Syllabi For Panjab and Punjabi Universities

PANJAB UNIVERSITY

SEMESTER-I
PAPER-III: PHYSICAL CHEMISTRY – A

Time: 3 Hrs.
Max. Marks: 22+3
30 Hrs. (2 Hrs/week)
3 Periods/week

OBJECTIVE OF THE COURSE

To teach the fundamental concepts of Physical Chemistry and their applications. The syllabus pertaining to B.Sc. (GENERAL) (Semester System) in the subject of Chemistry has been upgraded as per provision of the UGC module and demand of the academic environment. The course contents have been revised from time to time as per suggestions of the teachers of Chemistry working in the Panjab University, Chandigarh and affiliated colleges. The syllabus contents are duly arranged unit wise and contents are included in such a manner so that due importance may be given to requisite intellectual and laboratory skills.

UNIT–I (8 Hrs.)

Mathematical Concepts and Evaluation of Analytical Data:
Logarithmic relations, curve sketching, linear graphs and calculation of slopes, differentiation and integration of functions like e^x, x^n, sin x, log x; maxima and minima, partial differentiation and reciprocity relations.
Terms of mean and median, precision and accuracy in chemical analysis, determining accuracy of methods, improving accuracy of analysis, data treatment for series involving relatively few measurements, linear least squares curve fitting, types of errors, standard deviation.

UNIT–II (7 Hrs.)

Gaseous States:
Postulates of kinetic theory of gases, deviation from ideal behavior, Van der Waal's equation of state.
Critical Phenomena: PV isotherms of real gases, continuity of states, the isotherms of Van der Waal's equation, relationship between critical constants and Van der Waal's constants, the law of corresponding states, reduced equation of state.
Molecular Velocities: Root mean square, average and most probable velocities. Qualitative discussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter. Liquification of gases (based on Joule-Thomson effect).

UNIT–III (8 Hrs.)

Chemical Kinetics-I
Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction-concentration, temperature, pressure, solvent, light, catalyst. Concentration dependence of rates, mathematical characteristics of simple chemical reactions – zero order, first order, second order, pseudo order, half life and mean life. Determination of the order of reaction – differential method, method of integration, method of half-life period and isolation method.
Radioactive decay as a first order phenomenon.

UNIT–IV (7 Hrs.)

Chemical Kinetics-II
Theories of Chemical Kinetics: Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy.
Simple collision theory based on hard sphere model, transition state theory (equilibrium hypothesis). Expression for the rate constant based on equilibrium constant and thermodynamic aspects.
Catalysis and general characteristics of catalytic reactions, Homogeneous catalysis, acid-base catalysis and enzyme catalysis including their mechanisms, Michaelis Menten equation for enzyme catalysis and its mechanism.

Instructions for paper setters and candidates:

(i)   Examiner will set total of **NINE** questions comprising **TWO** questions from each unit and **ONE** compulsory question of short answer type covering whole syllabi.
(ii)   The students are required to attempt **FIVE** questions in all, **ONE** question from each unit and the Compulsory question.
(iii)   Compulsory question carries six marks and remaining all questions carry four marks each.

SEMESTER-II
PAPER-VII: PHYSICAL CHEMISTRY – B

Time: 3 Hrs.
Max. Marks: 22+3
30 Hrs. (2 Hrs/week)
3 Periods/week

OBJECTIVE OF THE COURSE

To teach the fundamental concepts of Physical Chemistry and their applications. The syllabus pertaining to B.Sc. (GENERAL) (Semester System) in the subject of Chemistry has been upgraded as per provision of the UGC module and demand of the academic environment. The course contents have been revised from time to time as per suggestions of the teachers of the Chemistry working in the Panjab University, Chandigarh and affiliated colleges. The syllabus contents are duly arranged unit wise and contents are included in such a manner so that due importance may be given to requisite intellectual and laboratory skills.

UNIT–I
(8 Hrs.)

Thermodynamic-I:
Definition of Thermodynamic Terms: System, surroundings etc. Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Concept of heat and work.

First Law of Thermodynamics: Statement, definition of internal energy and enthalpy, Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's Law, Joule-Thomson coefficient and inversion temperature. Calculations of w, q, dU and dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process.

UNIT–II
(7 Hrs.)

Thermochemistry:
Standard state, standard enthalpy of formation-Hess's Law of constant Heat Summation and its applications. Heat of reaction at constant pressure and at constant volume. Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy. Kirchoff's equation.

UNIT–III
(7 Hrs.)

Colloidal State:
Definition of colloids, classification of colloids.

Solids in liquids (sols): Properties–kinetic, optical and electrical; stability of colloids, protective action, Hardy-Schulze rules, gold number.
Liquids in liquids (emulsions): Types of emulsions, preparation. Emulsifier.
Liquids in solids (gels): Classification, preparation and properties, imbibition, general applications of colloids.

UNIT–IV
(8 Hrs.)

Solutions, Dilute Solutions and Colligative Properties:
Ideal and non-ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient.

Dilute solution, colligative properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis, law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression of freezing point, Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression of freezing point. Experimental methods for determining various colligative properties.

Abnormal molar mass, degree of dissociation and association of solutes.

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