IV	**Major Discipline Specific course MJDSC -1**	**Basic Chemistry- III**	**SC23MJDSCCHE401**	**4**	**50**	**50**	**2.30**	**100**
	Major Discipline Specific course MJDSC-II	**Basic Chemistry- IV**	**SC23MJDSCCHE401A**	**4**	**50**	**50**	**2.30**	**100**
	Major Discipline Specific course MJDSC -1II Practicals	**PMJDC Practical -I & II Lab Group A & Group B**	**SC23PMJDSCCHE401**	**4**	**50**	**50**	**2.30**	**100**
	Minor Discipline Specific course MIDSC	**To be Selected Simplified chemistry -I**	**SC23MIDSCCHE402**	**2**	**25**	**25**	**2.00**	**50**
	Minor Discipline Specific course MIDSC Practicals	**Practical's for simplified chemistry I**	**SC23PMIDSCCHE402**	**2**	**25**	**25**	**2.00**	**50**
	Ability Enhancement Courses AEC	**To be Selected (From languages)**	**SC23AECCHE404**	**2**	**25**	**25**	**2.00**	**50**
	Value Added course VAC	**To be Selected (VAC Bhartiya Science & Technology)**	**SC23VACCHE405**	**2**	**25**	**25**	**2.00**	**50**
	Skill Enhancement Course SEC	**To be Selected SEC-1 Green chemistry or SEC-2 Ceramics**	**SC23SECCHE406/ SC23SECCHE406A**	**2**	**25**	**25**	**2.00**	**50**
	Total Credits of Semester - IV			**22**	**275**	**275**		**550**

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Course Name : B. Sc. Chemistry Semester : IV
PROGRAM CODE : SCIUG102
COURSE CODE : SC23MJDSCCHE401

Type of course : Major Discipline Specific course
Name of course : Basic chemistry III 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 have knowledge on noble gases and their uses..
2. To understand chemistry of aminoacids and peptides and their application.
3. To study about polycyclic aromatic hydrocarbons and their relevant reactions.
4. To know about the role of ionic equilibrium in electrochemistry.

Course Outcome:

1.Students will have a firm foundation in the fundamentals and application of current chemical and scientific theories including those in 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 conductometric titrations and calculations for estimation of components in mixtures.

Unit	Topic	Credit	Hr
1	**Chemistry of Noble gases.** Introduction Discovery of Noble gases: Occurrence, Isolation of Non- radioactive Of Noble gases. Electronic configuration of Noble gases. Compound of Noble gases. Non real compounds prepared by different methods. True compounds: XeF_2, XeF_4, XeF_6, $XeOF_2$, XeO_2F_2, $XeOF_4$, XeO_3, XeO_4.	1	15
2	**Amino Acid & Peptides.** **Amino Acid** Introduction, Classification and nomenclature, Acid-Base Behavior (zwitterion) and Isoelectric point Synthesis of amino acids (GabrielPhthalimide, Straker, Fisher-melonic ester), Chemical properties and reaction of amino acids **Peptides** Structure and nomenclature of peptide, Structure determination of peptide, End group analysis (C-terminal & N-terminal) Synthesis of Peptide (Bergmann, Azide, Shehan)	1	15
3	**Poly Cyclic Aromatic Hydro Carbon.** Introduction, Nomenclatureof naphthalene, Anthracene, Phenanthrene and its derivatives Synthesis of Naphthalene Anthracene, Phenanthrene Chemical Reactions (oxidation, reduction and electrophilic, substitution reaction (ESR)) of naphthalene, Anthracene, Phenanthrene Carcinogenic hydrocarbon .	1	15
4.	**Ionic Equilibrium** Introduction , Electrolysis, Ionic equilibrium, Resistance,	1	15

	Conductance, Specific Conductance, equivalent conductance, Molar conductance and equivalent conductance at infinite dilution. Transport number: Determination of transport number (i) Hittorf's Method (ii) Moving Boundary Method. Relevant Numericals. Types of Condctometric titration Acid Base titration: Strong acid Vs Strong base, Strong acid Vs Weak base, Weak acid Vs Strong base, Weak acid Vs Weak base, Strong acid + Weak acid Vs Strong base. Hydrolysis of salt: Classification of salt, Derive pH equation for hydrolysis of strong acid & weak base Salt, Derive pH equation for hydrolysis of weak acid & strong base salt, Derive pH equation for hydrolysis of weak acid & weak base salt. Numericals.		

