

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Course Name : B. Sc. Chemistry Semester : I
PROGRAM CODE : SCIUG102
COURSE CODE : SC23MJDSCCHE101

Type of course : Major Discipline Specific course

Name of course : Fundamentals of chemistry I

Total Marks : 100

Effective from June 2023 Under NEP 2020

Total Credits : 04	Teaching Hours per Week: 04	Theory	External 50 Marks
	Teaching Hours per Semester: 60		Internal 50 Marks

Course Objectives:

1. To understand the core concepts of valence bond theories.
2. To understand organic chemistry i.e. resonance, hyperconjugation, inductive effect etc. and their application.
3. To study about the chemical kinetics and types of reactions.
4. To know about the Volumetric titrations and calculations for estimation.

Course Outcome:

1. Students will have a firm foundation in the fundamentals and application of current chemical and scientific theories including those in Analytical, Inorganic, Organic and Physical Chemistries.
2. Students will appreciate the central role of chemistry in our society and use this as a basis for ethical behavior in issues facing chemists including an understanding of safe handling of chemicals, environmental issues and key issues facing our society in energy, health and medicine.
3. Students will be able to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments.
4. Students will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
5. To know about the Volumetric titrations and calculations for estimation.

Unit	Topic	Credit	Hr
1	<p>CHEMICAL BONDING</p> <p>(A) Valence Bond Theory: Introduction; Hitler-London theory (energy changes taking place during the formation of H₂ Molecule, Pauling-Slater's Theory (orbital Overlap theory of Covalent Bond).</p> <p>Types of Bond, Covalent bond, ionic bond, Coordination covalent bond Coordination bond and Vanderwaals force bond. Hybridization and types of hybridization. SP, Sp², Sp³, dsp², sp³d, sp³d²</p> <p>(B) Molecular Orbital Theory: Introduction. M.O. Treatment for H₂ molecules Bonding molecular orbitals and Anti-bonding molecular orbitals, Sigma and Pi Molecular orbitals. Formation and configuration of Molecular orbital in a Homo-nuclear diatomic species of A₂ type (H₂; H₂⁺; N₂; N₂⁺; O₂; O₂⁺; O₂⁻²)</p> <p>Formation and configuration of Molecular orbital in a Hetero-nuclear diatomic species of AB type (CO; CN; CN⁻; NO; NO⁻)</p>	1	15
2	<p>(A) Structure And Properties</p> <p>Factors affecting to the properties of organic molecule: Intramolecular forces (dipole-dipole interaction, vander waals forces), Electromeric effect, Inductive effect, Resonance effect(draw resonating structures of Nitro benzene, Chlorobenzene, Phenoxide ion, Anilinium ion, Acetate ion), Hyper conjugation (O,P-directing effect of Alkyl group, Stability of Carbonium ion and Free radicals)</p> <p>(B) Reaction Mechanism</p> <p>Fission of Covalent bond (With at least one example of each intermediates), Types of reagents.: Nucleophile, electrophile, Free Radical, Types of organic reaction with mechanism, Substitution reactions Nucleophilic & Electrophilic), Elimination reactions (E1& E2), Addition reactions (Nucleophilic & Electrophilic)</p>	1	15
3	<p>Chemical Kinetics.</p> <p>Introduction : Rate of reaction, Order of reaction, Molecularity, Rate equation for zeroth order reaction, Rate equation for first order reaction, Characteristics of first order reaction, Rate equation for</p>	1	15

