હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી

| NAAC A (3.02) State University |

પો.બો.નં. ૨૧, યુનિવર્સિટી રોડ, પાટણ (ઉ.ગુ.) ૩૮૪૨૬૫

ફોન:(૦૨૭૬૬) ૨૩૦૦૭૭ ફેક્સ: (૦૨૭૬૬) ૨૩૮૫૩૦

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રાષ્ટ્રીય શિક્ષણ નીતિ-૨૦૨૦

પરિપત્ર નં.- ૬૭૭/૨૦૨૩

વિષય: વિજ્ઞાન વિદ્યાશાખા હેઠળના સ્નાતક કક્ષાના સેમેસ્ટર-૧ અને ૨ના જૂન ૨૦૨૩-૨૪ થી ક્રમશ: અમલમાં આવતા અભ્યાસક્રમ / પરિક્ષા સ્કીમ અંગે.

આ યુનિવર્સિટીના વિજ્ઞાન વિદ્યાશાખા અંતર્ગત વિષયોના સ્નાતક વિભાગો તથા સંલગ્ન વિજ્ઞાન વિદ્યાશાખાની તમામ કોલેજોના આચાર્યશ્રીઓને જણાવવાનું કે, એકેડેમિક કાઉન્સિલની તારીખ ૧૪/૦૮/૨૦૨૩ની ગળેલ સભાના નિર્દિષ્ટ ઠરાવોથી રાષ્ટ્રીય શિક્ષણ નીતિ-૨૦૨૦ અંતર્ગત UGCની Guideline તથા રાજ્ય સરકારશ્રીના શિક્ષણ વિભાગના તારીખ ૧૧/૦૭/૨૦૨૩ના ઠરાવ નં.કે.સી.જી./એડમીન/૨૦૨૩-૨૪/૦૬૦૩/૫-૧ થી પ્રકાશિત કરેલ ફોર્મન કરિકયુલમ એન્ડ ક્રેડિટ ફ્રેમવર્ક હેઠળ ક્રેડિટ માળખું તથા પ્રકાશિત કરેલ સ્ટાન્ડર્ડ ઓપરેટીંગ પ્રોસિજર (S.O.P.) મુજબ વિજ્ઞાન વિદ્યાશાખા હેઠળના નીચેના સ્નાતક કક્ષાના સામેલ પરિશિષ્ટ પ્રમાણેના નવા અભ્યાસક્રમો શૈક્ષણિક વર્ષ: ૨૦૨૩-૨૪ થી ક્રમશ: અમલમાં આવે તે રીતે મંજુર કરેલ છે, જેનો અમલ કરવા સારૂ સબંધિતોને આ સાથે મોકલવામાં આવે છે.

ક્રમ નં	અભ્યાસક્રમ	ઠરાવ ક્રમાંક	સેમેસ્ટર
૧	બી.એસ.સી. (ગણિતશાસ્ત્ર)	૧૯	સેમેસ્ટર ૧ અને ૨
૨	બી.એસ.સી. (વનસ્પતિશાસ્ત્ર)	૨૦	સેમેસ્ટર ૧ અને ૨
૩	બી.એસ.સી. (બાયોટેકનોલોજી)	૨૧	સેમેસ્ટર ૧ અને ૨
૪	બી.એસ.સી. (ભૌતિકશાસ્ત્ર)	૨૨	સેમેસ્ટર ૧ અને ૨
૫	બી.એસ.સી. (ઝુલોજી)	૨૩	સેમેસ્ટર ૧ અને ૨
૬	બી.એસ.સી. (રસાયણશાસ્ત્ર)	૩૨	સેમેસ્ટર ૧ અને ૨

સદર બાબતની જાણ આપના સ્તરેથી અધ્યાપકશ્રીઓ તથા વિદ્યાર્થીઓને કરવા વિનંતી છે.

નોંધ:

(૧) વિદ્યાર્થીઓની જરૂરીયાત માટે પરિપત્રની એક નકલ કોલેજના / ડિપાર્ટમેન્ટના ગ્રંથાલયમાં મૂકવાની રહેશે.

(૨) આ પરિપત્ર યુનિવર્સિટીની વેબસાઇટ www.ngu.ac.in પર પણ ઉપલબ્ધ કરવામાં આવેલ છે. આથી સંબંધિત કોલેજોને ડાઉનલોડ કરી ઉપયોગ કરવા સારૂ જણાવવામાં આવે છે.

NAACA(3.02)StateUniversityPATAN-384265

Curriculum and Credit Framework For SEM I and II

Asper UGC Guideline

(According to NATIONAL EDUCATION POLICY (NEP) – 2020)

Submittedon21st July 2023

I/c Principal
The H N S B Ltd Science College
Himatnagar-383 001

PROGRAM CODE : SCIUG102
Syllabus and Scheme of Examination
for

Sem. I and Sem. II of B.Sc. Honors Chemistry

Four-year Graduate Honors Program in Chemistry
Under NEP 2020

Submitted

to

Hemchandracharya North Gujarat University, Patan

Under

Choice Based Credit System

Implemented w.e. f June, 2023

Submitted on May, 2023
ReSubmitted on July, 2023
Resubmitted on August, 2023

Vc. Principal
The H.S.N.B. Ltd. Science College
Himatnagar-383001, S.K.