Books Recommended:

➢ **Inorganic Chemistry**

1. Inorganic chemistry, Catherine E. house croft, 5 th edition, Pearson , 2018.

2. Concise Inorganic Chemistry J.D.Lee, 4th edition, ELBS publication.

3. Inorganic chemistry, Manas chandra, Oxford Pubishers, 1998.

➢ **Organic Chemistry**

1. Organic Chemistry by Morrison and Boyd. 4th ed. Pearson Education- 2003

2. Organic Chemistry by pine, Hendriction, Cram and Hammond 4th ed. By P.S.Kalsi.

3. Advance Organic Chemistry by Jerry March.

4. Advance Organic Chemistry by ArunBahal and B.S.Bahal.

5. Organic Chemistry Vol. I & II by S.M.Mukherji, S.P.Sing, R.P.Kapoor.

6. Reaction mechanism and Reagents in Organic Chemistry by GurdeepR.Chatwal 4th ed. Himalaya public House.

7. Text book of Organic Chemistry by ArunBahal, B.S.Bhal, S.Chand.

8. Organic Spectroscopy by P.S.Kalsi.

9. Organic Chemistry by I.R.Finar.

➢ **Physical Chemistry**

1. Advance Physical Chemistry by Gurdeep Raj
2. Physical Chemistry (Question and Answers) by R.N.Madan, G.D.Tully, S.Chand.
3. Principal of Physical Chemistry by Puri, Sharma, Pathania.
4. Chemical Thermodynamics by R.P.Rastogy and R.R.Misra.
5. Essentials of Physical Chemistry by B.S.Bahal, ArunBahal, G.D.Tully.
6. Physical Chemistry by P.W.Atkins, 5th ed., Oxferd, 1994, 7th ed.,2002
7. Physical Chemistry by R.A.Alberty and R.J.Silbey, John Wiley, 1995.
8. Physical Chemistry by G.H.Barrow, 5th ed., Mac Graw Hill, 1998, 6th ed.
9. Physical Chemistry by W.J.Moore, 4th ed., Orient Longmans, 1969.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Course Name : B. Sc. Chemistry Semester : IV
PROGRAM CODE : SCIUG102
COURSE CODE : SC23MJDSCCHE401A

Type of course : Major Discipline Specific course
Name of course : Basic Chemistry IV 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 inner transition metal complexes.
2. To understand acid base organic chemistry i.e. resonance, inductive effect etc. and their explanations.
3. To study about the phase rule and types of reactionsphase reactions.
4. To know about the colorimetery and spectrophotometery for various applications.

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 analytical toolslike spectrophotometery for industrial practical applications.

Unit	Topic	Credit	Hr
1	**F Block Elements** **[A] Lanthanides:** Inner transition elements, position in the Periodic Table, Lanthanides: General Characteristics, (Electronic Configuration, Oxidation States, Oxidation Potential, Colour, MegneticProperies, Isotopes, Chemical Reactivity, Formation of Complex, Ionization Potential), Lanthanide Contraction, Effect of Actinide Contraction, Occurrence and Extraction of Lanthanides, Separation of Lanthanide elements, (Ion exchange method and Solvent Extraction Method.) **[B] Actinides:** General Characteristics (Electronic Configuration, Oxidation States, Atomic and Ionic radii, Actinide Contraction, Formation of Coloured salts, Formation of complex, Magnetic Properties). Occurrence and Isolation of Uranium, Use of Uranium, Preparation of Neptunium, Plutonium, Americium, Curium from Uranium.	1	15
2	**Acid-Base Properties**. Introduction: Proton acids – Bases and Lewis acids- Bases, Scale of acidity – Basicity. Factors effecting on acidity and basicity of compounds. Resonance effect (Drawing resonance structures and the conditions for resonance). Inductive effect, Hybridization Steric effects,Effects of hydrogen bonding	1	15
3	**Phase rule**. Gibbs Phase rule- statement and meaning of terms- phase, component, degree of freedom, Derivation of phase rule, Advantages and limitations of phase rule, One component system: water system, Sulphur system, Reduced phase rule of condensed system,	1	15