	second order reaction.(a = b) & (a≠b); Characteristics of second order reaction, Rate equation for third order reaction (a = b = c) ; Characteristics of third order reaction, Consecutive reaction, Parallel reaction, Reversible reaction, Numerical.		
4.	<p>Analytical Chemistry</p> <p>Introduction to Analytical Chemistry : Classification of Classical and Electro analytical Techniques, Literature of Analytical Chemistry (Names of Author and Publishers for Any Ten Books, Journals and Reviews), Criterion for Selection of analytical Techniques, Define: Accuracy, Precision, Specification, Detection limit, Characterization limit, Linearity, Range, Robustness, etc.Analytical Data Treatment: Error, Types of errors, Accuracy and Precision. Statistical Terms: Mode, Average, Median, Deviation, Average Deviation, Relative Average Deviation, Standard Deviation & Coefficient of variance. Q-Test for the rejection of result and related numerical, Significant figures, 2.5 d and 4.0 d rules.</p>	1	15
<p>Books Recommended:</p> <p>Inorganic Chemistry</p> <ol style="list-style-type: none"> 1.Modern Inorganic Chemistry’ by G.F.Liporni, ELBS, 4th edn. coilingEducational. 1983. 2. ‘Inorganic Chemistry’ D.F.Shriver. P.W.Atkinss and C.H.Longford, 3rd edn, ELPS Oxford University Press, 1999.. 3. ‘Concise Inorganic Chemistry’ J.D.Lee. 5thedn. 4. ‘Inorganic Chemistry’, D.F.Slirjver, P.W.Atkinss, 3rdedn, Oxferd. 1999. 5. ‘Concise Inorganic Chemistry’ J.D.Lee, 4thedn, Champman and hall ELBS,1991. 6. ‘Inorganic Chemistry’ by A.G.Sharp, 3rdedn, ELBS, Longman, 1990. <p>Organic Chemistry</p> <ol style="list-style-type: none"> 1. ‘Organic reaction and mechanism, P.S.Kalsi, New Age internationalPublishers. 2. Text book of organic Chemistry. P.S.Kalsi, New Age international Publishers. 3. Organic Chemistry Vol. I&II.S.M.Muklierji, S.P.Singh.R.P.Kapoor. 4. Reaction mechanism in Organic Chemistry, S.M.Mukhergi. S.P.Singh. 3rdedn. Macmillan. 			

Physical Chemistry

1. Advance Physical Chemistry by Gurdeep raj.
2. Physical Chemistry (Question and Answer) by R.N.Madan, G.D.Tuli..S.Chand.
3. Principal of Physical Chemistry by Puri Sharma, Pathania.
Chemical Thermodynamics by R.P.Rastogi and R.R.Misra.

Analytical Chemistry

1. Fundamentals of Analytical Chemistry by Skoos& West.
2. Analytical Chemistry, Garry D.Christain.
3. Analytical Chemistry, Day & Underwood.
4. Analytical Chemistry by Lerry&Hergins.
5. Qualitative Analysis by A.I.Vogel, 5th edn.

Further Reading:

1. Reaction Mechanism and Reagents in Organic Chemistry, GurdeepR.Chatwal
4th edn, Himalaya Publication House.
2. Text book of Organic Chemistry, ArunBahal, S.Chand.
3. Organic Chemistry, R.Morrison and R.Boyd, 6thedn, Pearson Education 2003.
4. Organic Chemistry. T.W.GrahamSolomons, 4thedn. John Wilay. 1998.
5. Nuclear Chemistry by C.V.Shekhar, Dominent-Publisher. New Delhi.
6. Essentials of physical Chemistr by B.S.Bahal, ArunBahal. G. D.Tuli.
7. Physical Chemistry by P.W.Atkins. 5th edn.Oxferd 1994 7thedn-2002.
8. Physical Chemistry b R.A.Albert and RJ. Silby, John Wiley 1995.
9. Physical Chemistry by G.H.Barrow. 5thedn, Mac GrawHill . 1988. 6thedn. 1996.
10. Physical Chemistry by W.J.Moore. 4thedn. Orient Longmans 1969.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Program Name : **B. Sc. ChemPMJDSCistry** Semester : **I**
PROGRAM CODE : SCIUG102
COURSE CODE : SC23PMJDSCCHE101