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 Teaching Hours per Semester: 60	Theory	External 50 Marks 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	**CHEMICAL BONDING** HTP **(A) Valence Bond Theory:**Introduction; Hitler-London theory (energy changes taking place during the formation of H_2 Molecule, Pauling-Slater's Theory (orbital Overlap theory of Covalent Bond). Types of Bond, Covent bond, ionic bond, Coordination covalent bond Coordination bond and Wanderwals force bond. Hybridization and types of hybridization. SP, Sp^2, Sp^3, dsp^2,sp^3d, sp^3d^2 **(B) Molecular Orbital Theory:** Introduction. M.O. Treatment for H_2 molecules Bonding molecular orbitals and Anti-boding molecular orbitals, Sigma and Pi Molecular orbitals. Formation and configuration of Molecular orbital in a Homo-nuclear diatomic species of A_2 type (H_2; H_2^+; N_2 ;N_2^+ ;O_2 ;O_2^+; O_2^{-2}) Formation and configuration of Molecular orbiral in a Hetero-nuclear diatomic species of AB type (CO; CN; CN^-; NO; NO^-)	1	15
2	**(A) Structure And Properties** SKP 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, Anillinium ion, Acetate ion), Hyper conjugation (O,P-directing effect of Alkyl group, Stability of Carbonium ion and Free radicals) **(B) Reaction Mechanism** 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)	1	15
3	**Chemical Kinetics.** RTD 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	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.	**Analytical Chemistry** 2M\C 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.	1	15

Books Recommended:

Inorganic Chemistry

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.

Organic Chemistry

1. 'Organic reaction and mechanism, P.S.Kalsi, New Age internationalPublishers.

2. Text book of organic Chemistry. P.S.Kalsi, New Age internationul 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 Theramodynamics 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. Chemistry Semester : I

PROGRAM CODE : [illegible]

COURSE CODE : [illegible]

Type of Course : Practicals Major Discipline Specific Course [illegible]

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

Total Marks : 100

Effective from June 2024 Under NEP 2020

GROUP A

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

GROUP B

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

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

	acid.Succinic acid **Phenols:** α-Napthol β-Naphthol **Bases:** p-Toludine, Diphenylamine, Aniline,Methyl aniline. **Neutrals:** Naphthalene, Anthracene, Acetamide, Benzamide, Acetanilide, m-Dinitrobenzene, Urea, Thiourea, Toluene, Acetone, Benzaldehyde, Methy acetate, Ethyl acetate,Ethanol, 1-Propanol, Glycerol, Chloroform,Carbon tetrachloride, Chlorobenzene, Nitrobenzene.		
GROUP B	**Standardization (Any Eight)** 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 $Na_2S_2O_3$ 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 $K_2Cr_2O_7$ 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
Books Recommended: 1.Practical Chemistry : For B.Sc. I, II And III Year Students of All India Universities By			

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) publisger Mc Graw Hill, 1st Edition Paperback – 16 September 2020.

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

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Course Name : **B. Sc. Chemistry** **Semester : I**
PROGRAM CODE : SCIUG102
COURSE CODE : SC23MIDSCCHE102

Type of course : Minor Elective course MIDSC
Name of course : Fundamentals of chemistry I
Total Marks : 50

Effective from June 2023 Under NEP 2020

Total Credits : 02	Teaching Hours per Week: 02 Teaching Hours per Semester: 30	Theory	External 25 Marks Internal 25 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.

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 be able to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments.
3. Students will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.

Unit	Topic	Credit	Hr
I	**CHEMICAL BONDING** HKP **(A) Valence Bond Theory:** Introduction; Hitler-London theory (energy changes taking place during the formation of H_2 Molecule, Pauling-Slater's Theory (orbital Overlap theory of Covalent Bond). Types of Bond, Covent bond, ionic bond, Coordination covalent bond Coordination bond and Wanderwals force bond. Hybridization and	1	15

	types of hybridization. SP, Sp^2, Sp^3, dsp^2, sp^3d, sp^3d^2 **(B) Molecular Orbital Theory:** *Introduction. M.O. Treatment for H_2 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 A_2 type (H_2; H_2^+; N_2 ;N_2^+ ;O_2 ;O_2^+; O_2^{-2})* Formation and configuration of Molecular orbital in a Hetero-nuclear diatomic species of AB type (CO; CN; CN^-; NO; NO^+)		
2	**(A) Structure And Properties** 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, Anillinium ion, Acetate ion), Hyper conjugation (O,P-directing effect of Alkyl group, Stability of Carbonium ion and Free radicals) **(B) Reaction Mechanism** Fission of Covalent bond (With at least one example of each intermedistes), 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)	1	15

Books Recommended:

Inorganic Chemistry

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.

Organic Chemistry

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.

Further Reading:

1. Reaction Mechanism and Reagents in Organic Chemistry. GurdeepR.Chatwal 4thedn. 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.Oxford 1994 7thedn-2002.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Program Name : B. Sc. Chemistry Semester : I
PROGRAM CODE : SCIUG102
COURSE CODE : SC23PMIDSCCHE102

Type of Course : Practicals Minor (Elective) Discipline Specific Course PMIDSC
Name of Course : Practical's for Fundamentals of chemistry I
Total Marks : 50

Effective from June 2023 Under NEP 2020

Total Credits : 02 Teaching Hours per Week: 04 Lab Teaching Hours per semester:60 Minimum Number Practicals to be Performed: 10	Practicals	External 25 Marks Internal 25 Marks

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
1	**Organic Chemistry (Any six)** 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. Cinnainic acid, Phthalic acid.Oxalic acid.Succinic acid. **Phenols:** α-Napthol. β-Naphthol. **Bases:** *p*-Toludine, Diphenylamine. Aniline.Methyl aniline. **Neutrals:** Naphthalene, Anthracene, Acetamide, Benzamide, Acetanilide, m-Dinitrobenzene, Urea, Thiourea, Toluene. Acetone,	1	30

	Benzaldehyde, Methyl acetate, Ethyl acetate, Ethanol, 1-Propanol, Glycerol, Chloroform, Carbon tetrachloride, Chlorobenzene, Nitrobenzene.		
3	**Standardization (Any Four)** 1. Preparation of standard solution of succinic acid and standardization of NaOH / KOH 2. Preparation of standard solution of $Na_2S_2O_3$ and standardization of I_2 solution. 3. Preparation of standard solution of EDTA and estimation of Ca^{+2} / Mg^{+2} in $CaCl_2$ / $MgCl_2$ solution. 4. Preparation of standard solution of Oxalic acid and standardization of $KMnO_4$ solution. 5. Preparation of standard solution of $K_2Cr_2O_7$ and standardization of $FeSO_4$ solution. 6. Preparation of standard stock (i.e. 0.1 N NaOH solution by w / v method and their different dilutions. 7. Preparation of standard stock solution of HCl by v/v method and their different dilutions.	I	30

