**Smt. A.A.A.Govt. PG College, Kalka**

**LESSON PLAN (Even Semester: April 2022 – July 2022)**

**NAME:  Puneet SUBJECT: Chemistry**

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| **Class & Paper** | **Month** | **Topic** |
| B.Sc-I  (Physical Chemistry) | April | **Kinetics:** Rate of reaction, rate equation and its types, factors influencing the rate of a reaction – concentration, temperature, pressure, solvent, light, catalyst. |
| May | Order of a reaction, integrated rate expression for zero order, first order, second and third order reactions. Half life period of a reaction. Effect of temperature on the rate of reaction – Arrhenius equation. Theories of reaction rate – Simple collision theory for unimolecular collision. Transition state theory of bimolecular reactions. |
| June | **Electrochemistry:** Electrolytic conduction, factors affecting electrolytic conduction, specific conductance, molar conductance,equivalent conductance and relation among them, their variation with concentration. Arrhenius theory of ionization, Ostwald’s Dilution Law. DebyeHuckel – Onsager’s equation for strong electrolytes (elementary treatment only), Application of Kohlrausch’s Law in calculation of conductance of weak electrolytes at infinite dilution. Applications of conductivity measurements: determination of degree of dissociation, determination of Ka of acids, determination of solubility product of sparingly soluble salts, conduc tometric titrations. |
| July | Concepts of pH and pKa , Buffer solution, Buffer action, Henderson – Hazel equation, Buffer mechanism of buffer action. |
| B.Sc-II (Inorganic Chemistry) | April | **Chemistry of f-Block elements**: Lanthanides: Electronic structure, oxidation states, magnetic properties, complex formation, colour |
| May | Ionic radii and lanthanide contraction, occurrence, separation of lanthanides, Lanthanide compounds.  Actinides: General characteristics of actinides, chemistry of separation of Np, Pu and Am from uranium, Transuranic elements, comparison of properties of Lanthanides and actinides with transition elements. |
| June | **Theory of Qualitative and Quantitative Analysis:** Chemistry of analysis of various groups of basic and acidic radicals, chemistry of identification of acid radicals in typical combination |
| July | **Theory of Qualitative and Quantitative Analysis:** Chemistry of interference of acid radicals including their removal in the analysis of basic radicals, common ion effect, solubility product, theory of precipitation, co-precipitation, post precipitation, purification of precipitates. |
| B.Sc-II (Physical Chemistry) | April | **Thermodynamics:** Second law of thermodynamics, need for the law, different statements of the law, Carnot’s cycles and its efficiency, Carnot’s theorm, Thermodynamics scale of temperature. |
| May | Concept of entropy – entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change, entropy as a criteria of spontaneity and equilibrium. Third law of thermodynamics: Nernst heat theorem, statement of concept of residual entropy, evaluation of absolute entropy   from heat capacity data. Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities, G as criteria for thermodynamic equilibrium and spontaneity, its advantage over entropy change. Variation of G with P, V and T. |
| June | **Electrochemistry:** Electrolytic and Galvanic cells – reversible & irreversible cells, conventional representation of electrochemical cells. Calculation of thermodynamic quantities of cell reaction (▲G, ▲H & K). Types of reversible electrodes – metal- metal ion, gas electrode, metal –insoluble salt- anion and redox electrodes |
| July | **Electrochemistry:** Electrode reactions, Nernst equations, derivation of cell EMF and single electrode potential. Standard Hydrogen electrode, reference electrodes, standard electrode potential, sign conventions, Concentration cells with and without transfe rence, liquid junction potential and its measurement.Applications of EMF measurement in solubility product and potentiometric titrations using glass electrode. |
| B.Sc-III (Physical Chemistry) | May | **Introduction to statistical mechanics**: Need for statistical thermodynamics, thermodynamic probability, Maxwell Boltzmann distribution statistics. |
| June | Born oppenheimer approximation, partition function and its physical significance. Factorization of partition function.  **Photochemistry:** Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grotthus-Drapper law, StarkEinstein law (law of photochemical equivalence)  Jablonski diagram depiciting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions-energy transfer processes.  **Phase Equilibrium** :Statement and meaning of the terms – phase, component and degree of freedom, thermodynamic derivation of Gibbs phase rule, phase equilibria of one component system –Example – water system. Phase equilibria of two component systems solid-liquid equilibria, simple eutectic Example Pb-Ag system, desilverisation of lead. |
| July | **Solutions, Dilute Solutions and Colligative Properties**: Ideal and non-ideal solutions, methods of expressing concentrations of solutions, Dilute solutions, Raoult’s law. Colligative properties: (i) relative lowering of vapour pressure (ii) Elevation in boiling point (iii) depression in freezing point (iv) osmotic pressure. Thermodynamic derivation of relation between amount of solute and elevation in boiling point and depression in freezing point.. Applications in calculating molar masses of normal, dissociated and associated solutes in solution. |
| B.Sc-III (Inorganic Chemistry) | April | **Bio inorganic chemistry**  Metal ions present in biological system, classification on the basis of action (essential, non essential, trace, toxic), |
| May | Metalloporphyrins with special reference to haemoglobin and myoglobin. Biological role of Na+, K+, Ca+2, Mg+2, Fe+2 ions, Cooperative effect, Bohr effect. |
| June | **Silicones and Phosphazenes**  Nomenclature, classification, prepration and uses of silicones, elastomers, polysiloxane copolymers, |
| July | Poly phosphazenes and bonding in triphosphazene. |