Type of Course : Practicals Major Discipline Specific Course PMJDSC

Name of Course : Practical's for Fundamentals of chemistry I

Total Marks : 100

Effective from June 2023 Under NEP 2020

GROUP A

Total Credits : 02	Teaching Hours per Week: 04	Practicals	External 25 Marks
	Lab Teaching Hours per semester:60		Internal 25 Marks
Minimum Number Practicals to be Performed: 12			

GROUP B

Total Credits : 02	Teaching Hours per Week: 04	Practicals	External 25 Marks
	Lab Teaching Hours per semester:60		Internal 25 Marks
Minimum Number Practicals to be Performed: 08			

Course Objectives:

1. To identify the organic components.
2. Preparation of solutions and their standardization.

Course Outcomes:

1. Students will gain a comprehensive knowledge and skills in standardization and preparation of solutions for carrying out reactions.
2. To understand basic methods to identify the compounds on the basis of M. Pt or b. Pt.

Sr.No.	List of Practicals	Credit	Hr
GROUP A	Organic Chemistry (Any twelve) 1) Identification of an organic compound through the functional group analysis, Determination of melting point and boiling point. Preparation of suitable derivative. 2) Candidate should perform the analysis of at least 06 compounds. List of compounds Acids: Benzoic acid. Cinnamic acid, Phthalic acid.Oxalic	2	60

	<p>acid.Succinic acid.</p> <p>Phenols: α-Naphthol. β-Naphthol.</p> <p>Bases: <i>p</i>-Toludine, Diphenylamine. Aniline.Methyl aniline.</p> <p>Neutrals: Naphthalene, Anthracene, Acetamide, Benzamide, Acetanilide, <i>m</i>-Dinitrobenzene, Urea, Thiourea, Toluene. Acetone, Benzaldehyde, Methyl acetate, Ethyl acetate.Ethanol, 1-Propanol, Glycerol, Chloroform.Carbon tetrachloride, Chlorobenzene, Nitrobenzene.</p>		
GROUP B	<p>Standardization (Any Eight)</p> <ol style="list-style-type: none"> 1. Identify laboratory glassware and equipments. 2. Calibration of burette, Pipette and measuring flasks. 3. Preparation of standard stock solution of HCl by v/v method and their different dilutions. 4. Preparation of standard solution of succinic acid and standardization of NaOH 5. Preparation of standard solution of oxalic acid and standardization of KOH 6. Preparation of standard solution of $\text{Na}_2\text{S}_2\text{O}_3$ and standardization of I_2 solution. 7. Preparation of standard solution of EDTA and estimation of Ca^{+2} in CaCl_2 solution. 8. Preparation of standard solution of EDTA and estimation of Mg^{+2} in MgCl_2 solution. 9. Preparation of standard solution of Oxalic acid and standardization of KMnO_4 solution. 10. Preparation of standard solution of $\text{K}_2\text{Cr}_2\text{O}_7$ and standardization of FeSO_4 solution. 11. Preparation of standard stock (i.e. 0.1 N NaOH solutions by w / v method and their different dilutions. 	2	60
<p>Books Recommended:</p> <p>1.Practical Chemistry : For B.Sc. I, II And III Year Students of All India Universities By</p>			

Pandey O.P. & et Al. publisher S. Chand's, Paperback December 2010.

2. Basic Principles of Practical Chemistry,

by V. Venkateswaran (Author) publisher S. Chand's, Paperback – 1 January 2012

3. Chemistry In Laboratory-B.Sc.-Sem-I-Vi-Hons.

By Dr. Subhojit Ghosh (Author), Dr. Madhushree Das Sharma (Author), publisher CBCS,
Paperback – 1 January 2019.

Further Reading:

1. Practical Chemistry, By Sonia Ratnani (Author), Swati Agrawal (Author), Sujeet Kumar Mishra (Author) publisher Mc Graw Hill, 1st Edition Paperback – 16 September 2020.

2. B.Sc. Practical Chemistry First Year By Paperback, Dr. M.M.N. Tandon, Publisher:
Shiva Lal Agarwal & Company, 2020.