

HEMCHNDRACHARYA NORTH GUJARAT UNIVERSITY
PATAN - 384 265



NAAC Accreditation Grade - " B "



FACULTY OF SCIENCE

B. Sc. - CHEMISTRY
New Syllabus and Exam Scheme

Semester - I TO II
With Semester / CBCS / Grading Pattern

W. E. F. June - 2011 .

Date : ~~30~~ - 06 - 2011

TOTAL PAGE - 20

*Received
Dated
15-7-11.*

HEMCHANDRACHARYA
NORTH GUJARAT UNIVERSITY
University Road, P.O.BOX NO : 21 PATAN-384265
N. Gujarat. INDIA.
Phone: 222745, 230529, 230743, 220932, 233648.
Fax: (02766) 231917 Gram: UNIVERSITY.
E-mail : ngu_vc@wilnetonline.net
ngu_regi@wilnetonline.net
Website : www.ngu.ac.in
www.ngu_patan.org

B.Sc. (Six Semester Programme)

The proposed new courses in chemistry for under graduate classes are reassigned in accordance to semester/CBCS/Grading system with new education policy. The new course is based on model curriculum of the university grants commission.

The medium of instruction should be Gujarati and/or English and the question paper should be drawn in Gujarati with the English version. Students are permitted to write answers in English or Gujarati language.

Its objectives are as under :

1. To meet the growing demand of specialization and Advanced courses in applied science.
2. To help the colleges to update and modernize their laboratories.
3. To redesign the courses with special emphasis on local requirements, environment and to link the courses, with requirements of the industries and research.

B.Sc. (HONS) Programme
SEMESTER - I & II
CHEMISTRY SYLLABUS
(Effective From June – 2011)

**HEMCHANDRACHARYA
NORTH GUJARAT UNIVERSITY
University Road, P.O.BOX NO : 21 PATAN-384265
N. Gujarat. INDIA.**

B.Sc. Semester - I & II

CHEMISTRY SYLLABUS

(Effective From June – 2011)

This syllabus is to be completed by assigning four periods of one hour each and two practicals of two hours each per week.

The number of students in a practical batch should not exceed Twenty.

PATTERN OF EXAMINATION

There will be one paper for core compulsory and one paper for subject elective theory and Five Hours for practical in the University Examination. The pattern will be as follow.

Written	Examination Time	Marks-External	Marks-Internal
Core Course	3 hours	70	30
Sub. Elective Course	2 hours	50	--
Fundamental Course	2 hours	50	--
Practical Core Course	5 hours	50	--

Hemchandracharya North Gujarat University. Patan.
F.Y.B.Sc.
Chemistry.(CC CH 101)
Semester: I

Unit : 1 (A) CHEMICAL BONDING

- Valence bond theory & its application
- Directional characteristics of covalent bond
- Various types of hybridization and shape of simple inorganic molecules
- V.S.E.P.R. theory for NH_3 , H_2O
- M.O. Theory-Energy level diagram for homo nucleus diatomic molecules (N_2 and O_2) and hetero diatomic molecule (CO and NO)

(B) F-BLOCK ELEMENTS

- Lanthanide electronic configuration, Oxidation state
- Lanthanide contraction, Effect of lanthanide contraction
- Separation method
 - (1) Solvent extraction methods
 - (2) Ion Exchange Method

Unit : 2(A) STRUCTURE AND PROPERTIES

Factors affecting to the properties of organic molecule

- Intramolecular forces (dipol-dipol interaction, vander waals forces)
- Electromeric effect
- Inductive effect
- Resonance effect(draw resonating structures of Nitro benzene, Chlorobenzen, 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 Co-Valent bond (With atleast one example of each intermediates)
- Types of reagents.
- Types of organic reaction with mechanism.
- Substitution reactions (Nucleophilic & Electrophilic)
- Addition reactions (Nucleophilic & Electrophilic)
- Elimination reactions (E_1 & E_2)

UNIT : 3 THERMODYNAMICS

- Thermodynamics (only introduction)
- System and surrounding- work & heat, state function, thermodynamic process, internal energy, 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
- Want-hoff isotherm and isochors
- Numerical

Unit : 4 ANALYTICAL CHEMISTRY

- Introduction to Analytical Chemistry
- Classification of Classical and Electroanalytical Techniques.
- Literature of Analytical Chemistry (Names of Author and Publishers for Any Ten Books, Journals and Reviews)
- Criterion for Selection of analytical Techniques.
- 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 numericals.

5

Hemchandracharya North Gujarat University. Patan.

F.Y.B.Sc.

Chemistry. (SE CH 101)

Semester : I

SUBJECT ELECTIVE PAPER

(Agricultural Chemistry)

Unit : 1 FERTILIZERS

- Plant Nutrients, Major Nutrients, Minor Nutrients, Trace Nutrients
- Definition of Fertilizer
- Classification of Fertilizer
- Synthesis of N Containing Fertilizer i.e. $(\text{NH}_4)_2\text{SO}_4$, $\text{Ca}(\text{CN})_2$, and Urea
- Synthesis of P Containing Fertilizer i.e. Super Phosphate, Tripal Super Phosphate
- Mix Fertilizer

Unit : 2 INSECTICIDE

- Introduction
- Inorganic Insecticide
- Organic Insecticide
- Natural or Plant Insecticide
- Synthesis of DDT, BHC, Malathion.

Reference : Industrial Chemistry by B.K.Sharma.

: REFERENCE BOOKS :

Inorganic Chemistry

1. 'Source Book on Atomic Energy' by Glasstone, 1969.
2. 'Modern Inorganic Chemistry' by G.F. Liporn, ELBS, 4th edn, colling Educational, 1983.
3. 'Inorganic Chemistry' D.F. Shriver, P.W. Atkins and C.H. Longford, 3rd edn, ELPS Oxford University Press, 1999.
4. 'Nuclear and Radio Chemistry' by G. Friedlander, J.W. Kennedy, E.S. Macias and J.M. Miller, 3rd edn, John Wiley, 1981.
5. 'Essentials of Nuclear Chemistry' H.J. Arnicall, 4th edn, New Age International, 1995.
6. 'Concise Inorganic Chemistry' J.D. Lee, 5th edn.
7. 'Inorganic Chemistry', D.F. Shriver, P.W. Atkins, 3rd edn, Oxford, 1999.
8. 'Concise Inorganic Chemistry' J.D. Lee, 4th edn, Chapman and Hall ELBS, 1991.
9. 'Inorganic Chemistry' by A.G. Sharp, 3rd edn, ELBS, Longman, 1990.

Organic Chemistry

1. 'Organic reaction and mechanism, P.S. Kalsi, New Age international Publishers.
2. Text book of organic Chemistry, P.S. Kalsi, New Age international Publishers.
3. Organic Chemistry Vol. I & II, S.M. Mukherji, S.P. Singh, R.P. Kapoor.
4. Reaction mechanism in Organic Chemistry, S.M. Mukherji, S.P. Singh. 3rd edn, Macmillan.
5. Reaction Mechanism and Reagents in Organic Chemistry, Gurdeep R. Chatwal 4th edn, Himalaya Publication House.
6. Text book of Organic Chemistry, Arun Bahal, S. Chand.
7. Organic Chemistry, R. Morrison and R. Boyd, 6th edn, Pearson Education 2003.
8. Organic Chemistry, T.W. Graham Solomons, 4th edn, John Wiley, 1998.

Physical Chemistry

1. Advance Physical Chemistry by Gurdeepraj.
2. Physical Chemistry (Question and Answer) by R.N. Madan, G.D. Tuli, S. Chand.
3. Principles of Physical Chemistry by Puri, Sharma, Pathania.
4. Chemical Thermodynamics by R.P. Rastogi and R.R. Misra.
5. Nuclear Chemistry by C.V. Shekhar, Dominant Publisher, New Delhi.
6. Essentials of physical Chemistry by B.S. Bahal, Arun Bahal, G.D. Tuli.
7. Physical Chemistry by P.W. Atkins, 5th edn, Oxford 1994 7th edn-2002.
8. Physical Chemistry by R.A. Albert and R.J. Silby, John Wiley 1995.
9. Physical Chemistry by G.H. Barrow, 5th edn, Mac Graw Hill, 1988, 6th edn, 1996.

10. Physical Chemistry by W.J. Moore, 4th edn, Orient Longmans 1969.

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.

8

Hemchandracharya North Gujarat University. Patan.

F.Y.B.Sc.

Chemistry Practical

Laboratory Course (LC CH 101)

Semester : I

This syllabus is to be completed by assigning two laboratory sessions per week, each of two hours. Total laboratory work is 60 hrs/semester (4 hrs/week) or 15 weeks.

The number of students in the laboratory batch should not exceed fifteen (15). The medium of instruction should be English in laboratory course.

1. 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
 Cl^- , Br^- , I^- , NO_3^- , NO_2^- , SO_4^{2-} , SO_3^{2-} , S^{2-} , CrO_4^{2-} , CO_3^{2-} , PO_4^{3-}
(Water Soluble and insoluble).
- Candidate should perform the analysis of at least 10 compounds.

2. Standardization

- 1) Preparation of standard solution of succinic acid and standardization of NaOH/KOH solution.
- 2) Preparation of standard solution of $\text{Na}_2\text{S}_2\text{O}_3$ and standardization of I_2 solution.
- 3) Preparation of standard solution of EDTA and estimation of $\text{Ca}^{+2}/\text{Mg}^{+2}$ in $\text{CaCl}_2/\text{MgCl}_2$ solution.
- 4) Preparation of standard solution of Oxalic acid and standardization of KMnO_4 solution.
- 5) Preparation of standard solution of $\text{K}_2\text{Cr}_2\text{O}_7$ and standardization of FeSO_4 solution.

3. Demonstrations

- Preparation of standard stock solution by w/v method and their different dilutions.
- Preparation of standard stock solution of HCl by v/v method and their different dilutions.

Hemchandracharya North Gujarat University. Patan.

F.Y.B.Sc.

Chemistry. (CC CH 201)

Semester: II

Unit : 1 (A) COORDINATION COMPOUNDS

- Definition
- Nomenclature of Complex.
- Werner's theory and its experimental verification.
- Concept of Effective Atomic Numbers (E.A.N.) for Coordination Compounds.
- Limitations of Valence bond theory of transition metal Complexes.
- An Elementary idea of (C.F.T.) Crystal field splitting of d-orbital in Oh and Td.
- Factors affecting to the crystal field splitting.
- Application of common complexes & chelates.

(B) ACTINIDE.

