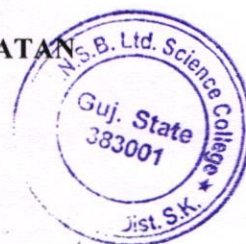


NEP-2020

BSC-Sem-4

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	Theory	External 50 Marks
	Teaching Hours per Semester: 60		Internal 50 Marks

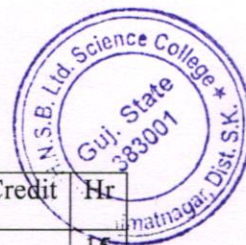
Course Objectives:

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.

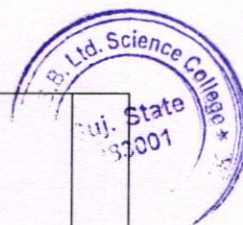
Course Outcome:

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.

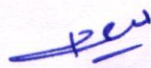

Principal
The H.S.N.B. Ltd. Science College
Himatnagar-383001, S.K.



Unit	Topic	Credit	Hr
1	Chemistry of Noble gases. KVU 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. ZMV 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. SPV Introduction, Nomenclature of 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 SPV Introduction , Electrolysis, Ionic equilibrium, Resistance,	1	15

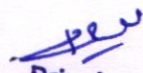


Conductance, Specific Conductance, equivalent conductance, Molar conductance and equivalent conductance at infinite dilution. Transport number: Determination of transport number (i) Hittorf's Method (ii) Moving Boundary Method. Relevant Numericals. Types of Conductometric titration Acid Base titration: 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. housecroft, 5 th edition, Pearson , 2018. 2. Concise Inorganic Chemistry J.D.Lee, 4th edition, ELBS publication. 3. Inorganic chemistry, Manas chandra, Oxford Publishers, 1998. ➤ Organic Chemistry 1. Organic Chemistry by Morrison and Boyd. 4th ed. Pearson Education- 2003 2. Organic Chemistry by pine, Hendrickson, 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	


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



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., Oxford, 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.


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

MJ-2-401-A Theory

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:

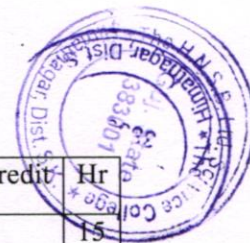
1. To understand the core concepts of inner transition metal complexes.
2. To understand acid base organic chemistry i.e. resonance, inductive effect etc. and their explanations.
3. To study about the phase rule and types of reactions phase reactions.
4. To know about the colorimetry and spectrophotometry 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 tools like spectrophotometry for industrial practical applications.

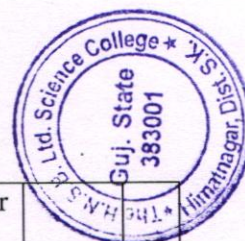

Principal
The H.S.N.B. Ltd. Science College
Himatnagar-383001, S.K.

MJ-02 - 401-A Theory



Unit	Topic	Credit	Hr
1	F Block Elements KVV [A] Lanthanides: Inner transition elements, position in the Periodic Table, Lanthanides: General Characteristics, (Electronic Configuration, Oxidation States, Oxidation Potential, Colour, Magnetic Properties, 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. APK 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. KPD 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

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



	Two component system: Pb - Ag system, Zn - Mg system, KI - water system, Dehydration of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, Steam distillation Numericals.		
4.	Calorimetry & Spectrophotometry. SLP 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

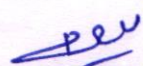
Books Recommended:

➤ **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, Hendricion, 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


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

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., Oxford, 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, Saunders 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

Practical - MJ

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PAT

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	Practicals	External 25 Marks
	Lab Teaching Hours per semester: 60		Internal 25 Marks
Minimum Number Practicals to be Performed: 12			

GROUP B

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

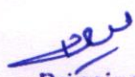
Course Objectives:

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


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



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 $\text{K}_2\text{Cr}_2\text{O}_7$. 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) 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.

Printed by
The H.S.N.B. Ltd. Science College
Himatnagar-383001, S.K.