	Two component system: Pb - Ag system, Zn - Mg system, KI - water system, Dehydration of $CuSO_4 \cdot 5H_2O$, Steam distillation Numericals.		
4.	**Calorimetry & Spectrophotometry.** Principle of colorimetry, Laws of Light: Groths - Drappers's Law, Lambert - Beer's Law. Various terms: Absorptivity, Optical density, Molar absorptivity, %transmission, - Relation between absorptivity and % transmission, deviation of Lambert - Beer's law. Applications of Lambert - Beer's law, Problem solving in colorimetry: Standard series method and Dilute method Basic differences in colorimer and spectrophotometer .Description of single beam and double beam spectrophotometry (Source for irradiation, Monochrometer, Wave selector, cuvette or sample holding vessel, detectors Working with spectrophotometer, probable error in working with spectrophotometer, study and evaluation of two components in the mixture. Numericals.	1	15

Books Recommended:

➢ Inorganic Chemistry

1. . Inorganic chemistry, Catherine E. house croft, 5 th edition, Pearson , 2018.

2. Concise Inorganic Chemistry J.D.Lee, 4th edition, ELBS publication.

3. Inorganic chemistry, Manas chandra, Oxford Pubishers, 1998.

➢ Organic Chemistry

1. Organic Chemistry by Morrison and Boyd. 4th ed. Pearson Education- 2003

2. Organic Chemistry by pine, Hendriction, Cram and Hammond 4th ed. By P.S.Kalsi.

3. Advance Organic Chemistry by Jerry March.

4. Advance Organic Chemistry by ArunBahal and B.S.Bahal.

5. Organic Chemistry Vol. I & II by S.M.Mukherji, S.P.Sing, R.P.Kapoor.

6. Reaction mechanism and Reagents in Organic Chemistry by GurdeepR.Chatwal 4th

ed. Himalaya public House.

7. Text book of Organic Chemistry by ArunBahal, B.S.Bhal, S.Chand.

8. Organic Spectroscopy by P.S.Kalsi.

9. Organic Chemistry by I.R.Finar.

➢ Physical Chemistry

1. Advance Physical Chemistry by Gurdeep Raj

2. Physical Chemistry (Question and Answers) by R.N.Madan, G.D.Tully, S.Chand.

3. Principal of Physical Chemistry by Puri, Sharma, Pathania.

4. Chemical Thermodynamics by R.P.Rastogy and R.R.Misra.

5. Essentials of Physical Chemistry by B.S.Bahal, ArunBahal, G.D.Tully.

6. Physical Chemistry by P.W.Atkins, 5th ed., Oxferd, 1994, 7th ed.,2002

7. Physical Chemistry by R.A.Alberty and R.J.Silbey, John Wiley, 1995.

8. Physical Chemistry by G.H.Barrow, 5th ed., Mac Graw Hill, 1998, 6th ed.

9. Physical Chemistry by W.J.Moore, 4th ed., Orient Longmans, 1969.

Analytical chemistry

1. Vogel, Arthur I: A Test book of Quantitative Inorganic Analysis (Rev. by GH Jeffery and others) 5th Ed. The English Language Book Society of Longman

2. Willard, Hobert H. et. al: Instrumental Methods of Analysis, 7th Ed. Wardsworth Publishing Company, Belmont, California, USA, 1988.

3. Christian, Gary D; Analytical Chemistry, 6th Ed. New York- John Willy, 2004.

4. Harris, Daniel C,Quantitative Chemical Analysis, 3rd Edition, W.H. Freeman and Company, New York, 2001.

5. Khopkar, S.M. Basic Concepts of Analytical Chemistry New Age, International Publisher, 2009.

6. Koogs, West and Holler, Fundamentals of Analytical Chemistry, 6th Edition, Sauders College Publishing, New York. 1991.

