquids. 2.3 Vapour pressure and boiling point diagrams of miscibleliquids. Type I : Systems with intermediate total vapour pressure. (i.e. System in which B.P. increases regularly - Zeotropic) Type II : Systems with a maximum in the total vapour pressure. (i.e. System with a B.P. minimum - Azeotropic) Type III :Systems with a minimum in the total vapour pressure. (i.e. System with a B.P. Maximum - Azeotropic) Distillation of miscible liquid pairs. 2.4 Solubility of partially miscible liquids. (i) Maximum solution temperature type : Phenol - watersystem. (ii) Minimum solution temperature type :Triethyl amine - watersystem. (iii) Maximum and

			minimum solution temperature type : Nicotine - watersystem