Enclosure - III

Sarvodaya Kelavani Samaj managed,

Shri Manibhai Virani and Smt. Navalben Virani Science College

(Autonomous)

(Affiliated to Saurashtra University, Rajkot)

Re-Accredited at 'A' Level by NAAC

STAR college Scheme & Status by MST-DBT

UGC-College with Potential for Excellence (CPE)

UGC-DDU KAUSHAL Kendra

GAAA –Grade A-1 by KCG, Government of Gujarat

GPCB-Government of Gujarat approved Environment Audit Center

Nodal Center for capacity building by GSBTM

Department of Chemistry

B.Sc. Chemistry

DSE 2 (Cluster):

Discipline Specific Elective Cluster (DSE-C) For the students admitted from A.Y. 2021-2022 & onwards		
Offering Department: **Chemistry**	Offered to: **Other B.Sc. Program**	
Semester – IV		
Course Code	Course Title	Course Credit and Hours
	DSE 2 (Cluster): Conceptual Analytical & Physical Chemistry	**4 Credits - 3 hrs/wk**

Course Description:

This course provides a systematic study of the theories, principles and its application related to the chemistry. Topics include, thermodynamic reactions and the effect of various functional. It also covers the concepts of chemical kinetics, types of electrode and its application. The course aims to address SDG No-4: Quality education.

Course Purpose:

This course aims to provide profound understanding of various terminologies related to the acid and base. It also provides concepts of various modes of concentration of solution. This course also provide various parameters of thermo chemistry .This is intended in such a way that students will be able to learn various methods of determining rate of reaction in chemical kinetics and its application.. This course also gives basic information about surface chemistry.

Course Outcomes: Upon completion of this course, the learner will be able to

CO No.	**CO Statement**	**Bloom's taxonomy Level(K_1 to K_6)**
CO_1	Distinguishing various types of concentration of aqueous solutions and apply it in the acid-base chemistry.	K_4
CO_2	Recognize concepts of thermodynamics and thermo chemistry.	K_2
CO_3	Use concept of chemical kinetics and interpretation of rate of reaction by different methods.	K_3
CO_4	Execute the fundamentals of electrochemistry in various application.	K_3
CO_5	Understand basics of surface chemistry	K_2

Course Content	Hours
Unit –1: Introduction of Acid-Base and Types of Concentration	**12hrs**
Acid- Base & Buffers • Introduction • Strong and weak electrolytes • Degree of ionization • Ionic product of water • Ionization of weak acid and weak base • pH scale • Common ion effect • Chemistry of Buffers • Determination of pH of buffer by Henderson equation **Modes of Concentration** • Introduction • Determination of Molecular weight and eq. weight • Different modes of concentration - Normality, Molarity, Molality, Mole fraction,% W/W ,% W/V,% V/V, ppm • Numericals	
Unit – 2 :Fundamentals of Thermodynamics and Thermo Chemistry	**12hrs**
Thermodynamics • Introduction • System, surrounding, types of system • Thermodynamic processes, Macroscopic properties • State function & Path function • Concept of Heat & work • Zeroth law (Statement & Mathematical expression) • First law (Statement & Derivation) **Thermo Chemistry** • Exothermic and endothermic reactions • Heat of reaction: Combustion, Solution, Neutralization, Vaporization, Sublimation, Transition • Bond dissociation energy • Hess's law	
Unit – 3: Concepts of Chemical Kinetics	**12hrs**
• Introduction • Reaction rate, Order and Molecularity of reaction • Derivation, Characteristics, Half life time & Examples ➢ Zero order reaction ➢ First order reaction	

• Method for determining the order of reaction: ➢ Graphical method ➢ Ostwald's isolation method ➢ Method of half-life period ➢ Integration method • Energy of Activation and catalysis • Numerical	
Unit –4:Introduction to Electrochemistry	**12hrs**
• Introduction • Reversible and Irreversible cell • Type of electrodes • Measurement of EMF of cells • Thermodynamics of electrode and cell potentials – Nernst equation • Standard electrode potential & measurement	
Unit – 5: Surface Chemistry	**12hrs**
Adsorption • Introduction • Concepts ➢ Adsorption,Absorption, Adsorbate, Adsorbent, Sorption, Desorption • Types of Adsorption ➢ Physisorption & Chemisorption • Adsorption isotherm ➢ Langmuir Adsorption ➢ Freundlich isotherm • Applications **Catalysis** • Introduction • Types of catalyst & catalysis • Theory of catalysis ➢ Acid base catalysis ➢ Enzyme catalysis • Applications	

Pedagogic Tools:

- Chalk and Talk
- PPT and Videos.
- Assignment
- Group discussion

Text Books:

- Bahl, Arun; Bahl, B. S.; Tuli, G. D. (2020, 28th edition) Essential of Physical Chemistry. New Delhi : S. Chand (ISBN No978-9352836093).

Reference Books:

- Negi, A. S.; Anand, S. C. (2007, 2nd edition) A Textbook of Physical Chemistry. New Delhi: New age International Publisher (ISBN: 81-224-2005-0).
- Peter Atkins; Julio de Paula (2018, 11th edition) Atkin's Physical Chemistry.Oxford: Oxford University Press (ISBN: 978-0198814740
- Christian, Gary D.; Dasgupta, Purnendu K.; Schug, Kevin A. (2020, 6th edition) Analytical Chemistry. Hoboken: Wiley-Blackwell Science Ltd. (ISBN: 978-9388991094).

Suggested reading / E-resources:

1. https://www.extension.harvard.edu/academics/courses/introduction-chemistry
2. https://libguides.reading.ac.uk/chemistry/e-resources
3. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=5
4. http://library.iiti.ac.in/

Suggested MOOCs:

1. https://swayam.gov.in/nc_details/NPTEL

Methods of assessing the course outcomes

Components of CIA: 40 marks

Sr. No.	Component	Content	Duration (if any)	Marks	Sub Total
A	Test 1	1st 2 units	1 1/2 hours	5 (Set for 30)	20
	Test 2	All 5 units	3 hours	15 (Set for 70)	
B	Assignment			10	20
C	Class activity			10	
				Grand Total	40

Assignment	• Abstract and executive summary • Case study writing • Concept mapping • Student generated handbook • Essay writing etc… • Short Time-Online Course
Class activity	• Presentation (PPT, Poster, Chart) • Seminar • Quiz

	• Model Making • Think Pair Share • Free writing • Class test • Debate/ Group Discussion • Open Book Test

Note: Any other assessment tools or methods can be adopted as per requirement of the course.