Further Reading:

Suggestive Digital Platforms Web Links:

1. http://chemcollective.org/vlabs
2. https://www.vlab.co.in/broad-area-chemical-sciences
3. https://wp.labster.com/chemistry-virtual-labs/
4. https://www.youtube.com/watch?v=O_nyEj_hZzg

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Program Name **: B. Sc. Chemistry** **Semester : IV**
PROGRAM CODE : SCIUG102
COURSE CODE : SC23PMJDSCCHE401

Type of Course : Practicals Major Discipline Specific Course PMJDSC
Name of Course : Practical's for Basic 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 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 for various estimations.

Course Outcomes:

1. Students will gain a comprehensive knowledge and skills in organic separations for carrying out reactions.
2. To understand basic methods to identify the compounds on the basis complexometric titrations.

Sr.No.	List of Practicals	Credit	Hr
GROUP A	**Organic chemistry** Separation of mixtures (any 10) Mixture should have two compounds and the compounds should be water insoluble.	2	60

GROUP B	Inorganic Quantitative analysis. (Any 10) 1. Estimation of Ca by complexometric titration. 2. Estimation of Mg by complexometric titration. 3. Estimation of Cu by EDTA complexometric titration 4. Estimation of Cu by Iodometrical titration 5. To estimate ferrous (Fe^{+2}) and ferric (Fe^{+3}) ions given in the mixture. 6.To determine the strength of Ferrous ammonium sulphate by $K_2Cr_2O_7$. 7. To determine the amount of Zn by EDTA Method. 8. To determine the amount of Ni by EDTA Method. 9. Estimation of Glucose/Aniline/Phenol 10. To determine the amount of Aniline by Brominating Method. 11. To determine the amount of Phenol by Brominating Method. 12. To determine the amount of Glucose by oxidation Method	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 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 : IV**
PROGRAM CODE : SCIUG102
COURSE CODE : SC23MIDSCCHE402

Type of course : Minor Elective course MIDSC
Name of course : Simplified 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 electrochemistry.
2. To understand role of electrodes and their applications.

Course Outcome:

1. Students will have a firm foundation in the fundamentals and application of elctro chemistry and scientific theories applicable to 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 practicals related to generation of current.

Unit	Topic	Credit	Hr
1	**Electro Chemistry** Introduction of terms: Oxidation, Reduction, Redox, Anode Cathode, Electrode, Half-cell Oxidation & Reduction Potential Electo chemical Cell (Galvanic Cell) 2 Representation Cell. Electo chemical series and its Significance. Nearest Equation of cell EMF and Single electrode potential. Describe the Electrode (Metal – Metal ion Electrode, Standard – Hydrogen Electrode, Calomel Electrode, Weston standard Electrode, Glen Electrode, Quienhydron Electrode)	1	15

	Application of cell potential to find out Equilibrium constant, Free Energy and PH Numericals		
2	**Inorganic Polymers** Classification of Inorganic polymers Polymers containing boron: Borazine, preparation and properties and structure of Borazine, Substituted borazines, Boron nitride Polymers containing Silicones, preparation and properties of Silicones, Types of Silicones. Plymers containing phosphorus, Types of Polymers containing phosphorus, Preparation and properties and Structure of Poly phosphonitritic chlorides, Plyorthophosphoric acid, Borophosphateglases Polymeric compounds of Sulphur, Nirides of sulphur,Thiazylhalides,Imides of sulphur	1	15

Books Recommended:

1. Electroanalytical methods, Allen j, Bard, Springer, 2000.
2. Electrochemistry by S. Glasstobne, 3rd edn, Oxford University Press, 1956.
3. 'Physical chemistry by s. Glasston, Oxford University Press, 1960.
4. 'electrochemistry by I O Bockris,, vol 1, 2, 3, Francis and taylor, 1990.
5. Inorganic polymers by James E. Mark, Oxford publisher 2005.
6. Inorganic polymers by Chatwal, Himalyan publishers, 2018.

Further Reading:

1. Essentials of physical Chemistr by B.S.Bahal, ArunBahal. G. D.Tuli.
2. Physical Chemistry by P.W.Atkins. 5th edn.Oxferd 1994 7thedn-2002.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Program Name **: B. Sc. Chemistry** **Semester : IV**
PROGRAM CODE : SCIUG102
COURSE CODE : SC23PMIDSCCHE402

Type of Course : Practicals Minor (Elective) Discipline Specific Course PMIDSC
Name of Course : Practical's for simplified 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 learn complexometric titrations.
2. Preparation of solutions and required standardization.

