Name of Faculty	:	Faculty of Science
Name of Program	:	Bachelor of Science
Course Code	:	2BSC01
Course Title	:	Physical Chemistry -I
Type of Course	:	Professional Core
Year of Introduction	:	2023-24

Prerequisite	:	Basic knowledge of physics, including classical mechanics, wave theory, and particle behavior
Course Objective	:	Enhance problem-solving abilities by applying theoretical concepts to real-world chemical scenarios and experimental data. Acquire the skills to quantitatively analyze and predict the behavior of chemical systems using mathematical equations and concepts. Apply thermodynamic and kinetic principles to explain chemical processes, equilibrium, and reaction mechanisms.
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	Remember the fundamental concepts of thermodynamics.
	CO2	Understand the Schrodinger equation and its applications in describing atomic and molecular system.
	CO3	Apply concepts of Chemical bonding to understand behavior of solids and materials.
	CO4	Analyze electrochemical methods, including potentiometry and voltammetry.

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
				Theory Marks		Practical Marks		Total Marks
L	**T**	**P**	**C**	**SEE**	**CIA**	**SEE**	**CIA**	
3	0	2	4	50	25	50	25	150

*Legends: **L**-Lecture; **T**–Tutorial/Teacher Guided Theory Practice; **P** – Practical, **C** – Credit, **SEE** – Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping WithCOs
1	**Thermodynamics and Thermochemistry** Basic concepts of thermodynamics, Laws of thermodynamics, State functions and path functions, Heat, work, and internal energy, Enthalpy and calorimetry Hess's law and standard enthalpy of formation. First law of thermodynamics, Second law of thermodynamics, Entropy and Gibbs free energy	12	26.66%	CO1
2	**Chemical Kinetics** Rate of reactions, Order and molecularity of reactions, Rate laws and rate constants, Integrated rate laws and half-life Reaction mechanisms, Arrhenius equation, Collision theory and transition state theory, Catalysis and enzyme kinetics	10	22.22%	CO2
3	**Quantum Mechanics and Molecular Structure** Wave-particle duality and photoelectric effect, Quantum numbers and atomic orbitals, Electronic structure of atoms and periodic trends.	11	24.44%	CO3
4	**Electrochemistry** Redox reactions and oxidation states, Galvanic cells and cell potential, Nernst equation and concentration cells, Electrolysis and Faraday's laws, Electrochemical series, Corrosion and its prevention, Batteries and fuel cells, Applications of electrochemistry.	12	26.66%	CO4

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	**25**	**25**	**25**	**25**	**-**	**-**

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested List of Experiments / Tutorials

Sr. No.	Name of Experiment/Tutorial	Teaching Hours
1	To determine heat capacity colorimetry for different volumes	02
2	To determine solubility of Benzoic acid in water and determination of different enthalpy.	02
3	To determine energy of ionization od Acetic Acid.	02
4	Preparation of Sodium acetate and acetic acid buffer solution.	02
5	Preparation of ammonium chloride and ammonium hydroxide buffer solution.	02
6	Determination of concentration of strong acid by pH meter i. HCl ii. H_2SO_4	02 x 02 = 04
7	Determination of concentration of weak acid by pH meter i. Oxalic acid ii. Acetic acid iii. Benzoic acid	02 x 03 = 06
8	Determination of concentration of strong base by pH meter i. NaOH ii. KOH	02 x 02 = 04
9	Determination of concentration of strong base by pH meter i. NH_4OH ii. $NaHCO_3$ iii. Na_2CO_3	02 x 02 = 04

Major Equipment/Instruments and Software Required

Sr. No.	Name of Major Equipment / Instruments and Software
1	Test tubes
2	test tube stand
3	Beakers
4	Funnel
5	chromatographic paper or TLC
6	Glass rod

Suggested Learning Websites

Sr. No.	Name of Website
1	**https://nptel.ac.in/courses/104103112**
2	**https://nptel.ac.in/courses/104106089**

Reference Books

Sr. No.	Name of Reference Books
1	Principles of Physical Chemistry, B. R. Puri, L. R. Sharma, M.S. Pathaniya
2	Principles of Physical Chemistry 4th edition Samuel Maron, Carl F. Prutton, Oxford & IBH Publishing.
3	Mathematical Preparation for Physical Chemistry, Farrington Daniels, Mc Graw- Hill Publication.
4	Barrow, G.M. Physical Chemistry Tata McGraw-Hill (2007)
5	J. N. Gurtu, A. Gurtu, Advanced Physical Chemistry, Pragati Edition
6	Thomas Engel, Philip Reid; Physical Chemistry, Pearson Education (2006)
7	Essentials of Physical Chemistry, B. S. Bahl, G. D. Tuli, Arun Bahl (S. Chand & Co Ltd.)
8	Atkins' Physical Chemistry, 10th edition (2014), Oxford University Press
9	Practical chemistry (for B.Sc. I, II and III year students) – O P Pandey, D. N. Bajpai and S. Giri (S Chand and company Ltd.)