- Electronic Configuration.
- Oxidation state.
- Synthesis of $^{239}_{94}\text{Pu}$, $^{241}_{94}\text{Pu}$.

Unit : 2 STEREO CHEMISTRY OF ORGANIC COMPOUNDS

Introduction of Stereo Isomers;

- 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, Threo and Erythro diastereomers, Meso compounds.
- Geometrical isomerism:
Definition and general discussion of geometric isomers, General methods of structure determination (physical methods), E-Z nomenclature (Simple illustration should be given).
- Conformational isomerism:
Definition, Conformational analysis of ethane, n-butane with rotational and torsional diagram, Conformation of cyclo hexane, Axial and equatorial bonds, Newmann projection, Saw horse formula, Fisher & flying wedge formula, Difference between conformation and configuration.

Unit : 3 (A) CHEMICAL KINETICS.

- Introduction of following terms.
- Rate of reaction, Order of reaction, Molecularity.
- Rate equation for second order reaction. ($a=b$) & ($a \neq b$).
- Characteristics of second order reaction.
- Rate equation for third order reaction.
- Characteristics of third order reaction.
- Numerical.

(B) NUCLEAR CHEMISTRY.

- Concept of Nuclear particle.
- Definition of Isotopes, Isotones, Isobars, Isomers.
- Packing fraction.
- Nuclear binding energy.
- Nuclear coulomb barrier.
- Rate of radio active disintegration, half life period, Average life period.
- Rutherford & Soddy's law (Group transfer law)
- Numerical.

Unit : 4 INTRODUCTION TO VOLUMETRIC ANALYSIS

Principle, Mechanism and Applications of,

- Acid-Base Titrations (Only strong acid Vs strong Base).
- Redox Titrations (Only Fe(II) vs KMnO_4)
- Complexometric Titrations (Only $\text{Ca}^{+2}/\text{Mg}^{+2}$ vs EDTA)
- Precipitation Titrations (Only Cl^- vs AgNO_3).
- Related Numericals.

Hemchandracharya North Gujarat University. Patan.

F.Y.B.Sc.

Chemistry. (SE CH 201)

Semester : II

SUBJECT ELECTIVE PAPER

(Medicinal Chemistry)

Unit : 1 INTRODUCTION

- Introduction of drugs.
- History of medicinal chemistry.
- Classification of drugs.
- General importance of drugs.
- Drug Design.

Unit : 2 ANTI-MALARIAL DRUGS

- Introduction and History.
- Life cycle of Plasmodium.
- Natural anti-malarial drugs :
Role of activity side in quinine structure
- Classification of anti-malarial drugs.
- Synthesis of Quinoline derivatives :
8-Amino quinoline derivatives.
(Plasmoquine & Pamaquine).

- Reference :
1. Sanshleshit Auoshadho nu Rasayan by Dr. Anamik Shah.
 2. Sanshleshit Auoshadho nu Rasayan by Dr. J.P.Trivedi & Dr.K.A.Thakar.
 3. Chemistry of Synthetic Drugs by Dyson & May.

: REFERENCE BOOKS :

Inorganic Chemistry

1. 'Source Book on Atomic Energy' by Glastone, 1969.
2. 'Modern Inorganic Chemistry' by G.F.Liporni, ELBS, 4th edn, colling Educational, 1983.
3. 'Inorganic Chemistry' D.F.Shriver, P.W.Atkinss and C.H.Longford, 3rd edn, ELPS Oxford University Press, 1999.
4. 'Nuclear and Redio Chemistry' by G fried lander, J.W.Kennedy, E.S.macias and J.M.Miller, 3rd edn, John wiley, 1981.
5. 'Essentials of Nuclear Chemistry' H.J.Arnical, 4th edn, New Age International, 1995.
6. 'Concise Inorganic Chemistry' J.D.Lee, 5th edn.
7. 'Inorganic Chemistry', D.F.Shriver, P.W.Atkinss, 3rd edn, Oxferd, 1999.
8. 'Concise Inorganic Chemistry' J.D.Lee, 4th edn, Champman and Hall ELBS, 1991.
9. 'Inorganic Chemistry' by A.G.Sharp, 3rd edn, ELBS, Longman, 1990.

Organic Chemistry

1. 'Organic reaction and mechanism, P.S.Kalsi, New Age international Publishers.
2. Text book of organic Chemistry, P.S.Kalsi, New Age international Publishers.
3. Organic Chemistry Vol. I & II, S.M.Mukherji, S.P.Singh, R.P.Kapoor.
4. Reaction mechanism in Organic Chemistry, S.M.Mukhergi, S.P.Singh. 3rd edn, Macmillan.
5. Reaction Mechanism and Reagents in Organic Chemistry, Gurdeep R. Chatwal 4th edn, Himalaya Publication House.
6. Text book of Organic Chemistry, Arun Bahal, S.Chand.
7. Organic Chemistry, R.Morrison and R.Boyd, 6th edn, Pearson Education 2003.
8. Organic Chemistry, T.W.Graham Solomons, 4th edn, John Wilay, 1998.

Physical Chemistry

1. Advance Physical Chemistry by Gurdeepraj.
2. Physical Chemistry (Question and Answer) by R.N.Madan, G.D.Tuli, S.Chand.
3. Principal of Physical Chemistry by Puri, Sharma, Pathania.
4. Chemical Thermodynamics by R.P.Rastogi and R.R.Misra.
5. Nuclear Chemistry by C.V.Shekhar, Dominent-Publisher, New Delhi.
6. Essentials of physical Chemistry by B.S.Bahal, Arun Bahal, G.D.Tuli.
7. Physical Chemistry by P.W.Atkins, 5th edn, Oxferd 1994 7th edn-2002.
8. Physical Chemistry by R.A.Albert and R.J.Silby, John Wiley 1995.
9. Physical Chemistry by G.H.Barrow, 5th edn, Mac Graw Hill, 1988, 6th edn, 1996.
10. Physical Chemistry by W.J.Moore, 4th edn, Orient Longmans 1969.

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.

Hemchandracharya North Gujarat University. Patan.

F.Y.B.Sc. Semester : II

Chemistry Practical (Laboratory Course) CH LC-201

This syllabus is to be completed by assigning two laboratory sessions per week, each of two hours. Total laboratory work is 60 hrs/sem (4 hrs/week) or 15 weeks.

The number of students in the laboratory batch should not exceed fifteen (15). The medium of instruction should be English in laboratory course.

1. Organic Chemistry

- 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 10 compounds.

List of compounds

▪ Acids:

Benzoic acid, Cinnamic acid, Phthalic acid, Oxalic acid, Succinic acid.

▪ Phenols:

α -Naphthol, β -Naphthol.

▪ Bases:

p-Toluidine, Diphenylamine, Aniline, Methyl aniline.

▪ Neutrals:

Naphthalene, Anthracene, Acetamide, Benzamide, Acetanilide, m-Dinitrobenzene, Urea, Thiourea, Toluene, Acetone, Benzaldehyde, Methyl acetate, Ethyl acetate, Ethanol, 1-Propanol, Glycerol, Chloroform, Carbon tetrachloride, Chlorobenzene, Nitrobenzene.

2. Volumetric Titrations

- 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 percentage composition.
- 3) To determine the Normality, gram/liter and molarities of $\text{H}_2\text{C}_2\text{O}_4$, $2\text{H}_2\text{O}$ and H_2SO_4 present in the solution mixture of $\text{H}_2\text{C}_2\text{O}_4$, $2\text{H}_2\text{O}$ & H_2SO_4 by using X N NaOH and Y N KMnO_4 solutions.
- 4) To determine the Normality, gram/liter and molarity of $\text{H}_2\text{C}_2\text{O}_4$, $2\text{H}_2\text{O}$ and $\text{K}_2\text{C}_2\text{O}_4$ present in the solution mixture of $\text{H}_2\text{C}_2\text{O}_4$, $2\text{H}_2\text{O}$ & $\text{K}_2\text{C}_2\text{O}_4$ 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 .

3. Demonstrations

- Melting point and Boiling point of an organic compound.
- Calibration of burette and Pipette.

Choice Based Credit System

The 11th Five Year plan of India proposed various measures for academic reforms in higher education.

Keeping in view the challenges of the changed times and make the higher education in Indian universities compatible with the universities in developed nations, the UGC (11th plan, March 2009) and later on the Association of Indian Universities (AIU) stressed on the following recommendations:

1. Semester System
2. Choice Based Credit System.
3. Curriculum Development
4. Examination Reforms
5. Administrative Reforms

All the above recommendations for reforms have been reviewed in by representatives of various universities in the State and considered for implementation with the aim of transforming Higher Education – a transformation where students change from being passive recipients of knowledge to becoming active participants of the knowledge imbibing process. The education system in the State thus changes from a teacher-centric to learner-centric mode. It should aim at all-round integral development of students' personality so that they become good citizens of the new world order.

Salient Features of Choice Based Credit System:

CBCS in UG programme shall be offered from the Academic year 2011-12.

1. All Undergraduate departments in the Universities/Affiliated Colleges shall offer undergraduate programmes in faculties of Arts, Commerce, Science, Education, Home Science, Law and Social Sciences from the Academic year 2011-12.
2. A student will have to get enrolled a Core course depending upon his/her requirement of a degree in the said discipline of study.
3. A student will have a choice of selecting an Elective as well as Foundation courses from a pool of courses.
4. The faculty may design and offer courses after the due consideration and approval by the university.
5. Each course shall be assigned a specific number of Credits.
6. A Core course is the course which should compulsorily be studied by a candidate as a Core requirement so as to get degree in a said discipline of study.

7. There shall be three core compulsory courses (Theory) each with 4 credits and their practical's each with 2 credits. Thus credit weight age for core course shall be of 6 credits. In short, 6 credits multiplied by 3 core compulsory courses equal to total of 18 credits.

In addition to the Core courses, a student will have to choose Elective as well as Foundation courses from a pool of courses.

Two courses of Elective, one each from Generic Elective and Interdisciplinary/Multidisciplinary/Subject centric electives shall have to be offered. The Credit weight age for each Elective course shall be of Two (02) Credits. Hence, credit weight age for Elective course shall be 4 credits.

One compulsory course of Foundation (English Language) shall have to be offered. The Credit weight age for Foundation course shall be of Two (02) Credits.

Each course shall have a unique Course code. The Core courses, Elective courses and the Foundation courses shall be abbreviated respectively as CC, PC, EG, ES and FC.