Course Outcomes:

1. Students will gain a comprehensive knowledge and skills in standardization and preparation of solutions for carrying out complexometric titrations.
2. To understand basic methods to estimate the metal ionss on the basis of complexation with ligands.

Sr.No.	List of Practicals	Credit	Hr
1	Inorganic Quantitative analysis. (Any 10) 1. Estimation of Ca by complexometric titration. 2. Estimation of Mg by complexometric titration. 3. Estimation of Cu by EDTA complexometric titration 4. Estimation of Cu by Iodometrical titration 5. To estimate ferrous (Fe^{+2}) and ferric (Fe^{+3}) ions given in the mixture. 6.To determine the strength of Ferrous ammonium sulphate by $K_2Cr_2O_7$. 7. To determine the amount of Zn by EDTA Method. 8. To determine the amount of Ni by EDTA Method.	1	30

	9. Estimation of Glucose/Aniline/Phenol 10. To determine the amount of Aniline by Brominating Method. 11. To determine the amount of Phenol by Brominating Method. 12. To determine the amount of Glucose by oxidation Method		

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 V**

PROGRAM CODE: SCIUG102

COURSE CODE: SC23VACCHE405

Type of course : Value Added Course VAC
Name of course : Bhartiya Science and Technology **Total Mark : 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 Bhartiya science and tecchnology
2. To have knowledge about contribution of Bhartiya science and tecchnology.
3. To know about great mathematicians to our culture.

Course Outcome:

1. Students will gain a comprehensive knowledge of Bhartiya science and tecchnology.
2. To raise awareness among students about Bhartiya science and tecchnology.
3. Students will develop faith and honor about our culture.

Unit	Topic	Credit	Hr
1	**Fundamentals of Bhartiya science and tecchnology** An overviw of indian contribution to technology, technological innovations, Metullrgy, Textile andchemistry: copper/ bronze/Zinc/ gold/ Silver Iron and steel technology, textile and dyeing Chemistry -1: Traditional chemical practices in India- pottery, mortar, cement, essential oils, Chemistry II: Tradittions medical systemsin India Ayurveda, surgery, anatomy, nanoscience.	1	15

2	**Ancient applications of bhartiya technology** Management: Harappa water management, other case studies,Medieval water structures, Transportation: modes of transpotation and its reforms, development of trading activities, Mathematics: development of mathematics in india, Great mathematicians and their contribution. Unique aspects of mathematics,	1	15

Books Recommended:

1. Science and Technology in ancient indian texts,, Bal Ram singh, girish Nath jha, D K Print publisher, 2012.

2. Ancient hindu science, Alok kumar, Jaco publishing house, 2019..

3. Engineering and technology in ancient India, Ravi kumar Arya, krishna publisher, 2022.

Further Reading:

1. Traditional knowledge system, Amit Jha, Atlantic publisher, 2019.
2. A modern introduction to ancient Indian Mathematics, T S Bhanu moorty, New age international publishers, 2008.
3. Vedic physics, Keshav Das verma, motilal banaridas publisher, 2012.

Suggestive Digital Platforms Web Links:

1. http://www.phindia.com
2. https://www.garudabooks.com
3. https://www.exotiindiaart.com/
4. https://www.anaadi.org

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Program Name **: B. Sc. Chemistry** **Semester : IV**
PROGRAM CODE : SCIUG102
COURSE CODE: SC23SECCHE406

Type of course : Skill Enhancement course SEC
Name of course : Green chemistry

Effective from June 2023 Under NEP 2020

Total Credits : 02 Teaching Hours per Week: 02 Teaching hours per semester: 30	**Theory Mark: 50**	External 25 Marks Internal 25 Marks

Course Objectives:

1. To understand importance of taking precautions in study of Chemical reactions in greener way.
2. To have knowledge of lab wastage and save the chemicals.
3. To know about designing green synthesis .