Books Recommended:

1.Practical Chemistry : For B.Sc. I, II And III Year Students of All India Universities By 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.Subhajit 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.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Course Name : B. Sc. Chemistry Semester : I
PROGRAM CODE : SCIUG102
COURSE CODE : SC23MDCCHE103

Type of course : Multidisciplinary Course MDC
Name of course : General chemistry I
Total Marks : 50

Effective from June 2023 Under NEP 2020

Total Credits : 02	Teaching Hours per Week: 02 Teaching Hours per semester: 30	Theory	External 25 Marks Internal 25 Marks

Course Objectives:

1. To study about the Chemical kinetics and types of reactions.
2. To know about the Volumetric titrations and calculations for estimation.

Course Outcomes:

1. Students will be able to explore new areas of research in both chemistry and allied fields of science and technology.
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 explain why chemistry is an integral activity for addressing social, economic, and environmental problems.
4. Students will be able to function as a member of an interdisciplinary problem solving team.

Unit	Topic	Credit	Hr
1	**Chemical Kinetics.** Introduction : Rate of reaction, Order of reaction, Molecularity, Rate equation for zeroth order reaction, Rate equation for first order	1	15

	reaction. Characteristics of first order reaction. Rate equation for 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.		
2	**Analytical Chemistry** 2ma 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.	1	15

Books Recommended:

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, 5thedn.

Further Reading:

1. Reaction Mechanism and Reagents in Organic Chemistry, GurdeepR.Chatwal 4thedn, 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 Wiley. 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.Oxford 1994 7thedn-2002.
8. Physical Chemistry b R.A.Albert and RJ. Silby, John Wiley 1995.
9. Physical Chemistry by G.M.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. Chemistry Semester : I
PROGRAM CODE : SCHUG102
COURSE CODE : SC23PMDCCHE103

Type of course : Practicals Multi Disciplinary Course PMDC
Name of course : Practical's for General chemistry I
Total Marks :50

Effective from June 2023 Under NEP 2020

Total Credits : 02 Teaching Hours per Week: 04 Lab Teaching Hours per semester: 60 Minimum Number Practicals to be Performed: 10	Practicals	External 25 Marks Internal 25 Marks

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
1	**Organic Chemistry (Any six)** 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 acid.Succinic acid. **Phenols:** α-Napthol. β-Naphthol. **Bases:** *p*-Toludine, Diphenylamine. Aniline.Methyl aniline. **Neutrals:** Naphthalene, Anthracene, Acetamide, Benzamide, Acetanilide, m-Dinitrobenzene, Urea, Thiourea, Toluene. Acetone,	1	30

	Benzaldehyde, Methy acetate, Ethyl acetate Ethanol, 1-Propanol, Glycerol, Chloroform Carbon tetrachloride, Chlorobenzene, Nitrobenzene.		
2	**Standardiration (Any Four)** 1) Preparation of standard solution of succinic acid and standardiration of NaOH / KOH 2) Preparation of standard solution of Na_2S2O_3 and standardization of I_2 solution. 3) Preparation of standard solution of EDTA and estimation of Ca^{+2} / Mg^{+2} in $CaCl_2$ / $MgCl_2$ solution. 4) Preparation of standard solution of Oxalic acid and standardization of $KMnO_4$ solution. 5) Preparation of standard solution of $K_2Cr_2O_7$ and standardization of $FeSO_4$ solution. 6) Preparation of standard stock (i.e. 0.1 N NaOH solution by w / v method and their different dilutions. 7) Preparation of standard stock solution of HCl by v/v method and their different dilutions.	1	30

Books Recommended:

1.Practical Chemistry : For B.Sc. I, II And III Year Students of All India Universities By 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) publisger 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.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Program Name : B. Sc. Chemistry　　Semester : I

PROGRAM CODE : SCIUG102

COURSE CODE : SC23SECCHE106

Type of course : Skill Enhancement course SEC

Name of course : Analytical Chemistry-I

Total Marks : 50

Effective from June 2023 Under NEP 2020

Total Credits : 02	Teaching Hours per Week: 02 Teaching hours per semester: 30	Theory	External 25 Marks Internal 25 Marks

Course Objectives:

1. To understand importance of taking precautions in Chemical laboratory
2. To have knowledge of lab apparatus
3. To know about primary and secondary laboratory reagents .

Course Outcome:

1. Students will gain a comprehensive knowledge and skills in assessing laboratory reagents.
2. To understand the importance glass wares in chemical laboratories and in performing experiments.
3. Students will learn how to prepare chemical solutions needed in chemical laboratories.

Unit	Topic	Credit	Hr
1	**Lab Apparatus** (A) Glass apparatus Beaker, test tube, boiling tube, conical flask, filtration flask, round bottom flask, flat bottom flask, funnel, separating funnel, watch glass, measuring cylinder, petridish, desiccator, measuring cylinder, glass rod, glass tube. (B) Volumetric and Heating apparatus Volumetric apparatus: Volumetric flask, burette, pipette, analytical balance, electronic balance. Heating apparatus: Bunsen burner, water bath, sand bath, hot air oven, heating mantle	1 SPV	15

Sem-1 Chem-SEC

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

COURSE NAME= BSW SEMESTER =1

PROGRAM CODE= RURUG201

COURSE CODE - RS23VAC BSW105/A

SCENARIO OF GANDHIAN LIFE

(EFFECTIVE FROM JUNE 2023-24 UNDER NEP)

Total Credits- 02 (02 Period/Week) Hours - 30	Theory	External-25 Marks	
		Internal- 25 Marks	

Program Outcome:

1. Students are equipped with an understanding of the art of holistic living
2. They gain a fair understanding of the life of Gandhi and nonviolence as a way of life
3. They understand Community mobilization and nation building through the study of his work, and his leadership;
4. To study the relevance of a nonviolent life style and his approach in the light of present day development.