1. Core Compulsory CC
Practical Core (Core Elective) PC
2. Elective Generic EG
Elective Subject ES
3. Foundation Compulsory FC

Each Academic year shall consist of two semesters, each of 15 weeks of teaching equivalent to 90 working days. The Odd semester period shall be from July to November and the Even semester period shall be from December to April.

The course with 4 credits shall be of 60 hrs (15 weeks x 4 credits) duration. The course with 3 credits shall be of 45 hrs (15 weeks x 3 credits) duration. The course with 2 credits shall be of 30 hrs (15 weeks x 2 credits) duration.

A general framework for Bachelor of Science programme shall be as follows:

Semester wise credits

Semester wise credits						Total credits
I	II	III	IV	V	VI	
24	24	24	24	24	24	144

The semester wise weight age of core, elective and foundation courses shall be as follows:

Academic year	Core compulsory courses	Elective courses	Foundation course
Sem I & II	65-75%	15-20%	10-15%
Sem III & IV	65-75%	15-20%	10-15%
Sem V & VI	65-75%	15-20%	10-15%

Attendance:

The Attendance Rules as per the norms of Hemchandracharya North Gujarat University.

Medium of Instruction:

The Medium of Instruction shall be of Gujarati medium however, it may be decided as per Board of Studies of the concern subject.

Question paper should be drawn in Gujarati Language and its English version should be given.

Evaluation Methods:

1. A student shall be evaluated through Comprehensive Continuous Assessment (CCA) as well as the End of Semester examination. The weight age of CCA shall be 30%, where as the weight age of the Semester end examination shall be 70%. There will be no internal evaluation in practical courses as well as in elective courses.
2. The In Semester assessment (CCA) is spread through the duration of the course and is to be done by the Teacher teaching the course. The assessment is to be done by various means including:

Written Tests

MCQ based quiz

Presentations/Seminars

Project work/Field work

Group discussions/Group activities.

The End of Semester examination shall have an assessment based upon following perspective with respect to all the courses:

Evaluation with respect to Knowledge

Evaluation with respect to Understanding

Evaluation with respect to Skill

Evaluation with respect to Application

Higher Order Thinking Skills.

With respect to all the above components, there will be following four types of Questions from each unit of the course.

1. MCQs
2. Short Questions
3. Medium answer questions
4. Long answer questions

The Schedule of the In Semester examination (Internal Evaluation) and the End of Semester examination (External Evaluation) shall be as follows. The End of Semester Examination will be conducted by the University.

It will be compulsory for a candidate to obtain passing percentage in both Internal as well as External Evaluation. The passing marks for each course shall be 40%, or as decided by concern Board of Studies of the University.

Promotion, Re-Admission and Time for Completion of Course, Procedure for Awarding Grades, Provision for Appeal, etc, as decided by the Hemchandracharya North Gujarat University.

B.Sc. Programme-CBCS-Semester-Grading pattern

Common format for Question paper

Elective Courses (Subject)

Chemistry/Botany/Biotechnology/Physics/Microbiology/Mathematics/Zoology

All Semesters

Time: 2Hrs

Total Marks: 50

Part A

(Answer all questions)

- 1-5. Short answer type questions such as, MCQs, Fill in the blanks, Match the pairs, etc. 05
(Each of 1 Mark) [At least **two** questions from each Unit]

Part B

(Answer all questions)

- 6-10. Short answer type questions such as, Definition, Explain the terms, Functions, Principles, etc 05
(Each of 1 Mark) [At least **two** questions from each Unit]

Part C

(Answer any five/seven of the following)

- 11-17. Short answer type questions such as, Definition, Explain the terms, examples, reasons, figures differences, etc. (Each of 2 Marks) [At least **three** questions from each Unit] 10

Part D

(Answer any three/five of the following)

- 18-22. Medium answer type questions such as, Short notes, diagrams, examples, reasons, differences, etc 12
(Each of 4 Marks) [At least **two** question from each Unit]

Part E

(Answer any three/five of the following)

- 23-27. Long answer type questions such as, Describe in detail, diagrams, examples, etc 18
(Each of 6 Marks) [At least **two** question from each Unit]

B.Sc. Programme-CBCS-Semester-Grading pattern

Common format for Question paper

Core Complementary Courses

Chemistry/Botany/Biotechnology/Physics/Microbiology/Mathematics/Zoology

All Semesters**Time: 3Hrs****Total Marks: 70****Part A**

(Answer all questions)

- 1-10.** Short answer type questions such as, MCQs, Fill in the blanks, Match the pairs, etc. **10**
(Each of 1 Mark) [At least **two** questions from each Unit]

Part B

(Answer all questions)

- 11-20.** Short answer type questions such as, Definition, Explain the terms, etc. **10**
(Each of 1 Mark) [At least **two** questions from each Unit]

Part C

(Answer any eight/ten of the following)

- 21-30.** Short answer type questions such as, Definition, Explain the terms, examples/problems, reasons, differences, figures/diagrams, etc. **16**
(Each of 2 Marks) [At least **two** questions from each Unit]

Part D

(Answer any four/six of the following)

- 31-36.** Medium answer type questions such as, Short notes, figures/diagrams, examples/problems, reasons, differences, etc. **16**
(Each of 4 Marks) [At least **one** question from each Unit]

Part E

(Answer any three/five of the following)

- 37-41.** Long answer type questions such as, Describe in detail, diagrams, examples, etc. **18**
(Each of 6 Marks) [At least **one** question from each Unit]



પરિપત્ર ક્રમાંક- ૪૨ / ૨૦૧૨

જિન
પ્રા. મા. લ. રજી.
નંદા રજી.
કે. રજી.

વિષય : બી.એસસી.-કેમેસ્ટ્રી ના સેમેસ્ટર-૩ અને ૪ ના અભ્યાસક્રમ/સ્કીમ અંગે..

આ યુનિવર્સિટી સંલગ્ન સાયંસ કોલેજોના આચાર્યશ્રીઓને જણાવવાનું કે, આ યુનિવર્સિટીની કેમેસ્ટ્રી વિષયની અભ્યાસ સમિતિની તારીખ : ૦૪/૦૨/૨૦૧૨ ના રોજ મળેલ સભાએ ભલામણ કર્યાનુસાર સામેલ પરિશિષ્ટ પ્રમાણેનો બી.એસસી.-કેમેસ્ટ્રીનો સેમેસ્ટર-૩ અને ૪ નો જૂન-૨૦૧૨ થી ક્રમશઃ અમલમાં આવે તે રીતે નવો અભ્યાસક્રમ/સ્કીમ એકેડેમિક કાઉન્સિલવતી માન.કુલપતિશ્રીએ મંજૂર કરેલ છે. જેનો અમલ થવા સારૂ સંબંધિતોને મોકલવામાં આવે છે.

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

- નોંધ : (૧) વિદ્યાર્થીઓની જરૂરીયાત માટે અભ્યાસક્રમની એક નકલ કોલેજના ગ્રંથાલયમાં મૂકવાની રહેશે.
(૨) આ અભ્યાસક્રમ યુનિવર્સિટીની વેબ સાઈટ www.ngu.ac.in પર પણ મૂકવામાં આવેલ છે.

બિડાણ : ઉપર મુજબ.

જુમાશીલ
કુલસચિવવતી

નં.-એ કે/અ સ/ ૨૦૨૭ / ૨૦૧૨
યુનિવર્સિટી રોડ, પો.બો. નં.- ૨૧
પાટણ. - ૩૮૪૨૬૫. (ઉ. ગુ.)
તારીખ ૦૫/૦૨/૨૦૧૨

- પ્રતિ,
૧. સંલગ્ન સાયંસ કોલેજોના આચાર્યશ્રીઓ
૨. ડો.એમ.બી.પ્રજાપતિ (ડીનશ્રી-વિજ્ઞાન વિદ્યાશાળા) મેથેમેટીક્સ ડીપાર્ટમેન્ટ, હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ.
૩. પરીક્ષા નિયામકશ્રી, હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ (પાંચ નકલ)
૪. ગ્રંથપાલશ્રી, હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ.
૫. ઈન્ચાર્જશ્રી, કોમ્પ્યુટર (રીઝલ્ટ) સેન્ટર, હેમ.ઉ.ગુ.યુનિવર્સિટી, પાટણ. તરફ ⇨ પરિણામ તથા વેબ સાઈટ સારૂ.
૬. કુલપતિશ્રી/કુલસચિવશ્રીનું કાર્યાલય, હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ.
૭. પ્રવેશ પ્રશાખા (એકેડેમિક), હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ.
૮. મુખ્ય હિસાબી અધિકારીશ્રી (મહેકમ), હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ. તરફ ⇨ પરિપત્રની ફાઈલ અર્થે.

૦.૫૧૬
૧૪/૨/૨૦૧૨

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

PATAN-384265

NAAC Accreditation Grade - "B"

FACULTY OF SCIENCE

CHEMISTRY

New Syllabus and Exam Scheme

Kind of Course - Core/Elective etc.....

B.Sc.

Semester - III & IV

With a Semester/ CBCS/Grading Pattern

W.E.F. June -2012

Date : 04-02-2012

Total Page : 27

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Programme code :	—	Programme Name :	B.Sc.
Faculty :	SCIENCE	Semesters :	III
Subject :	CHEMISTRY		
Effective from :	From Academic Year : 2012 - 2013 (FIRST Term)		

Sr.	Paper Code	Name of Paper	Credit
1	CC CH-301	CORE COMPULSORY-CHEMISTRY-I	3
2	CC CH-302	CORE COMPULSORY-CHEMISTRY-II	3
3 OR 3	SE CH-301A	SUBJECT ELECTIVE; ENVIRONMENTAL POLLUTION	2
	SE CH-301B	SUBJECT ELECTIVE; CERAMICS	2
4	LC CH-301	LABORATORY COURSE-I	1.5
5	LC CH-302	LABORATORY COURSE-II	1.5

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Programme code :		Programme Name :	B.Sc.
Faculty :	SCIENCE	Semesters :	IV
Subject :	CHEMISTRY		
Effective from :	From Academic Year : 2012 - 2013 (SECOND Term)		

Sr.	Paper Code	Name of Paper	Credit
1	CC CH-401	CORE COMPULSORY-CHEMISTRY-I	3
2	CC CH-402	CORE COMPULSORY-CHEMISTRY-II	3
3 OR	SE CH-401A	SUBJECT ELECTIVE; NAME REACTIONS	2
3	SE CH-401B	SUBJECT ELECTIVE; GREEN CHEMISTRY	2
4	LC CH 401	LABORATORY COURSE-I	1.5
5	LC CH 402	LABORATORY COURSE-II	1.5

Hemchandracharya North Gujarat University. Patan.