Course Outcome:

1. Students will gain a comprehensive knowledge and skills in assessing laboratory reagents and use of them in greener ways.
2. To understand the importance of cost of chemicals, environment protection and safety in performing green experiments.
3. Students will learn how to use chemicals in greener ways and makngichemical laboratories.

Unit	Topic	Credit	Hr
1	**BASICS OF GREEN CHEMISTRY:** Introduction of green Chemistry, Twelve principles of green chemistry. Green products, recycling of waste, Green Fuels methods:Natural gas reforming Methods. Coal gasification Process. Hydrogen gas, Biomass gasification, Eco-efficiency-environmental protection laws. Inception of green chemistry-awards for green chemistry.International organizations promoting green chemistry.	1	15

2	**Designing Green Synthesis** Choice of starting materials, choice of reagents, choice of catalysts. Bio catalysts, polymer supported catalysts, choice of solvents.Synthesis involving basic principles of green chemistry. Green approaches in synthesizing of Nanomaterials (ZnO, TiO_2) for environment. Examples – Adipic acid, Catechol, Methyl methacrylate, Urethane, Aromatic amines (4-aminodiphenylamine), Benzyl bromide, Acetaldehyde, Citral, Ibuprofen, Paracetamol, Asprin.	1	15

Books Recommended:

1. V.K.Ahluwalia & M.R.Kidwai : New Trends in Green Chemistry, Anamalaya Publishers (2005).
2. V.Kumar, An Introduction to Green Chemistry, Vishal Publishing Co.Jalandhar, 2007.
3. Sanghi A Shrivastav Green Chemistry, Krihna publications, 2016
4. Chemistry of Fosil Fuels and fuels, Harold H Schobert First published 2013 ISBN 978-0-521-11400-4

Further Reading:

Suggestive Digital Platforms Web Links:

1. http://chemcollective.org/vlabs
2. https://www.vlab.co.in/broad-area-chemical-sciences
3. https://wp.labster.com/chemistry-virtual-labs/
4. https://www.youtube.com/watch?v=O_nyEj_hZzg

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Program Name : B. Sc. Chemistry **Semester : IV**
PROGRAM CODE : SCIUG102
COURSE CODE: SC23SECCHE406A
Type of course : Skill Enhancement course SEC
Name of course : Ceramics **Total Mark: 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 ceramics used in day todaylife
2. To have knowledge of basic of raw materials used inceramic industry.
3. To know about primary and secondary kilns needed for ceramic manufacture .

Course Outcome:

1. Students will gain a comprehensive knowledge and skills in assessing laboratory testing needed for ceramic industry.
2. To understand the importance ceramics for practicl utility
3. Students will oftion to ceramic industry as carrer.

Unit	Topic	Credit	Hr
1	**Introduction of ceramics**, Definition and Ceramics bodies, Procedures of body preparation. Quality testing of raw material: Grinding, sieving and demagnetizing. Filter pressing, Dearing pug mill, Slip casting & slip Parameters, Finishing & Glazing & Firing, Type of kiln Industrial uses of ceramics modern ceramics – Hi-tech Ceramics-Sub-division in Ceramics.	1	15

2	**Property Measurement Of Ceramic & Refractories** Common physical test in ceramics, Moisture measurement, Grit content, Specific density, Water of plasticity(WOP), Viscosity, Dry shrinkage, Porosity, Water absorption, Fired shrinkage Loss of ignition(LOI) & Module of rapture(MOR), Crazing test Classification of Refractories Properties and application of refractories Manufacturing process of silica bricks	1	15

Books Recommended:

1. 1. Industrial ceramics – Felix singer and Sonja S. Singer, Springer, august 2014.
2. Ceramics technology and processing Alan G. king
3. Modern industrial ceramics, Stafford, Macmillian publishing company,1980.
4. Source book of Ceramics, part-1 and 2 by S.Kumar, Krishna publishers 2022.

Further Reading:

Suggestive Digital Platforms Web Links:

1. http://chemcollective.org/vlabs
2. https://www.vlab.co.in/broad-area-chemical-sciences
3. https://wp.labster.com/chemistry-virtual-labs/
4. https://www.youtube.com/watch?v=O_nyEj_hZzg