Course Outcome:

1. 1.Students will learn about Gandhi's holistic living from the birth.
2. 2. Students will understand the Gandhi's nonviolent struggle.
3. 3. Students will learn about the different campaign of Leader Gandhi.

Sr. No		Contents	Credit	Hr.
1	Unit-1	**Early Life:** a. Birth and Parentage – Education at School - Bar-at-Law studies in London – Conviction to Vegetarianism – Deep encounter with English civilization – Initial interest in religions other than Hinduism.	0.66	10
2	Unit-2	**Experimenting Years:** a. Sailing to South Africa - Racial Prejudice - Natal Indian Congress Experimenting in Inter-Religious Community living - Phoenix settlement – Vow of Chastity - Birth of Satyagraha - Organizing thousands of followers for Nonviolent Struggle – First Prison Terms - Great March- First negotiated settlement – Compromises of Satyagrahas.	0.67	10
3	Unit-3	**From Non-cooperation to Civil Disobedience:** a. Return to India - Struggle for Local issues - Champaran Satyagraha - Ahmedabad Mill Workers' Strike - Kheda Satyagraha - Nationwide Nonviolent Protest against Rowle Act – Non-cooperaon Movement - ChauriChaura - Preparing the masses for Nonviolence – Constructive Programme - Nonviolent DirectAction - Salt March - Quit India Movement	0.67	10

Reference:

1. Gandhi, M K. (1940), The Story of My Experiments With Truth, Navjivan Publishing House, Ahmedabad.
2. Gandhi, M K. (1925), Satyagraha in South Africa, Navjivan Publishing House, Ahmedabad.
3. Fischer, Louis, Mahatma Gandhi-His Life and Times, BharayaVidyabhavan, Mumbai.

Further Reading:

4. Desai, Mahadev (1951),A righteous struggle, Navajivan Pub House, Ahmedabad.
5. Prasad, Rajendra (1949), Satyagraha in Champaran, Navajivan Pub House, Ahmedabad.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

COURSE NAME= BSW SEMESTER =1

PROGRAM CODE= RUBUG201

COURSE CODE – RS23VAC BSW105/A

SCENARIO OF GANDHIAN LIFE

(EFFECTIVE FROM JUNE 2023-24 UNDER NEP)

Total Credits- 02 (02 Period/Week) **Hours - 30**	Theory	External-25 Marks	
		Internal- 25 Marks	

Program Outcome:

1. Students are equipped with an understanding of the art of holistic living
2. They gain a fair understanding of the life of Gandhi and nonviolence as a way of life
3. They understand Community mobilization and nation building through the study of his work, and his leadership;
4. To study the relevance of a nonviolent life style and his approach in the light of present day development.

Course Outcome:

1. 1.Students will learn about Gandhi's holistic living from the birth.
2. 2. Students will understand the Gandhi's nonviolent struggle.
3. 3. Students will learn about the different campaign of Leader Gandhi.

Sr. No	Contents		Credit	Hr.
1	Unit-1	**Early Life:** a. Birth and Parentage – Education at School - Bar-at-Law studies in London – Conviction to Vegetarianism – Deep encounter with English civilization – Initial interest in religions other than Hinduism.	0.66	10
2	Unit-2	**Experimenting Years:** a. Sailing to South Africa - Racial Prejudice - Natal Indian Congress Experimenting in Inter-Religious Community living - Phoenix settlement – Vow of Chastity - Birth of Satyagraha - Organizing thousands of followers for Nonviolent Struggle – First Prison Terms - Great March-First negotiated settlement – Compromises of Satyagrahas.	0.67	10
3	Unit-3	**From Non-cooperation to Civil Disobedience:** a. Return to India - Struggle for Local issues - Champaran Satyagraha - Ahmedabad Mill Workers' Strike - Kheda Satyagraha - Nationwide Nonviolent Protest against Rowle Act – Non-cooperaon Movement - ChauriChaura - Preparing the masses for Nonviolence – Constructive Programme - Nonviolent DirectAction - Salt March - Quit India Movement	0.67	10

Reference:

1. Gandhi, M K. (1940), The Story of My Experiments With Truth, Navjivan Publishing House, Ahmedabad.
2. Gandhi, M K. (1925), Satyagraha in South Africa, Navjivan Publishing House, Ahmedabad.
3. Fischer, Louis, Mahatma Gandhi-His Life and Times, BharatyaVidyabhavan, Mumbai.

Further Reading

4. Desai, Mahadev (1951),A righteous struggle, Navajivan Pub House, Ahmedabad.
5. Prasad, Rajendra (1949), Satyagraha in Champaran, Navajivan Pub House, Ahmedabad.

Re. Principal
The H.S.N.B. Ltd. Science College
Himatnagar-383001, S.K.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Course Name : B. Sc. Chemistry Semester : II
PROGRAM CODE : SCIUG102
COURSE CODE : SC23MJDSCCHE201

Type of course : Major Discipline Specific course MJDSC
Name of course : Fundamentals of chemistry II
Total Marks : 100

Effective from June 2023 Under NEP 2020

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

Course Objectives:

1. To understand concepts of inorganic chemistry in terms of coordination compounds, p lock elements.
2. To apply Stereo chemistry and spatial arrangement of some compounds.
3. To understand Thermodynamics as basis of general laws of sustainable equilibrium.
4. To know about the Volumetric titrations and calculations for estimation various ions.

Course Outcomes:

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. Majors to be certified by the American Chemical Society will have extensive laboratory work and knowledge of Biological Chemistry.
2. Students will be able to explore new areas of research in both chemistry and allied fields of science and technology.
3. 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.
4. Students will be able to explain why chemistry is an integral activity for addressing social, economic, and environmental problems.
5. Students will be able to function as a member of an interdisciplinary problem solving team.