B.Sc. Semester: III & IV

Chemistry Syllabus

(Effective from june-2012)

This syllabus is to be completed by assigning three period of one hour each and two practicals of three hours each per week.

The number of students in a practical batch should not exceed twenty five.

PATTERN OF EXAMINATION :

They will be two paper for core compulsory and one paper for subject elective theory and five hours/day for two days per batch practicals in the university examination. The pattern will be as follow.

written	Examination:	Marks External	Marks Internal
Core course-I	3 hours	70	30
Core course-II	3 hours	70	30
Subject elective course	2 hours	50
Laboratory course-I	5 hours	50
Laboratory course-II	5 hours	50

Theory Examination Pattern:

Que. No : 1	10 MCQ (Min 2 from each unit)	10 Marks
Que. No : 2	(A) Two out of Three (B) One out of Two	10 Marks 05 Marks
Que. No : 3.	(A) Two out of Three (B) One out of Two	10 Marks 05 Marks
Que. No: 4	(A) Two out of Three (B) One out of Two	10 Marks 05 Marks
Que. No : 5	(A) Two out of Three (B) One out of Two	10 Marks 05 Marks

Total Marks: 70

Hemchandracharya North Gujarat University, Patan.

B.Sc.

Semester : III

Chemistry (CC CH – 301)

Unit:–I Wave Mechanics :

- Black Body Radiation & Quantum Theory.
- Photo electric effect : Wave particle duality of radiation.
- Compton effect.
- Basic postulates of quantum Mechanics.
- Operator : Definition, Algebra of operators, Addition, Multiplication, Commutative properties, Linear operator, Commutator operators, Laplacian operator.
- Free particle system.
- Particle in one dimension box.

REF :- Quantum Chemistry by R.K.Prasad, Revised IIIrd Edition,
Page- 3,5,7,34-37,41,65-68.

Unit:–II 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.
 - 1) Non real compounds prepared by different methods.
 - 2) True compounds: XeF_2 , XeF_4 , XeF_6 , XeOF_2 , XeO_3 , XeO_2F_2 , XeO_4 , XeOF_4 .

REF :- Concise Inorganic Chemistry J.D.Lee, 4th edition, ELBS publication.

Unit:—III Thermodynamics :

❖ Phase in Equilibrium.

- Clapeyron-clausius equation
- Integrated form of clapeyron-clausius equation.
- Application of clapeyron-clausius equation from various phase in equilibrium.
- Trouton's law.
- Craft equation.
- Elevation in Boiling point.(K_b)
- Depression of freezing point. (K_f)

❖ Partial molar Properties.

- Partial molar free energy.
- Concept of Chemical Potential.
- Gibbs-Duhem equation.
- Variation of chemical potential with temperature and pressure.
- Duhem-Margules equation.

❖ Numericals.

Unit:—IV Physical Properties & Molecular Structure:

❖ The Vacancy Theory of Liquid.

- Vapor-Pressure
- Surface tension
 - 1) Measurement of surface tension by stalagmometer.
 - 2) Perachore and its applications.
- Viscosity
 - 1) Measurement of viscosity by Ostwald-viscometer
- Refractive index
 - 1) Specific refraction.
 - 2) Molar refraction.
 - 3) Measurement of Refractive index by Abbe's Refractometer.
- Optical activity
 - 1) Measurement of Optical activity by Polarimeter.
- Dipole moment and its measurements & its application.
- Numericals.

REF:-

❖ For Unit III & IV

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, Arun Bahal, 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.

B.Sc.

Semester : III

Chemistry (CC CH – 302)

Unit:–I Acid-Base Properties :

- 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 and electronic effects.
 - Effect of hybridization.
 - Steric effects.
 - Effects by hydrogen bonding.

Unit:–II

(A) Amino acids & Peptides :

❖ **Amino acids.**

- Introduction.
- Classification and nomenclature.
- Dipolar ion structure and Isoelectric point.
- Synthesis of amino acids (Gabriel Phthalimide, Straker, Fisher-Malonic ester).
- Reactions of amino acid.

❖ **Peptides.**

- Geometry of peptide linkage.
- Synthesis of peptides (Bergmann Method, Shehan Method).
- Determination of structure of peptide by terminal residue analysis.

(B) Electrophillic Aromatic Substitution :

- Introduction.
- Effect of substituent groups.

- Determination of orientation.
- Classification of substituent groups.
- Orientation in disubstituted benzenes.
- Orientation and synthesis.
- Mechanism of ... Nitration, Sulfonation, Friedel - Crafts alkylation and Halogenation.
- Electrophilic aromatic substitution (Two steps).
- Theory of reactivity.
- Theory of orientation.
- Electron release via resonance.

Unit:-III Colorimetry and Spectrophotometry:

- Law of absorbance:
- Visual colorimetric method.
- Spectrophotometric instrumentation.
- Light sources optical system.
- The wave length selectors.
- Light sensitive devices.
- Accuracy and error in spectrophotometry.
- Analysis of mixture.
- Flame photometry, Atomic absorbance spectrometry. (Only principle).

Unit:-IV Potentiometry:

- The scope of potentiometric titration.
- Type of titrations... Acid-Base, Redox, Complexometric.
- Graphical methods including Gran's plot of selecting end point.
- Differential potentiometric titration.
- Dead stop titration.
- Ion selective electrode elementary.
- Glass electrode.
- Principle of pH meter.

REF:-

❖ For Unit-I & II

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 Arun Bahal 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 Gurdeep R.Chatwal 4th ed. Himalaya public House.
7. Text book of Organic Chemistry by Arun Bahal, B.S.Bhal, S.Chand.
8. Organic Spectroscopy by P.S.Kalsi.
9. Organic Chemistry by I.R.Finar.

❖ For Unit-III & IV

1. Analytical Chemistry by G.D.Christian, J.Wiley.
2. Fundamental of Analytical Chemistry by D.A.Skoog, D.M.West and F.J.Holler.
3. Analytical Chemistry- Principals by J.H.Kennedy, W.B.Saunders.
4. Analytical Chemistry Principles and Techniques by L.G.Hargis, Prentice Hall.
5. Principles of Instrumental Analysis by D.A.Skoogs, J.L.Loary, W.B.Saunders.
6. Principles of Instrumental Analysis by D.A.Skoogs, W.B.Saunders.
7. Qualitative Analysis by R.A. Day, Jr, and A.L.Underwood, Prentice Hall.

#####

Hemchandracharya North Gujarat University, Patan.

B.Sc.

Semester : III

Chemistry (SE CH – 301A)

SUBJECT ELECTIVE PAPER

(Environmental Pollution)

Unit -I

- Introduction
- Classification of pollutant
- Types of pollution
- What is air pollution
- Source of air pollution
- Acid Rain
- Emissions of major industrial air pollutant
- What is water pollution
- Types of water pollution -Physical & Chemicals, Biological and Physiological
- Source of Water Pollution

Unit-II

- What is soil pollution
- Sources of soil pollution
- Effect of Modern Agro-Technology on Soil
- What is Noise Pollution
- What is Thermal Pollution
- What is Radio Active Pollution
- Prevention of pollution

REF:-

1. Industrial Chemistry by B.K.Sharma.

#####

Hemchandracharya North Gujarat University. Patan.

B.Sc.

Semester : III

Chemistry (SE CH – 301B)

SUBJECT ELECTIVE PAPER

(Ceramics)

Unit : I

❖ **Ceramics :**

- Introduction of Ceramics, History-Definition- Domestic and Industrial uses of Ceramics - Modern Ceramics - Hi-tech ceramics - Sub-division in Ceramics.
- Ceramic 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

UNIT - II :

(A) Ceramic Properties Measurements :

- 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 rupture (MOR),
- Craze test,

(B) Refractories :

- Classification of refractories,
- Properties and application of refractories,
- Manufacturing process of silica bricks.

REF :

1. Industrial ceramics - Felix singer and Sonja s. singer
2. Ceramic technology and processing - Alan G. king
3. Source book of Ceramics, Part-1 - S.kumar
4. Source book of Ceramics, Part-2 - S.kumar

#####

Hemchandracharya North Gujarat University, Patan.

B.Sc.

Semester: III

Laboratory Course -I (Chemistry)

Organic Chemistry

(4 hours per practical)

- Separation of Organic Mixture. (Any 7 out of 10)
Mixture Containing Two Compounds (Only Water Insoluble Solid Compounds taken)

Hemchandracharya North Gujarat University, Patan.

B.Sc.

Semester: III

Laboratory Course -II (Chemistry)

Physical Chemistry.(Any 7 out of 10) (4 hours per practical)

- 1) Conductometric titration:- $\text{HCl} / \text{CH}_3\text{COOH}$ Vs NaOH
- 2) Conductometric titration:- HCl Vs NH_4OH
- 3) pH- metric titration:-
 - a. Calibration of pH - meter by 4 - pH buffer.
 - b. HCl Vs NaOH
- 4) Determine the Dissociation constant of the acid of mixtures of CH_3COONa and CH_3COOH by determine the PH
- 5) Determine the specific refraction and molar refraction of the given liquid A, B and mixture C (A+B) and calculate the percentage composition of A and B in the mixture C by Abbe's Refractrometer.
- 6) Determine the molar refraction $\text{CH}_3\text{COOC}_2\text{H}_5$, $\text{CH}_3\text{COOC}_3\text{H}_7$ and $\text{CH}_3\text{COOC}_4\text{H}_9$ and show the constancy of reaction equivalent of $-\text{CH}_2-$ Group by Abbe's Refractrometer.
- 7) To determine the viscosity of a different mixture of liquid A and B and determine the percentage composition of unknown mixture by graphical method.
- 8) To determine the surface tension and compare cleaning-efficiency of two samples of a detergent or soap with stalagmo meter.

- 9) To study kinetic reaction of decomposition of H_2O_2 catalysis by iodine ion (Clock reaction)
- 10) Find the solubility and heat of solution of the given organic acid at two different temperatures

University Exam Pattern: (Two Days per Batch)

Name of Practical	Day	Marks
Lab. Course-I		
Organic Separation	One day (5 hours)	40+5(viva) = 45
Lab. Course-II		
Physical Chemistry	One day (5 hours)	40+5(viva) = 45
	Journal	10
	Total	100

#####

Hemchandracharya North Gujarat University, Patan.

B.Sc.

