**Syllabus**

**First Year B.Sc. Chemistry Certificate course 2023-24**

**Numerical Chemistry**

**Module I Analytical chemistry (10 hrs.)**

Mole concept, Equivalent mass, methods of expressing concentration, weight %, molality, molarity, normality, mole fraction, ppm, millimoles, numerical problem related to basic concepts (related problems).

**Module II Nuclear chemistry (10 hrs)**

Problem related to radioactive disintegration, halflife period, integrated rate exponent for radioactive disintegration, C-14 dating, rock dating (related problems).

**Module III Atomic structure (10 hrs)**

Concept of matter waves, wave particle duality, uncertainty principle, Calculation of B O based on MOT calculation of lattice energy - the born -lande equation, born= haber cycle and its applications (Related problems)

**Second Year B.Sc. Chemistry Certificate course 2023-24**

**chemistry problems and solutions (LFCC23CHM2)**

**Module I Gaseous State (10 hrs)**

Molecular velocities, RMS, average and most probable velocity, collision number, mean free path, collision diameter - virial equation and calculation of Boyle temperature. Relationship between critical constants and vander waals constants. Related problems.

**Module II Chemical thermodynamics (15 hrs)**

Zeroth law, first law of thermodynamics, Concepts of heat work, internal energy, Enthalpy, Cp, Cv relationships - work done in isothermal expansion and reversible isothermal expansion. Entropy change of system and surroundings for various processes and transformations. Free energy functions and their variations with T, P and V. Existence for spontaneity and Equilibrium. Carnot's theorm- Carnot cycle and its efficiency Related problems

**Module III Chemical Equilibrium (5 hrs)**

Equilibrium constants and quantitative dependence on temperature, pressure and PH, Pka, Pkb. Buffer action, solubility and ionic hydrolysis constant degree of dissociation of weak acids and bases.

**THIRD YEAR B.SC. CHEMISTRY CERTIFICATE COURSE 2023 -2024**

**CHEMISTRY PROBLEMS AND SOLUTIONS (LFCC23CHM2)**

**Module I Adsorption (10 hrs)**

 Gibbs adsorption equation; adsorption isotherm – Langmuir adsorption and freundlich adsorption; BET

**Module II Spectroscopy (10 hrs)**

Beer-Lambert's law; fundamental concepts of rotational, vibrational, electronic and magnetic resonance spectroscopy.

**Module III Solid State (10 hrs)**

Unit Cells, Miller indices, crystal systems and Bravais Lattices, X-ray diffraction, Bragg's Law, Structure of NaCl, CsCl, and KCl, diamond, and graphite; Close packing in metals and metal compounds; Defects in crystals.