Unit	Topic	Credit	Hr
1	**Coordination Compounds** DR. NIP Werner,s Theory: Explain the structure of Co(III) ammines on the basics of Werner's theory, Experimental evidence in favor of Werner's theory Sidgwick's effective atomic number (EAN) rules, Application of EAN rules, Nomenclature of Coordination compounds. Nature of Metal legend bonding VB theory, Limitation of VB theory. Isomerism in Coordination Compounds, Structural, Conformation, Ionization, Hydrate, Coordination, Linkage, Coordination position, Ligand and Polymerization isomerism. Stereo isomerism, Geometrical isomerism and Optical isomerism.	1	15
2.	**Stereochemistry** DR. MAP Introduction of Stereo Isomers; **(A) Optical isomerism :** General, Discussion of elements of symmetry, Molecular chirality, Enantiomers, Optical activity, Properties of enantiomers, Chiral and achiral molecules with two stereogenic centers, Diastereomers, R-S Nomenclature, Threo and Erythro diastereomers, Meso compounds. **(B) Geometrical isomerism:** Definition and general discussion of geometric isomers, General Methods of structure determination (physical methods), E-Z nomenclature, (Simple illustration should be given). **(C) Conformational isomerism:** Definition, Conformational analysis of ethane, n-butane with rotationalAnd tortional diagram, Conformation of cyclohexane, Axial and Equitorial bonds, Newmann projection, Show horse formula, Fisher &flying wedge formula, Difference between conformation and configuration.	1	15
3.	**Thermodynamics** DR. MRL Thermodynamics (only introduction) : System and surrounding- work & heat, state function, thermodynamic process, internal energy,	1	15

	enthalpy, free energy, maximum work function. First law of thermodynamics heat capacity, specific and molar heat capacity, heat capacity at constant volume and pressure and their relationship, Work done in adiabatic and isothermal reversible expansion of an ideal gas. Second law of thermodynamics, Carnot cycle and its efficiency , Concept of entropy; entropy change for an ideal gas under different conditions, entropy change for mixture of ideal gases. Gibbs- Helmholtz equation, Vant hoff isochore equation, Vant hoff isotherm equation, Numerical.		
4.	**(A) Introduction To Volumetric Analysis** Prof. APK Principle, Mechanism and Applications of Acid-Base Titrations (Only strong acid Vs strong Base), Redox Titrations (Only Fe(II) Vs $KMnO_4$), Complexo metric Titrations (Only Ca^{+2}/Mg^{+2}Vs EDTA), Precipitation Titrations (Only Vs $AgNO_3$), Related Numerical. **(B) Complexometric titrations** Introduction, EDTA :An important chelating Agents Types of EDTA titration metallochromic indicators, Factors Affecting on stability of complexes, masking and de masking, selectivity of titration construction of the titration curve.	1	15

Books Recommended:

Inorganic Chemistry

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.

Organic Chemistry

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, 5thedn.

Further Reading:

1. Reaction Mechanism and Reagents in Organic Chemistry, GurdeepR.Chatwal 4thedn, 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. Chemistry Semester : II
PROGRAM CODE : SCIUG102
COURSE CODE : SC23PMJDSCCHE201

Type of course : Practicals Major Discipline Specific Course PMJDSC
Name of Course : Practical's for Fundamentals of chemistry II
Total Marks : 100

Effective from June 2023 Under NEP 2020

GROUP A

Total Credits : 02 Teaching Hours per Week: 04 Lab Teaching Hours per semester:60 Minimum number of practicals to be performed: 12	Practicals	External 25 Marks Internal 25 Marks

GROUP B

Total Credits : 02 Teaching Hours per Week: 04 Lab Teaching Hours per semester:60 Minimum number of practicals to be performed: 08	Practicals	External 2 5Marks Internal 25 Marks

Course Objectives:

1. To identify the cationic and .anionic ions in mixture.
2. Preparation of solutions for volumetric solutions.

Course Outcomes:

1. Students will gain a comprehensive knowledge and skills in identification of cations and anions.
2. Students will have basic knowledge of volumetric titrations.

Sr.No.	List of Practicals (Any twelve)	Credit	Hr
GROUP A	**Inorganic Chemistry Semi micro Analysis:** Cation analysis: separation and identification of ions from group I, II, III-A, III-B, IV, V-A, V-B. Anion analysis like (Water Soluble and insoluble). Candidate should perform the analysis of at least 12 compounds.	2	60
GROUP B	**Volumetric Titrations (Any Eight)** 1. To determine the strength of NaOH and Na_2CO_3 present in	2	60

the mixture of NaOH & Na_2CO_3 solution and to find out their percentage composition.

2. To determine the strength of $NaHCO_3$ and Na_2CO_3 present in the solution mixture of $NaHCO_3$ & Na_2CO_3 solution and to find out their percentage composition.
3. To determine the Normality, gram/liter and molarities of $H_2C_2O_4.2H_2O$ and H_2SO_4 present in the mixture of $H_2C_2O_4.2H_2O$ and H_2SO_4 solution by using X N NaOH and Y N $KMnO_4$ solutions.
4. To determine the Normality, gram/liter and molarity of $H_2C_2O_4.2H_2O$ and $K_2C_2O_4$ present in the mixture of $H_2C_2O_4.2H_2O$ & $K_2C_2O_4$ solution by using X N NaOH and Y N $KMnO_4$ solutions.
5. To determine the amount of Ca^{2+} and Mg^{2+} ion by EDTA solution from the mixture of $CaCl_2$ and $MgCl_2$ solution.
6. Determination of chloride ions in the given solution by titrating against the standardized solution of silver nitrate.
7. To determine the concentration/molarity of $KMnO_4$ solution by titrating it against
   Standard solution of ferrous ammonium sulphate.
8. Preparation of standard stock solution of NaOH by W/V method and their different dilutions.
9. Preparation of standard stock solution of $K_2Cr_2O_7$ by W/V method and their different dilutions.
10. To determine molar mass of unknown acid by titration with NaOH.