Semester : IV

Chemistry (CC CH – 401)

Unit:–I

(A) Application of CFT :

- Application of C.F.T.
 - 1) For determination of color of complex.
 - 2) Use of C.F.S.E. value.
- Limitation of C.F.T.
- Isomerism in complexes.

(B) Magnetic properties of Co-Ordination Compound :

- Type of magnetic behavior.
- Method of determining magnetic susceptibility.
- Spin only formula.
- Magnetic properties for 3rd metal complexes.

REF :- Advance Inorganic chemistry – Satya Prakash . G.D.Tuli,
S.K.Basu, R.D.Madan, S.Chand Voll-II.

Unit:–II Boron Hydride :

- Introduction.
- Classification of hydrides.
- Preparation, properties structure and use of Diborane.
- Bridge bonding in B₂H₆ (M.O. and sp³ approach.).
- Structure of higher Boranes : B₄H₁₀, B₅H₉, B₅H₁₁, B₆H₁₀, B₁₀H₁₄.

REF :- Advance Inorganic chemistry Satya Prakash, S.Chand Voll-I.
Page No-819-828.

Unit:—III Ionic Equilibrium:

- Only Introduction.
Electrolysis, Ionic Equilibrium, Resistance, Conductance, Specific conductance, Equivalent Conductance, Molar Conductance, Equivalent Conductance at Infinite Dilution.
- Type of Conductometric Titration.
Acid-Base Titration.
 - 1) Strong Acid Vs Strong Base.
 - 2) Strong Acid Vs Weak Base
 - 3) Weak Acid Vs Strong Base
 - 4) Weak Acid Vs Weak Base
 - 5) Strong Acid + Weak Acid Vs Strong Base.
- Transport number.
Determination of Transport Number.
 - 1) Hittorf's Method.
 - 2) Moving Boundary Method.
- Hydrolysis of Salt.
Classification of Salt.
 - 1) Strong Acid & Strong Base.
 - 2) Strong Acid & Weak Base.
 - 3) Weak Acid & Strong Base.
 - 4) Weak Acid & Weak Base.
- Numericals.

Unit:—IV Electro Chemistry:

- Introduction of terms.
- Oxidation, Reduction, Redox, Anode, Cathode, Electrode, Half Cell, Oxidation & Reduction Potential.
- Electrochemical cell (Galvanic Cell) & Representation cell.
- Electrochemical Series and its Significance.
- Nernst Equation of Cell EMF and single electrode potential.
- Describe the Electrode.
 - 1) Metal-Metal ion Electrode.
 - 2) Standard Hydrogen Electrode.
 - 3) Calomel Electrode.
 - 4) Weston standard Electrode.

- 5) Glass Electrode.
- 6) Quinhydrone Electrode.
- Application of cell potential.
 - 1) Equilibrium constant.
 - 2) Free energy.
 - 3) pH.
- Numerical.

REF:-

❖ For Unit III & IV

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, Arun Bahal, 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.

#####

Hemchandracharya North Gujarat University, Patan.

B.Sc.

Semester : IV

Chemistry (CC CH – 402)

Unit:-I

(A) Heterocyclic Compound :

- Introduction.
- Nomenclature.
- Molecular orbital picture and aromatic characteristics of Pyrrole, Furan, Thiophene and Pyridine.
- Methods of synthesis for Pyrrole, Furan, Thiophene and Pyridine.
- Chemical reactions for Pyrrole, Furan and Thiophene.
- Electrophilic and Nucleophilic substitution reactions of pyridine.
- Basicity of Pyridine, Piperidine and pyrrole.

(B) Carbohydrates :

- Introduction
- Definition.
- Classification of Mono Sacharides.
- Nomenclature.
- Reactions of Glucose and Fructose.
(Methylation, Acetylation, Oxidation with Br_2 water and Conc. HNO_3 ,
Reaction with HCN , NH_2OH , Osazone formation and Epimerisation.)
- Lengthening of carbon chain of aldoses.
- Shortening of carbon chain of aldoses.

Unit:-II**(A) Polynuclear Aromatic Hydrocarbons :**

- Nomenclature of naphthalene & anthracene derivatives.
- Synthesis of naphthalene & anthracene by Haworth Synthesis.
- Reaction of naphthalene & anthracene.
 - 1) Oxidation
 - 2) Reduction
 - 3) Dehydrogenation
 - 4) Nitration
 - 5) Halogenation
 - 6) Sulphonation
 - 7) Friedel-Craft reaction
- Orientation of electrophilic substitution in Naphthalene.
- Synthesis of α - and β - substituted Naphthalene derivatives (By Haworth synthesis only).
- Synthesis of 9- & 9,10- substituted Anthracene derivatives (By Haworth synthesis only)

(B) Cyclo Alkane :

- Nomenclature.
- Physical property.
- Method of preparation.
- Chemical properties of Cycloalkanes.
- Bayer's strain theory.
- Orbital picture of angle strain.
- Heats of combustion and relative stabilities of Cycloalkane.
- Strainless ring theory.

Unit:-III Ultraviolet Spectroscopy :

- Type of electronic transitions.
- Effect of conjugation.
- Concept of Chromophore and Auxochrome.

- Bathochromic, Hypsochromic, Hyperchromic, and Hypochromic shifts.
- Woodward –fisher rules.
- Problems of conjugated enes, enones and aromatic ketones, aldehydes, acids and esters using empirical rules.

Unit:-IV

(A) Theory of Precipitation :

- Preparation from homogenous solution.
- Precipitation Titration,
 - The Mohr's method,
 - Fajan's method ,
 - Volhard's method.
- construction of precipitation titration curve.
- Factors influencing the sharpness of end point.

(B) Complex metric EDTA titration:

- Type.
- Indicator.
- Masking and demasking.
- Construction of the titration curves.

REF:-

❖ For Unit I, II & III

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 Arun Bahal 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 Gurdeep R. Chatwal 4th ed. Himalaya public House.
7. Text book of Organic Chemistry by Arun Bahal, B.S. Bhal, S. Chand.
8. Spectroscopy of Organic Compounds 6th ed. by P.S. Kalsi.
9. Organic Chemistry by I.R. Finar.
10. Organic Spectroscopy by Williams and Kemp.
11. Spectroscopic Methods in Organic Chemistry by Dudley H. Williams and Ian Fleming.

❖ For Unit- IV

1. Analytical Chemistry by G.D. Christian, J. Wiley.
2. Fundamental of Analytical Chemistry by D.A. Skoog, D.M. West and F.J. Holler.
3. Analytical Chemistry- Principals by J.H. Kennedy, W.B. Saunders.
4. Analytical Chemistry Principles and Techniques by I. G. Hargis, Prentice Hall.
5. Principles of Instrumental Analysis by D.A. Skoogs, J.L. Loary, W.B. Saunders.
6. Principles of Instrumental Analysis by D.A. Skoogs, W.B. Saunders.
7. Qualitative Analysis by R.A. Day, Jr. and A.I. Underwood, Prentice Hall.

#####

Hemchandracharya North Gujarat University. Patan.

B.Sc.

Semester : IV

Chemistry (SE CH – 401A)

SUBJECT ELECTIVE PAPER

(Name Reactions)

Unit:–I Mechanism and Synthetic applications of following Name Reactions :

- Arndt- Eistert Reaction.
- Hofmann-Rearrangement.
- Aldol Condensation.
- Diels - Alder Reaction.

Unit:–II Mechanism and Synthetic applications of following Name Reactions :

- Dieckmann Condensation.
- Mannich Reaction.
- Clemmensen Reduction.
- Dakin Oxidation .

REF:-

1. Name Reaction by Prof.G.S.Kapadia. Uni.Granth Nirman Board.
2. Name Reaction by Jie Jack Li, Springer International Edition.
3. Reaction Mechanism and Reagents in Organic Chemistry by G.R.Chatwal.

#####

Hemchandracharya North Gujarat University. Patan.

B.Sc. Semester : IV

Chemistry (SE CH – 401B)

SUBJECT ELECTIVE PAPER

(Green Chemistry)

UNIT : I

Basics of Green Chemistry

- The need for green chemistry
- Eco-efficiency- environmental protection laws
- Challenges --pollution control and pollution
- Green methods, green products, recycling of waste
- Twelve principles of green chemistry
- Inception of green chemistry--awards for green chemistry
- International organizations promoting green chemistry.

UNIT : II.

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
- Examples –adipic acid, catechol, methyl methacrylate, urethane, aromatic amines (4-aminodiphenylamine), benzyl bromide, acetaldehyde, citral, ibuprofen, paracetamol,

REF :

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

#####

Hemchandracharya North Gujarat University. Patan.

B.Sc.

Semester: IV

Laboratory Course-I (Chemistry)

Section: A Inorganic Chemistry

(4 hours per practical)

- Inorganic qualitative analysis: (Any 7 Mixture out of 10)
Mixture Containing 4 Radicals
(Except PO_4^{-3} , BO_3^{-3} , ASO_4^{-3} , ASO_3^{-3} , O^{-2})

Hemchandracharya North Gujarat University. Patan.

B.Sc.

Semester: IV

Laboratory Course-II (Chemistry)

Analytical Chemistry

(4 hours per practical)

A. Volumetric Analysis of Cu, Zn, Ni (Any Three)

1. To determine the amount of Zn by EDTA Method.
2. To determine the amount of Ni by EDTA Method.
3. To determine the amount of Cu by Iodometry Method.
4. To determine the amount of Cu by EDTA titration.

B. Estimation of Glucose/Aniline/Phenol (Any Two)

1. To determine the amount of Aniline by Brominating Method.
2. To determine the amount of Phenol by Brominating Method.
3. To determine the amount of Glucose by oxidation Method.

C. Paper Chromatography 1st & 3rd Group Radicals

❖ University Exam Pattern: (Two Days per Batch).

Name of Practical	Day	Marks
Laboratory Course-I Inorganic Qualitative Analysis	One day (5 hours)	40+5(viva) = 45
Laboratory Course-II Analytical Chemistry	One day (5 hours)	40+5(viva) = 45
	Journal	10
	Total	100

= x = x =



કે. વર્મા

આચાર્ય પ્રિયારમ

આચાર્ય પ્રિયારમ
અ.ઈ.કે.એ.એ.
અ.ઈ.કે.એ.એ.
અ.ઈ.કે.એ.એ.
20/6/23

હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી,

યુનિવર્સિટી રોડ, પો. બો. નં.-૨૧, પાટણ.- ૩૮૪૨૬૫. (ઉ. ગુ.) ફોન નં.- (૦૨૭૬૬) ૨૨૦૮૩૨.

