

Name of Faculty	:	Faculty of Science
Name of Program	:	Master of Science
Course Code	:	1MSO03
Course Title	:	Physical Chemistry
Type of Course	:	Basic Science
Year of Introduction	:	2023-24

Prerequisite	:	Basic Knowledge about of thermodynamics
Course Objective	:	Physical chemistry enhances critical ability and inculcates problem solving skills among the learners. All industries rely heavily on physical parameters for manufacturing and quality assurance of products.
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	Understand basic concepts and theories for thermodynamics and electrochemistry
	CO2	Implement and build theoretical and experimental processes using thermodynamics and electrochemical concepts
	CO3	Remember basic theories related to thermodynamics, chemical kinetics and polymers.
	CO4	Evaluate numerical problems associated with thermodynamics, and electrochemistry

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
L	T	P		Theory Marks		Practical Marks		Total Marks
SEE	CIA	SEE	CIA					
4	0	0	4	70	30	-	-	100

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

Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping With COs
1	Chemical Thermodynamics: Chemical Thermodynamics: Brief Concepts of laws of thermodynamics, free energy, chemical potential and entropies. Partial molar properties: partial molar free energy, partial molar volume and partial molar heat content and their significances. Determinations of these quantities. Concept of fugacity and determination of fugacity, Non-ideal systems : Excess functions for non-ideal solutions, Activity, activity coefficient, Debye-Huckel theory for activity coefficient of electrolytic solutions; determination of activity and activity coefficients ; ionic strength.	15	25%	CO1 CO2 CO3 CO4
2	Chemical Kinetics: Unimolecular reactions, chain reactions and branched chain reactions, explosion limits, chain reaction between hydrogen and bromine, theory of absolute reaction rates, kinetic isotope effect. Enzyme catalyzed reactions, mechanism, kinetics and some examples.	15	25%	CO3
3	Electrochemistry: Sign convention-American, European and IUPAC; Determination of dissociation constant of monobasic acids by conductometry, determination of dissociation constants of monobasic and polybasic acids by potentiometry. The rate of charge transfer, polarization and overvoltage, basic principle of polarography, origin of different types of current; equation of polarographic wave, Ilkovic equation.	15	25%	CO1 CO2 CO4
4	Polymer chemistry: Kinetics and mechanism of polymer processes, criteria of polymer solubility, thermodynamics of polymer solutions, polymer characterization, molecular weight of polymer (number average and weight average) , methods of molecular weight determination, properties of polymers and applications.	15	25%	CO1 CO3

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 Learning Websites

Sr. No.	Name of Website
1	https://onlinecourses.nptel.ac.in/noc22_cy58/preview
2	https://onlinecourses.nptel.ac.in/noc22_me103/preview

Reference Books

Sr. No.	Name of Reference Books
1	Textbook of physical chemistry - W.J.Moore
2	Textbook of physical chemistry - Glasstone
3	Textbook of physical chemistry - P.Atkins
4	Advanced physical chemistry - Surdeep Raj
5	Thermodynamics for chemists -Glasstone
6	Advanced physical chemistry - J.N.Gurtu, A.Gurtu
7	Physical chemistry - S. Castellian
8	Thermodynamics of non equilibrium processes- Karapitaneh
9	Chemical Kinetics- Laidler
10	Chemical Kinetics - Frost and Pearson