Books Recommended:

1.Practical Chemistry : For B.Sc. I, II And III Year Students of All India Universities By 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) publisger 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.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Course Name : B. Sc. Chemistry   Semester : II
PROGRAM CODE : SCIUG102
COURSE CODE : SC23MIDSCCHE202

Type of course : Minor (Elective) Discipline Specific course MIDSC

Name of course : Fundamentals of chemistry II

Total Marks : 50

Effective from June 2023 Under NEP 2020

Total Credits : 02	Teaching Hours per Week: 02 Teaching Hours per Semester: 30	Theory	External 25 Marks Internal 25 Marks

Course Objectives:

1. To understand concepts of inorganic chemistry in terms of coordination compounds, p lock elements
2. To apply Stereo chemistry and spatial arrangement of some compounds.

Course Outcomes:

1. Students will have a firm foundation in the fundamentals and application of current chemical and scientific theories including those in Inorganic and Physical Chemistries.
2. Students will be able to explore new areas of research in both chemistry and allied fields of science and technology.
3. 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.
4. Students will be able to explain why chemistry is an integral activity for addressing social, economic, and environmental problems.

Mines

Unit I coordination chemistry - NTP

	Werner's theory Sidgwick's effective atomic number (EAN) rules, Application of EAN rules, Nomenclature of Coordination compounds. Nature of Metal legend bonding VB theory, Limitation of VB theory. Isomerism in Coordination Compounds, Structural, Conformation, Ionization, Hydrate, Coordination, Linkage, Coordination position, Ligand and Polymerization isomerism. Stereo isomerism, Geometrical isomerism and Optical isomerism.	1	15
2	**Stereochemistry** NAP Introduction of Stereo Isomers; **(A) Optical isomerism :** General, Discussion of elements of symmetry, Molecular chirality, Enantiomers, Optical activity, Properties of enantiomers, Chiral and achiral molecules with two stereogenic centers, Diastereomers, R-S Nomenclature, Threo and Erythro diastereomers, Meso compounds. **(B) Geometrical isomerism:** Definition and general discussion of geometric isomers, General Methods of structure determination (physical methods), E-Z nomenclature, (Simple illustration should be given). **(C) Conformational isomerism:** Definition, Conformational analysis of ethane, n-butane with rotationalAnd tortional diagram, Conformation of cyclohexane, Axial and Equitorial bonds, Newmann projection, Show horse formula, Fisher &flying wedge formula, Difference between conformation and configuration.		

Books Recommended:

Inorganic Chemistry

1.Modern Inorganic Chemistry' by G.F.Liptrot, ELBS, 4th edn. collingEducational. 1983.

2. 'Inorganic Chemistry' D.F.Shriver. P.W.Atkinss and C.H.Longford, 3rd edn. ELBS 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.

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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.

Further Reading:

1. Reaction Mechanism and Reagents in Organic Chemistry, GurdeepR.Chatwal 4thedn, Himalaya Publication House.

2. Text book of Organic Chemistry, ArunBahal, S.Chand.

3. Organic Chemistry, R.Morrison and R.Boyd, 6thedn, Pearson Education2003.

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. Chemistry Semester : II
PROGRAM CODE : SCHUG102
COURSE CODE : SC23PMIDSCCHE202

Type of course : Practicals Minor (Elective) Discipline Specific Course PMIDSC
Name of Course : **Practical's for Fundamentals of chemistry II**
Total Marks : 50

Effective from June 2023 Under NEP 2020

Total Credits : 02 Teaching Hours per Week: 04 Lab Teaching Hours per semester:60 Minimum number of practicals to be performed: 10	Practicals	External 25 Marks Internal 25 Marks

Course Objectives:

1. To identify the cationic and .anionic ions in mixture.
2. Preparation of solutions for volumetric solutions.

Course Outcomes:

1. Students will gain a comprehensive knowledge and skills in identification of cations and anions.
2. Students will have basic knowledge of volumetric titrations.

Sr.No.	List of Practicals	Credit	Hr
1	**Inorganic Chemistry Semi micro Analysis: (Any six)** Cation analysis: separation and identification of ions from group I, II, III-A, III-B, IV, V-A, V-B. Anion analysis like (Water Soluble and insoluble). Candidate should perform the analysis of at least 08 compounds.	1	30
2	**Volumetric Titrations (Any four)** 1) To determine the strength of NaOH and Na_2CO_3 present in the solution mixture of NaOH & $Na_2CO_3$and to find out their percentage composition. 2) To determine the strength of $NaHCO_3$ and Na_2CO_3 present in the solution mixture of $NaHCO_3$ & Na_2CO_3 and to find out their	1	30

	percentage composition. 3) To determine the Normality, gram/liter and molarities of $H_2C_2O_4$ $2H_2O$ and H_2SO_4 present in the solution mixture of $H_2C_2O_4$ $2H_2O$ and H_2SO_4 by using X N NaOH and Y N $KMnO_4$ solutions. 4) To determine the Normality, gram/liter and molarity of $H_2C_2O_4$ $2H_2O$ and $K_2C_2O_4$ present in the solution mixture of $H_2C_2O_4$ $2H_2O$ & $K_2C_2O_4$ by using X N NaOH and Y N $KMnO_4$ solutions. 5) To determine the amount of Ca^{+2} and Mg^{+2} ion by EDTA solution from the mixture solution of $CaCl_2$ and $MgCl_2$. 6) Calibration of burette Pipette and measuring flasks.		

