GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Chemical/Petrochemical/Biotechnology
		Version	1.0.0.0
Semester	II	Course Category	Engineering Science
Course Code	2BSC1104	Course Name	Engineering Chemistry
Effective from Academic Year	2026-27	Effective for the batch Admitted in	July 2026

Teaching, Learning and Examination Scheme

Teaching & Learning Scheme							Examination scheme (Marks)					
Hours (per week)				Cr	SL	TSL	Theory			Practical		
L	TU	P	TTH				CE	SEE	Total	CE	SEE	Total
3	0	2	5	4	45	120	50	50	100	25	25	50

L: Lecture, TU: Tutorial, P: Practical, TTH: Total Teaching Hours/Week, Cr: Credit, SL: Min. Self-Learning/Term Work Hours/Sem, TSL: Min. Total Teaching & Learning Hours/Sem, CE: Continuous Evaluation, SEE: Semester End Examination,

Pre-requisites

N/A

Course Outcomes

COs	Description
CO1	Understand principles of water technology and solve industrial challenges related to water treatment
CO2	Determine reaction rates and rate constants using basic kinetic models
CO3	Apply equilibrium concepts to analyse chemical and ionic equilibria.
CO4	Explain electrochemical and interfacial phenomena in practical systems.

Theory Syllabus

Unit	Content	Hrs
1	**Water chemistry:** Hardness of water, Softening of water, Boiler problems; caustic embrittlement, sludge, scale, priming and foaming. Treatment of boiler feed water, Desalination using reverse osmosis, Production of potable water	9
2	**Chemical Kinetics:** rate of a reaction, elementary and complex reactions; molecularity and order of a reaction; rate constant, effect of concentration, temperature and catalyst on rate; derive integrated rate equations for the zero and first order reactions, determine the rate constants for zeroth and first order reactions, describe collision theory.	10
3	**Equilibrium Phenomena:** Physical and chemical equilibrium, Laws of Chemical Equilibrium and Equilibrium Constant, Homogeneous and Heterogeneous Equilibria, Applications of Equilibrium Constants, Relationship between Equilibrium Constant, Reaction Quotient and Gibbs Energy, Factors Affecting Equilibria, Ionic Equilibrium in Solution, Acids, Bases and Salts, Buffer Solutions	10
4	**Electrochemistry:** Electrolytic conductance, Transference Number, Specific and Equivalent Conductance, application of conductance (solubility of sparingly soluble salts, conductometric titrations), introduction to electrochemical cells and the Nernst equation	8
5	**Surface Chemistry:** Surface tension, surface energy, flat and curve surface, pressure differential across a curved surface and capillary rise and fall, contact angle, wetting, spreading and adhesion, basics of adsorption process (types, isotherms, applications)	9

Practical Content

Laboratory and Term Work will be based on above syllabus

Text Books

1	*Engineering Chemistry by P.C. Jain and Monica Jain. Pub.: Dhanpat Rai Publishing Company.*
2	*Physical Chemistry* by O. P. Pandey and D. Madhwani

Reference Books

1	*Engineering Chemistry by S. S. Dara. Pub.: S. Chand & Company Ltd*
2	*Physical Chemistry* by G. M. Barrow

ICT/MOOCs Reference

1	https://nptel.ac.in/courses/104105084
2	https://nptel.ac.in/courses/104106137

Mapping of Cos, POs, and PSOs

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO1	3	2	1	2	1	1	1	1	1	3	3	3	2	1
CO2	3	3	1	2	1	1	1	1	1	3	3	3	3	1
CO3	3	3	1	2	1	1	1	1	1	3	3	3	2	1
CO4	2	2	1	2	2	2	1	1	1	2	3	2	2	2

Unit	Unit Title	Aligned COs	Learning Hours	BTL Level
1	Water chemistry	1	9	U, A
2	Chemical Kinetics	2	10	U, A
3	Equilibrium Phenomena	3	10	U, A
4	Electrochemistry	4	8	R, U
5	Surface Chemistry	4	9	R, U

Note:

- Version 1.0.0.0 (First Digit= New syllabus/Revision in Full Syllabus, Second Digit=Revision in Teaching Scheme, Third Digit=Revision in Exam Scheme, Forth Digit= Content Revision)
- L=Lecture, TU=Tutorial, P= Practical/Lab., TW= Term work, DT= Direct Teaching, Lab.= Laboratory work CE= Continuous Evaluation, SEE= Semester End Examination
- 1 Hour Lecture = 1 Credit, 1 Hour Tutorial = 1 Credit, 2 Hours Practical = 1 Credit, 2 Hours Internship/Project/Seminar = 1 Credit
- As per NCrF/NEP 2020, Minimum Self-Learning or Term Work Hours per Semester should be calculated in such a way that 1 Credit should have minimum 30 Hours of Teaching and Self Learning Engagement per semester