પરિપત્ર ક્રમાંક - ૧૦૫ / ૨૦૧૩

વિષય : વિજ્ઞાન વિદ્યાશાખામાં સ્નાતક કક્ષાના સેમેસ્ટર/સીબીસીએસ/ગ્રેડીંગ પેટર્નના સેમેસ્ટર-૫ અને ૬ ના અભ્યાસક્રમ/સ્કીમ મોકલવા અંગે..

આ યુનિવર્સિટી સંલગ્ન વિજ્ઞાન કોલેજોના આચાર્યશ્રીઓને જણાવવાનું કે, આ યુનિવર્સિટીમાં વિજ્ઞાન વિદ્યાશાખામાં સ્નાતક કક્ષાએ જૂન-૨૦૧૧ થી દાખલ કરવામાં આવેલ સેમેસ્ટર/સીબીસીએસ/ગ્રેડીંગ પેટર્ન અન્વયે એકેડેમિક કાઉન્સિલે તેની તારીખ : ૧૪/૦૫/૨૦૧૩ ની સભામાં પાછળ દર્શાવેલ વિગતે વિવિધ વિષયોના સામેલ પરિશિષ્ટ પ્રમાણેના સેમેસ્ટર-૫ અને ૬ ના અભ્યાસક્રમ/સ્કીમ જૂન-૨૦૧૩ થી ક્રમશઃ અમલમાં આવે તે રીતે મંજૂર કરેલ છે. જે સંબંધિત સર્વેની જાણ તથા અમલ સારૂ આ સાથે મોકલવામાં આવે છે.

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

- નોંધ : (૧) સામેલ અભ્યાસક્રમોની યાદી પાછળ સામેલ છે. વિદ્યાર્થીઓની જરૂરીયાત માટે તમામ અભ્યાસક્રમોની એક નકલ આપની કોલેજના ગ્રંથાલયમાં મૂકવાની રહેશે.
- (૨) આ તમામ અભ્યાસક્રમો યુનિવર્સિટીની વેબ સાઈટ www.ngu.ac.in પર પણ ઉપલબ્ધ કરવામાં આવનાર છે.

બિડાણ : ઉપર મુજબ.

ગુમારીય
કુલસચિવવતી

નં.-એ કે/અ x સ/ ૩૦૬૩ / ૨૦૧૩

તારીખ : ૧૨ / ૦૬ / ૨૦૧૩

પ્રતિ,

૧. સંલગ્ન વિજ્ઞાન કોલેજોના આચાર્યશ્રીઓ

૨. ડો.એમ.બી. પ્રજાપતિ (ડીનશ્રી-વિજ્ઞાન વિદ્યાશાખા) મેથેમેટીક્સ ડીપાર્ટમેન્ટ, યુનિવર્સિટી કેમ્પસ, હેમ. ઉ. ગુ.યુનિવર્સિટી, પાટણ.

૩. પરીક્ષા નિયામકશ્રી, હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ. (પાંચ નકલ)

૪. ગ્રંથપાલશ્રી, હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ. (વિદ્યાર્થીઓના ઉપયોગ સારૂ રેકર્ડ ફાઈલ માટે)

૫. ઈન્ચાર્જશ્રી, કોમ્પ્યુટર(રીઝલ્ટ) સેન્ટર, હેમ.ઉ.ગુ.યુનિવર્સિટી, પાટણ. તરફ ⇨ પરિણામ માટે તથા વેબ સાઈટ પર મૂકવા સારૂ.

૬. માન.કુલપતિશ્રી/ઉપકુલપતિશ્રી/કુલસચિવશ્રીનું કાર્યાલય, હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ.

૭. પ્રવેશ પ્રશાખા (એકેડેમિક), હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ.

૮. મહેકમ શાખા, હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ. તરફ ⇨ પરિપત્રની ફાઈલ અર્થે.

વિજ્ઞાન વિદ્યાશાખામાં સ્નાતક કક્ષાએ જૂન-૨૦૧૧ થી અમલી સેમેસ્ટર/ સીબીસીએસ/ ગ્રેડીંગ પેટર્ન પ્રમાણેનાં એકેડેમિક કાઉન્સિલની તારીખ : ૧૪/૦૫/૨૦૧૩ ની સભાએ મંજૂર કરેલ સેમેસ્ટર-૫ અને ૬ ના અભ્યાસક્રમ :

SR NO	ACADEMIC COUNCIL [Dated : 14/ 05/ 2013, Resolution Nos.]	SUBJECT	SYLLABUS & SCHEME	SEMESTER
1	28	Chemistry	B. Sc.	Sem. - 5 & 6
2	29	Mathematics	B. Sc.	Sem. - 5 & 6
3	31	Biotechnology	B. Sc.	Sem. - 5 & 6
4	32	Zoology	B. Sc.	Sem. - 5 & 6
5	33	Botany	B. Sc.	Sem. - 5 & 6
6	34	Micribiology	B. Sc.	Sem. - 5 & 6
7	35	Physics	B. Sc.	Sem. - 5 & 6
8	25	Statistics	B. Sc.	Sem. - 3 & 4

HEMCHNDRACHARYA NORTH GUJARAT UNIVERSITY
P A T A N - 384 265



NAAC Accreditation Grade - " B "



FACULTY OF SCIENCE

B. Sc. PROGRAMME

CHEMISTRY

SEMESTER - V & VI
New Syallbus / Scheme

With Semester / CBCS / Grading Pattern

W. E. F. JUNE - 2013 (In Continuation)

DATE : 01-09-2012

TOTAL PAGE - 42.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Programme code :		Programme Name :	B.Sc.
Faculty :	SCIENCE	Semesters :	V
Subject :	CHEMISTRY		
Effective from :	From Academic Year : 2013 - 2014 (FIRST Term)		

Sr.	Paper Code	Name of Paper	Credit
1	CC CH- 501	CORE COMPULSORY-INORGANIC CHEMISTRY - I	3
2	CC CH-502	CORE COMPULSORY-ORGANIC CHEMISTRY - II	3
3	CC CH- 503	CORE COMPULSORY-PHYSICAL CHEMISTRY - III	3
4	CC CH- 504	CORE COMPULSORY-STRUCTURAL-ANALYTICAL CHEMISTRY - IV	3
	SE CH- 505 A	Polymer Chemistry	
	SE CH- 505 B	Oils, Fats and Waxes	
5	SE CH- 505 C	Paints and Varnishes	2
	SE CH- 505 D	Cosmetic Chemistry	
	SE CH- 505 E	Metallurgy	
	GE CH- 506 A	ELECTIVE (GENERIC) COURSE	
6	GE CH- 506 B	ELECTIVE (GENERIC) COURSE	2
	GE CH- 506 C	ELECTIVE (GENERIC) COURSE	
	LC CH-507 A	Laboratory course-I Inorganic Chemistry Practicals	1.5
7	LC CH-507 B	Laboratory course-II Organic Chemistry Practicals	1.5
	LC CH-507 C	Laboratory course -III Physical Chemistry Practicals	1.5
	LC CH-507 D	Laboratory course -IV Viva-Voce	1.5

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

Programme code :		Programme Name :	B.Sc.
Faculty :	SCIENCE	Semesters :	VI
Subject :	CHEMISTRY		
Effective from :	From Academic Year : 2013 - 2014 (SECOND Term)		

Sr.	Paper Code	Name of Paper	Credit
1	CC CH- 601	CORE COMPULSORY-INORGANIC CHEMISTRY - I	3
2	CC CH-602	CORE COMPULSORY-ORGANIC CHEMISTRY - II	3
3	CC CH- 603	CORE COMPULSORY-PHYSICAL CHEMISTRY - III	3
4	CC CH- 604	CORE COMPULSORY-STRUCTURAL-ANALYTICAL CHEMISTRY - IV	3
5	SE CH- 605 A	Synthetic Dyes	2
	SE CH- 605 B	Chemistry of Portland Cement	
	SE CH- 605 C	Food Additives	
	SE CH- 605 D	Soaps and Detergents	
	SE CH- 605 E	Forensic Chemistry & Toxicology	
6	GE CH- 606 A	ELECTIVE (GENERIC) COURSE	2
	GE CH- 606 B	ELECTIVE (GENERIC) COURSE	
	GE CH- 606 C	ELECTIVE (GENERIC) COURSE	
7	LC CH-607 A	Laboratory course-I Inorganic Chemistry Practicals	1.5
	LC CH-607 B	Laboratory course-II Organic Chemistry Practicals	1.5
	LC CH-607 C	Laboratory course -III Physical Chemistry Practicals	1.5
	LC CH-607 D	Laboratory course -IV Viva-Voce	1.5

• **HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY**

University Road, P.O.BOX NO: 21, PATAN-384265

N. Gujarat. INDIA.

NAAC Accreditation Grade – "B"

E-Mail: ngu_vc@wilnetonline.net

ngu_regi@wilnetonline.net

Website: www.ngu.ac.in

www.ngu_patan.org

FACULTY OF SCIENCE

CHEMISTRY SYLLABUS

(Effective from June-2013)

B.Sc. (semester V & VI Programme)

The proposed new courses in chemistry for under graduate classes are reassigned in accordance to semester/CBCS/Grading system with new education policy. The new course is based on model curriculum of the university grants commission.

The medium of instruction should be Gujarati and the question paper should be drawn in Gujarati with the English version. Students are permitted to write answer in English or Gujarati language.

Its objective are as under:

1. To meet the growing demand of Specialization and Advanced Courses in applied science.
2. To help the colleges to update and modernize their laboratories.
3. To redesign the courses the special emphasis on local requirements, environment, to link the courses with requirements of the industries and research
4. To prepare for National level entrance test like NET/SLET/JRF and other competitive exams.

4

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

University Road, P.O.BOX NO: 21, PATAN-384265

N. Gujarat. INDIA.

NAAC Accreditation Grade – "B"

E-Mail: ngu_vc@wilnetonline.net

ngu_regi@wilnetonline.net

Website: www.ngu.ac.in

www.ngu_patan.org

FACULTY OF SCIENCE

CHEMISTRY SYLLABUS

(Effective from June-2013)

Common Formula For Question Paper (Core course)

Time: 3 Hours

Total Marks: 70

Theory Examination Pattern(Core Course):

Que. No : 1	A: Write any Two out of Three Questions	14 Marks
	B: Write any One out of Two Questions	06 Marks
Que. No : 2	A: Write any Two out of Three Questions	14 Marks
	B: Write any One out of Two Questions	06 Marks
Que. No : 3	A: Write any Two out of Three Questions	14 Marks
	B: Write any One out of Two Questions	06 Marks
Que. No : 4	Write any Ten out of Twelve Short question / M.C.Q / Short numerical / diagram (Four Questions to be asked from each Unit.)	10 Marks

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY**PATAN-384265**

NAAC Accreditation Grade – "B"

FACULTY OF SCIENCE**Chemistry syllabus****Effective from June-2013**

This syllabus is to be completed by assigning three periods of one hour each and four practicals of three hours each per week. The number of students in a practical batch should not exceed fifteen.