Books Recommended:

1.Practical Chemistry : For B.Sc. I, II And III Year Students of All India Universities By 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) publisger 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.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Course Name : B. Sc. Chemistry Semester : II
PROGRAM CODE : SCHUG102
COURSE CODE : SC23MDCCHE203

Type of course : Multidisciplinary course MDC

Name of course : General chemistry II

Effective from June 2023 Under NEP 2020

Total Credits : 02	Teaching Hours per Week: 02 Teaching Hours per Semester: 30	Theory	External 25 Marks Internal 25 Marks

Course Objectives:

1. To understand Thermodynamics as basis of general laws of sustainable equilibrium.
2. To know about the Volumetric titrations and calculations for estimation of various ions.

Course Outcomes:

1. Students will be able to explore new areas of research in both medicinal chemistry and allied fields of science and technology.
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 explain why chemistry is an integral activity for addressing social, economic, and environmental problems.
4. Students will be able to function as a member of an interdisciplinary problem solving team.

Unit	Topic	Credit	Hr
I	**Thermodynamics** MRC Thermodynamics (only introduction) : System and surrounding- work & heat, state function, thermodynamic process, internal energy, enthalpy, free energy, maximum work function.	1	15

	First law of thermodynamics heat capacity, specific and molar heat capacity, heat capacity at constant volume and pressure and their relationship, Work done in adiabatic and isothermal reversible expansion of an ideal gas. Second law of thermodynamics, Carnot cycle and its efficiency , Concept of entropy; entropy change for an ideal gas under different conditions, entropy change for mixture of ideal gases. Gibbs- Helmholtz equation, Vant hoff isochore equation, Vant hoff isotherm equation, Numerical.		
2	**(A) Introduction To Volumetric Analysis** APK Principle, Mechanism and Applications of Acid-Base Titrations (Only strong acid Vs strong Base), Redox Titrations (Only Fe(II) Vs $KMnO_4$), Complexo metric Titrations (Only Ca^{+2}/Mg^{+2}Vs EDTA), Precipitation Titrations (Only Vs $AgNO_3$), Related Numerical. **(B) Complexometric titrations** Introduction, EDTA :An important chelating Agents Types of EDTA titration metallochromic indicators, Factors Affecting on stability of complexes, masking and de masking, selectivity of titration construction of the titration curve.	1	15

Books Recommended:

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, 5thedn.

Further Reading:

1. Reaction Mechanism and Reagents in Organic Chemistry, GurdeepR.Chatwal 4thedn, 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 Wiley. 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. Chemistry Semester : II
PROGRAM CODE : SCIUG102
COURSE CODE : SC23PMDCCHE203

Type of course : Practicals Multi Disciplinary Course PMDC
Name of course : **Practical's General chemistry II**
Total Marks : 50

Effective from June 2023 Under NEP 2020

Total Credits : 02 Teaching Hours per Week: 04 Lab Teaching Hours per semester:60 Minimum number of practicals to be performed: 10	Practicals	External 25 Marks Internal 25 Marks

Course Objectives:

1. To identify the cationic and .anionic ions in mixture.
2. Preparation of solutions for volumetric solutions.

Course Outcomes:

1. Students will gain a comprehensive knowledge and skills in identification of cations and anions in inorganic mixtures.
2. Students will have basic knowledge of volumetric titrations.

Sr.No.	List of Practicals	Credit	Hr
1	**Inorganic Chemistry Semi micro Analysis: (Any six)** Cation analysis: separation and identification of ions from group I, II, III-A, III-B, IV, V-A, V-B. Anion analysis like (Water Soluble and insoluble). Candidate should perform the analysis of at least 08 compounds.	1	30
2	**Volumetric Titrations (Any four)** 1) To determine the strength of NaOH and Na_2CO_3 present in the solution mixture of NaOH & $Na_2CO_3$and to find out their percentage composition. 2) To determine the strength of $NaHCO_3$ and Na_2CO_3 present in the	1	30

	solution mixture of $NaHCO_3$ & Na_2CO_3 and to find out their percentage composition. 3) To determine the Normality, gram/liter and molarities of $H_2C_2O_4$ $2H_2O$ and H_2SO_4 present in the solution mixture of $H_2C_2O_4$ $2H_2O$ and H_2SO_4 by using X N NaOH and Y N $KMnO_4$ solutions. 4) To determine the Normality, gram/liter and molarity of $H_2C_2O_4$ $2H_2O$ and $K_2C_2O_4$ present in the solution mixture of $H_2C_2O_4$ $2H_2O$ & $K_2C_2O_4$ by using X N NaOH and Y N $KMnO_4$ solutions. 5) To determine the amount of Ca^{+2} and Mg^{+2} ion by EDTA solution from the mixture solution of $CaCl_2$ and $MgCl_2$. 6) Calibration of burette Pipette and measuring flasks.		

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3. Chemistry In Laboratory-B.Sc.-Sem-I-Vi-Hons.
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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Program Name : B. Sc. Chemistry Semester : II

PROGRAM CODE : SCIUG102
COURSE CODE : SC23SECCHE206C

Type of course : Skill Enhancement Course SEC
Name of course : Water Quality Assessment
Total Marks : 50

Effective from June 2023 Under NEP 2020

Total Credits : 02	Teaching Hours per Week: 02 Teaching Hours per semester: 30	Theory	External 25 Marks Internal 25 Marks

Course Objectives:

1. to obtain quantitative information on the physical, chemical, and biological characteristics of water via statistical sampling
2. The type of information sought depends on the objectives of the monitoring program.

Course Outcomes:

1. Explain the general properties of water and understand water resources and water conservation.
2. Develop awareness about water quality criteria and standards, and their relation to public health and environment
3. Understand important parameters for measuring water quality.
4. Know about the methods for the determination of water quality parameters
5. Learn how to run accurate water quality tests and to determine how the parameters relate to each other.