Pattern of examination:

There will be four paper for core compulsory and one paper for subject elective theory and fourteen hours (two days) for practical in the university examination

The pattern of university exam :

Written	Examination time	Marks External	Marks Internal
Core Course	3 hours (per course)	70	30
Practical Core Course	7 hours (two days)	200	--
Subject elective course	2 hours	50	--

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : V

Inorganic Chemistry

Paper : CC CH – 501

UNIT – I : Reaction mechanism of coordination compounds

- Substitution reaction of square planar complexes
- Reaction of Platinum II complexes, the trans effect, theories of trans effect, use of synthesis in trans effect and analysis
- Substitution reaction in octahedral complexes, Possible mechanism reactions, Ligand displacement reaction in octahedral complexes, acid hydrolysis, Base hydrolysis
- Electron transfer reaction, mechanism of redox reaction, mechanism of substitution in square planar complexes

UNIT- II : Organo Metallic Compounds

- Definition
- Types of O.M.C.
- Classification
- Nomenclature of O.M.C
- Structure and bonding in dihapto and metal olifines complexes. e.g. Ziese's salt complexes, ferrocene structure
- O.M.C. of Li and Al complexes

UNIT- III : Corrosion

- Principle of corrosion
- Types of corrosion
- (i) Wet corrosion
- (II) Galvanic corrosion
- (III) Atmospheric corrosion
- (IV) Pitting corrosion
- (V) Inter granular corrosion
- (VI) Dezincification
- Prevention of corrosion: Inhibitors- Definition, type and use of inhibitors.

Books Suggested (Inorganic Chemistry):

1. Valance and molecular structure by Cartmell and Flower.
2. Text book of Inorganic Chemistry by Durent and Durent.
3. Inorganic Chemistry by S. Chand.
4. Advance Inorganic Chemistry Vol-II Satya Prakash (S.Chand)
5. Concise Inorganic chemistry by J.D.Lee.
6. Metalic Corrosion By M.N. Desai
7. Advance Inorganic Chemistry J.E. Huhee.

5

Hemchandracharya North Gujarat University, Patan

B.Sc Chemistry

Semester : V

Organic Chemistry

Paper : CC CH - 502

UNIT- I : Stereochemistry

- Conformational analysis of mono and di substituted cyclohexanes
- Molecular asymmetry as illustrated by allenes and diphenyls
- Isomerism of oximes.
- Determination of geometrical isomerism of Aldoxime.
- Determination of geometrical isomerism of Ketoxime(Beckmann's transformation)

UNIT- II

(A) Carbohydrates

- Introduction of Disaccharides
- Structure determination of
 - (1) Sucrose
 - (2) Maltose

(B) Isoprenoids

- Classification
- General methods of structure determination
- Isoprene rule
- Constitution of Citral and α -Terpeneol and their synthesis

UNIT- III : Nucleophilic substitution at saturated carbon atom

- The reaction mechanism
- Stereochemistry of nucleophilic substitution
- Scope of nucleophilic substitution
- Stereochemistry of SN^1 and SN^2 reaction
- Relative reactivity in substitution
- Solvent effect variation at carbon site
- Relative leaving group activity
- Neighboring group participation
- Competitive reactions. Elimination E_1 , E_2 and E_{1cb} mechanisms

Books Suggested (Organic Chemistry):

1. Organic chemistry by Morrison & Boyd Vth Edition
2. Advance organic chemistry by R.K.Bansal.
3. Organic chemistry by I.L.Finar Vol I & II Vth Edition
4. Organic chemistry by pine, Hendrikson, Cram and Hammond IVth edition...
5. Outline of chemical technology by Dryden- IInd Edition
6. Synthetic organic chemistry by Gurdeep R Chatwal.
7. Advanced organic chemistry by Jerry March.
8. Organic reactions and their mechanisms IInd edition by P.S. Kalsi.
9. Stereo chemistry: conformation and mechanism VIth edition by P.S.Kalsi.
10. Organic chemistry of natural product Vol: I & II by Gurdeep R. Chatwal.
11. Advanced organic chemistry by Arun Bahal and B.S. Bahal.
12. Organic chemistry Vol, I, II, III by S.M.Mukherjee, S.P.Singh, R.P.Kapoor.
13. Stereo Chemistry by Nasipuri.

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : V

Physical Chemistry

Paper : CC CH – 503

UNIT- I : Electro Motive Force

- Chemical Cell: Without Transference with Transference Verification of Concentration cell and it's EMF equation.
- Electrolyte concentration cell
Concentration cell without transference, Concentration cell with transference
- Electrode concentration cell
- Amalgam concentration cell, Gas Concentration Cell
- Liquid –Liquid junction potential
Application of EMF measurements Determination of
- Degree of hydrolysis of salt
- Solubility of sparingly soluble salt
- Stability constant of complex,
- Dissociation constant of weak acid,
- Numericals

UNIT- II : Statistical Thermodynamics

- Introduction
- Combination and permutation
- Probability
- Sterling approximate formula (No Derivation)
- Type of Statistics
 - Maxwell-Boltzmann
 - Bose-Einstine Statistics
 - Fermi-Dirac Statistics
- Partition Function
 - Transnational Partition function
 - Rotational Partition function
 - Vibrantional Partition function
- Numericals

UNIT- III : Macromolecules

- Classification of Polymers
- Tacticity of polymers. (Optical Isomers)
- Polymerization reaction with example
 - Addition Polymerization. (Polyethylene, Polystyrene,PVC)
 - Condensation Polymerization (Nylon-66, Dacron)
- Mechanisms of Polymerization
 - Free radical chain Polymerization
 - Anionic Polymerization
 - Cationic Polymerization
- Kinetics of Free radical chain Polymerization
- Degree of Polymerization
- Molar masses of Polymer
 - Number Average Molar Mass
 - Weight Average Molar Mass
- Determination of Molar Masses of Macro Molecules
 - Viscosity Method
 - Light Scattering Method
 - Numerical

Books Suggested (Physical Chemistry):-

1. Advance Physical Chemistry by Gurdeepraj.
2. Physical Chemistry (Question and Answer) by R. N. Madan, G.D. Tuli, S.Chand.
3. Principal of Physical Chemistry by Puri, Sharma, Pathania.
4. Chemical Thermodynamics by R.P. Rastogi and R.R.Mishra.
5. Physical chemistry by atkins.
6. Essentials of Physical Chemistry by B. S. Bahal, Arun Bahal, G.D.Tuli,
7. Physical Chemistry by P.W. Atkins, 5th edn, Oxford 1994 7th edn-2002.
8. Physical Chemistry by R.A. Albern and R.J.Silby, John Wiley 1995.
9. Physical Chemistry by G.H. Barrow, 5th edn, Mac Graw Hill, 1988,6th edn, 1996.
10. Physical Chemistry by W.J.Moore, 4th edn, Orient Longmans 1969.

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : V

Structural – Analytical Chemistry

Paper : CC CH - 504

UNIT:- I : Symmetry of molecules

- Symmetry elements & symmetry operations
- Multiplications of symmetry operations
- Multiplication table for C_{2v} , C_{3v} , C_{2h} point groups only
- Classification of Schoenflies point groups
- Determination of Schoenflies point group notations
- Symmetry & optical activity
- Symmetry property of orbitals for C_{2v} , C_{3v} , C_{2h} point groups

UNIT- II : NMR spectroscopy

- Introduction
- Proton magnetic resonance (1H NMR) spectroscopy
- Equivalent and non equivalent protons
- Nuclear shielding & de-shielding
- Chemical shift & molecular structure
- Spin-spin splitting and coupling constant
- Area of signals
- Interpretations of PMR spectra
Simple organic molecule such as ;
(1) Ethyl bromide (2) Ethanol (3) Acetaldehyde (4) 1,1,2-Tri bromo ethane
(5) Ethyl acetate (6) Toluene (7) Acetophenone (8) Iso propyl Benzene (9)
Acetic acid (10) Phenitol

UNIT:- III : Acid- base titration

- Construction of titration curves
- Feasibility of titration of poly protic acid
- Analysis of mixture of acid & base
- Differential titration of alkalis
- Gran's plot
- Buffers, buffer level, buffer range & buffer capacity

Suggested books: (structural chemistry)

1. Chemical application of group theory by F.A.Cotton
2. Chemical bonding and introduction by K.C.Patel, R.D.Patel and Raval
3. Application of group theory to chemistry by Bhattacharya

4. Symmetry in chemistry by Jaffe and Orchin
5. Advance inorganic chemistry by Cotton & Wilkinson
6. Basic principles of spectroscopy by R. Chand
7. Organic chemistry Vol. 1 by S.M. Mukherji, S.P. Shingh, Kapoor
8. Spectroscopy organic compounds VIth edition by P.S. Kalsi
9. Organic chemistry by Morrison and Boyd
10. Spectrometric identification of organic compounds IVth edition by Silverstein, Bassler and Morrill.
11. Application of absorption spectroscopy of organic compounds by John R. Dyer
12. Spectroscopic method in organic chemistry Vth edition by Dudley H. Williams & Ian Fleming
13. Physical methods for chemist Ruwssell S. Drago
14. Organic spectroscopy by Williams & Kemp
15. Organic spectroscopy by V.R. Dani
16. Qualitative Analysis R.A. Day & A.L. Underwood
17. Analytical Chemistry G.D. Christain
18. Fundamentals of Analytical Chemistry D.A. Skoog, D.M. West & F.J. Holler
19. Principales of Analytical Chemistry J.H. Kennedy
20. Analytical Chemistry – Principals & Techniques L.G. Hargis

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : V

Synthetic Dyes

Paper : SE CH – 505 A

UNIT :- I :

- Introduction
- Synthetic Dyes
- Chromophores, Chromogens, Oxochroms, Bathochromic shift, Hypsochromic shift
- Difference between Dyes and Pigments
- Classification of Dyes
 - According to constitution
 - According to method of coloring the fibres
- Optical Brightners

UNIT :- II : Synthesis and uses

- Congo Red
- Eosin
- Alizarin
- Crystal violet
- Indigo
- Sefronine –T
- Methylene Blue
- Ereochrom Black –T
- Rhodamine
- Rosanilin