Unit	Topic	Credit	Hr
1	**Water Quality Fundamentals:** SPV Chemistry of water, Physical and chemical properties, Water recourses, water pollution, Important water Quality parameters and methods for their determination - turbidity, color, taste, pH, acidity, alkalinity,	1	15

	chemical constituents, hardness, dissolved oxygen etc., water sampling, standard for drinking water as per BIS specifications, household water treatment and safe storage. **Water quality standards** in India, Industrial water quality standard in India, Water management, Water control Agency and Laws to monitor and enforce water quality standards in India, Water Pollution Act.		
2	**Laboratory tests for water quality monitoring:** HKP Determination of pH and conductivity, Test for acidity and alkalinity, Test for total hardness, Test for chloride, calcium, iron etc., calculation of magnesium content and total solids. III. Project Quality assessment of water samples collected from different localities.	1	15

Books Recommended:

1. Subash. C Jain, International Marketing, 6th edition.

2. Varshney, R.L and Bhattacharya, B International marksetying management and Indian perspective, Sultan chand and sons, New Delhi.

3. Kohler P, Keller K.L, Koshy A, Jha M, 13th edition 2009, Marketing Management- A South Africa Perspective, Pearson Education, New Delhi.

Further Reading:

4. Ramaswamy, V.S and Namakumari ,S.; 4th edition Marketing Manangement –Global Perspective- Indian Content, McMillan Publishers India Ltd, New Delhi.

5. Saxena. Rajan, 3rd edition: Marketing management, Tata McGraw Hill Publishing Company Ltd, New Delhi.

Bsc.Sem.II VAC · IPDC-I CBP-Group

MS23VACBCA205

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

"Accredited By NAAC with 'A' Grade (CGPA 3.02)"

Bachelor of Computer Application (BCA)

Semester: II	Program Code:MGTUG201
Course Code: MS23VACBCA205	Course Title: Integrated Personality Development Course - I IPDC-I
Course Credits: 02	Hours/Week: 02
Exam Duration: 1 Hours	Course Type: Value Added Course (VAC)
Internal Exam Marks: 25	External Exam Marks: 25

Course Outcome:

After completion of course students able to,

- Gain holistic value-based education that will enable them to succeed academically, professionally, and socially.
- Become self-aware, sincere, and successful in their many roles – as ambitious students, reliable employees, caring family members, and contributing Indian citizens.

Total Teaching Hour: 30		
Sr. No.	PARTICULAR	MARKS
Unit - I	**The Need for Values: (2 Hour)** Students will learn about the need for values as part of their holistic development to become successful in their many roles - as ambitious students, reliable employees, caring family members, and considerate citizens. **Module: Remarking Yourself** **Subject: Restructuring Yourself: (2 Hour)** Students learn how self-improvement enables them to secure a bright future for themselves. They will learn 6 powerful thought processes that can develop their intellectual, physical, emotional, and spiritual quotients. **Subject: Power of Habits: (2 Hour)** Students will undergo a study of how habits work, the habits of successful professionals, and the practical techniques that can be used to develop good habits in their life. **Module: Learning from Legends** **Subject: Tendulkar & Tata : (2 Hour)** Students will learn from the inspirational lives of India's two legends, Sachin Tendulkar and Ratan Tata. They will implement these lessons through relatable case studies. **Module: From House to Home:** **Subject: Listening & Understanding: (2 Hour)** Active listening is an essential part of academic progress and communication. Students will learn to listen with their eyes, ears, mind, and heart. **Module: Facing Failures** **Subject: Welcoming Challenges: (2 Hour)**	50% NIP

	This lecture enables students to revisit the way in which they approach challenges. Through the study of successful figures such as Disney, Lincoln and Bachchan, students will learn to face difficulties through a positive perspective. **Module: My India My Pride** **Subject: Glorious Past - Part 1: (2 Hour)** India's ancient Rishis, scholars, and intellectuals have made tremendous contributions to the world; they developed an advanced, sophisticated culture and civilization which began thousands of years ago. Students will learn the importance of studying India's glorious past so that they could develop a strong passion and pride for our nation. **Subject: Glorious Past - Part 2: (2 Hour)** Our ancient concepts can be used to seek revolutionary ideas and generate inspiration. Students will develop a deeper interest in India's Glorious Past – by appreciating the need to read about it, research it, write about it, and share it.	
Unit - II	**Module: Significance of Failures: (2 Hour)** Failure is a student's daily source of fear, negativity, and depression. Students will be given the constructive skills to understand failure as a formative learning experience. **Module: Learning from Legends** **Subject: A.P.J. Abdul Kalam : (2 Hour)** Dr Kalam's inspirational life displayed legendary qualities which apply to students (1) Dare to Dream (2) Work Hard (3) Get Good Guidance (4) Humility (5) Use Your Talents for the Benefit of Others **Module: Soft Skills** **Subject: Networking & Leadership: (2 Hour)** Students are taught the means of building a professional network and developing a leadership attitude. **Subject: Project Management: (2 Hour)** Students will learn the secrets of project management through the kshardham case study. They will then practice these skills through an activity relevant to student life. **Module: Remaking Yourself** **Subject: Handling Social Media: (2 Hour)** Students will learn how social media can become addictive and they will imbibe simple methods to take back control. **Module: Facing Failures** **Subject: Power of Faith: (2 Hour)** Students will learn about the power and necessity of faith in our daily lives. **Module: From House to Home** **Subject: Bonding the Family: (2 Hour)** Students will understand the importance of strong family relationships.	50% MRC

	They will learn how to overcome the generation gap and connect with their family more. **Module: Selfless Service** **Subject: Seva: (2 Hour)** Students will learn that performing seva is beneficial to one's health, well-being, and happiness. It also benefits and inspires others.	

Text & Reference Books:

- IPDC Workbook – 1

University Question Paper Scheme			
Q.1	Unit-I	Descriptive/ Long questions with choice	10 Marks
Q.2	Unit-II	Descriptive/ Long questions with choice	10 Marks
Q.3	All Unit	Objective / Short Question / True –False etc.	5 Marks

Ic. Principal
The H.S.N.B. Ltd. Science College
Himatnagar-383001, S.K.