References Books :

1. Synthetic Dyes by Venkatramanan
2. Synthetic Dyes by G.R.Chatwal
3. Synthetic Dyes and Drugs by O.P.Agrawal
4. Synthetic Dyes by O. D. Tyagi & M. Yadav
5. Sanshlesit Rangako, Granth Nirman Board

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : V

Oils, Fats and Waxes

Paper : SE CH – 505 B

UNIT:- I : Oils, Fats, and Waxes

- Introduction
- Distinction between oils and fats properties
- Classification
- Vegetable oils
- Manufacture of cotton seed oil by expression and solvent extraction
- Manufacture of soybean oil by solvent extraction
- Refining of crude vegetable oils
- Some other vegetable oils
- Animal oils, animal fats and oils
- Processing of animal fats and oils
- Mineral oils
- Difference between animal, vegetable and mineral oils
- Essential oils
- Isolation and uses of essential oils
- Waxes
- Classification of waxes
- Properties of waxes
- Some common waxes
- Qualitative solubility of waxes

UNIT:- II : Analysis of Oils, Fats and Waxes

- Saponification value
- Ester value
- Acid value
- Iodine value-wijs methods
- Richert meissl value

- Henher value
- Elaiden test
- Aniline point
- Hydrogenation of oils
- Optimum conditions for the Hydrogenation process
- The dry process
- The wet process
- Manufacture of candles

Reference Books :

1. Industrial Chemistry By B. K. Sharma
2. Dryden's Outlines of Chemical Technology, 3rd Edition, East-West Press

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : V

Paints and Varnishes

Paper : SE CH – 505 C

UNIT:- I : Paints

- Historical background of Paint : Natural and synthetic
- Main Components of Paints
 - Pigments
 - Vehicle or medium
 - Thinners
 - Driers
 - Fillers
 - Plasticizers
- Different Color changing paint
- Art and use of Paint : Methods of Application of Paints
- Various Application of Paint
- Failure of a paint: Chalking, Fracking, Cracking, Blistering, Change of colour
- Prevention of failure of Paint FILM
- Synthesis of oil soluble dyes: Red, orange, blue
- Emulsion Paints; Cement Paints; Distempers

UNIT:- II : Varnishes

- History
- Components of classic varnish:- Drying oil; Resin, Turpentine or solvent.
- Characteristics of good varnishes
- Types of Varnish
 - Violin
 - Resin
 - Shellac
 - Alkyd

- Spar varnish
 - Drying Oils
 - Polyurethane
 - Enamles
 - Lacquer
 - Acrylic
- Differentiate between paint and varnish

References Books :

1. Industrial Chemistry by B.K.Sharma

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester: V

Cosmetic Chemistry

Paper : SE CH – 505 D

UNIT:- I : Introduction to Cosmetics

- What are cosmetics?
- Analysis of cosmetics (Name the methods only)
 - Separation of the components
 - Identification of the ingredients
 - Quantitative determination of these ingredients
- Types of the cosmetics-Definition, Compositions and uses
 - Lipsticks
 - Nail enamels
 - Shampoos and soaps
 - Deodorants and antiperspirants
 - Hair sprays
 - Sunscreens
 - Cream, Lotions and Talcum powder
 - Hair dyes
- Name of the leading producers in cosmetics

UNIT:- II : Cosmetics and health

- pH of the cosmetic products
- Preservatives - botanical, parabens and formaldehyde releasing
- Toxic chemicals used as a ingredients
 - Antibacterials (triclosan)
 - Butylacetate
 - Butylated hydroxyl toluene
 - Coaltar
 - Diethanolamine
 - 1,4-dioxane
 - Formaldehyde
- Indian standards for the various cosmetic products

Reference Books:

1. Herbal cosmeticshandbook by H panda, Asia pacific business press publications
2. Org. chem. for cosmetic chemists by Anthony and Thomas, Allured publishing house
3. Beginning cosmetic chemistry by Randy scheuller and Pery romanoswaki, Allured publishing house
4. Encyclopedia of Industrial Chemical Analysis vol-11, Wiley publishers

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : V

Metallurgy

Paper : SE CH – 505 E

UNIT:- I :

- Introduction
- Occurrence of Metals
- Mineral wealth of India
- Ore dressing
 - Gravity Separation (Hydraulic washing)
 - Froth flotation method
 - Magnetic Separation Method
- Production of the metal
 - Calcination
 - Roasting
 - Smelting and Reduction of the metal oxide

UNIT:- II :

- Purification of the Metals :
 - Electrolysis
 - Metal refining by Complexation
 - Van Arkel
 - deBoer method
 - Bassemerisation
 - Zone Refining
- Microbial Metallurgy
- Advantages of Microbial Metallurgy
- Extraction, Separation and Purification of Al and Fe from its Ore

References Books :

1. Inorganic Chemistry by R. Gopalan pp 567-590
2. Textbook of Inorganic Chemistry, by P.L. Soni

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : V

Laboratory Course

LC CH - 507

(Inorganic, Organic, Physical Chemistry)

This syllabus is to be completed by assigning four laboratory session per week, each of Three periods. The number of students in the laboratory batch should not exceed fifteen (15) the medium of instruction will be English in laboratory course

Inorganic Chemistry practical

(A) Alloy (Minimum three)

- 1) Brass alloy ----- Zn (Gravimetric) and Cu (Volumetric)
- 2) German silver alloy -----Ni (Gravimetric) and Cu (Volumetric)
- 3) Bronze alloy -----Sn (Gravimetric) and Cu (Volumetric)

(B) Synthesis by convention method (Minimum five)

- 1) Ferrous Sulphate or Green vitriol ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$)
- 2) Sodium cobaltinitrate $\text{Na}_3 [\text{Co}(\text{NO}_2)_6]$
- 3) Tetra amine cupric sulphate
- 4) Hexa thio urea plumbous nitrate
- 5) Cuprous chloride

Organic Chemistry practical

(A) Qualitative Analysis (Minimum 08)

Analysis of an organic mixture containing two components using water, NaHCO_3 , NaOH , HCl for Separation /or using distillation process for separation and identification with the Preparation of Suitable derivatives.

Soluble Components:- Oxalic Acid, Succinic Acid, Resorcinol, Urea, Thio Urea

Separation of two components from Organic Mixture Such as....

Solid-Solid -----Mixture

Solid- Liquid -----Mixture

Liquid-Liquid ----- Mixture

[Liquid component must be neutral in nature]

Physical Chemistry practical

[A] Instruments: (Minimum 05)

1. To determine normality and amount of HCl and CH_3COOH in the given solution by Conductometric titration against 0.2N (exact) NaOH solution.
2. To determine the solubility product and solubility of sparingly soluble salts PbSO_4 by Conductometry.
3. To determine Normality and amount of each acid in the given mixture of HCl + CH_3COOH by pH metrically.
4. To determine the strength of strong and weak acid in a given mixture by Potentiometric titration using 0.1 N NaOH
5. To determine the concentration of Nickel in the given solution by Colourimetric estimation.
6. To determine the concentration of unknown solution from given KMnO_4 solution by Colourimetry.

[B] Kintetics & Distributions: (Minimum 03)

7. To determine the order of the reaction between $\text{K}_2\text{S}_2\text{O}_8$ and KI.
8. To determine the order of the reaction between H_2O_2 and HI.
9. To determine the distribution coefficient of Iodine between $\text{CCl}_4/\text{CHCl}_3$ & water at a given temperature.
10. To study the distribution of Benzoic acid between Benzene and water at room temperature and prove the dimerization of Benzoic acid in Benzene.

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : V

Pattern of University Practical Exam

Time: 10:30am to 6:00pm (Including 30 minutes recess) Total Marks: 200

First Day

(A) Inorganic (50 marks)

- Estimation from Alloy (30 marks) and Inorganic Preparation (20 marks)

(B) Organic (50 marks)

- Qualitative analysis of an organic mixture.

Second Day

(C) Physical (50 marks)

- Any one exercise should be selected for each candidate from syllabus.

(D) Viva-Voce and Journal

- **Viva-Voce on practical base (40 marks)**

- Inorganic 13 marks
- Organic 13 marks
- Physical 14 marks

- **Journal (10 marks)**

✓ **Note: Certified practical journal is compulsory for practical exam.**

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : V

Suggested batch distribution for practical exam

First Day:

10:30am to 2:00pm	2:30pm to 6:00pm
Inorganic: A	Inorganic: B
Organic: B	Organic: C
Physical: C	Physical: A

Second Day :

10:30am to 2:00pm	2:30pm to 6:00pm
Inorganic: C	Inorganic viva- All students (A,B & C batch)
Organic: A	Organic viva- All students (A,B & C batch)
Physical: B	Physical viva- All students (A,B & C batch)

Batch distribution (for 24 students)

A = 1 to 8
B = 9 to 16
C = 17 to 24

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : VI

Inorganic Chemistry

Paper : CC CH – 601

UNIT :- I : Valency

- Variation method, Secular Equation, Stability of H_2^+ ion; M.O. approach, Stability of H_2 molecule; V. B. approach, Classical interaction energy
- Representation of wave function for SP , SP^2 and SP^3 hybrid orbitals, bond angle and bond strength
- M.O. treatment of OH molecules
- Quantum mechanical representation of Pauli's exclusion principle

UNIT :- II : Metal Carbonyl

- Introduction
- Classification: Mononuclear and Polynuclear
- Physical and Chemical Properties
- Metal Carbonyl (M-CO) bonding (On the basis of V.B.T. and M.O.T.)
- Use of IR Spectra to determination of structure of metal carbonyl
- Structure of Metal Carbonyl
 $Ni(CO)_4, Fe(CO)_5, Cr(CO)_6, Fe_2(CO)_9, Co_2(CO)_8, Mn_2(CO)_{10}, Fe_3(CO)_{12}$
- Calculation of EAN of metal atom in metal carbonyl
- Metal Nitrosyl complexes: - Bonding in metal nitrosyl
- Classification of metal Nitrosyl

UNIT :- III : Bio-Inorganic Chemistry

- Introduction,
- Essential elements,
- Trace elements
- Metal porphyrine,
- Study of hemoglobin and myoglobin
- Nitrogen fixation: In Vivo and In Vitro

Books Suggested (Inorganic Chemistry)

1. Valence and molecular structure by Cartmell and Flower.
2. Text book of Inorganic Chemistry by Duren and Duren.
3. Inorganic Chemistry by S. Chand.
4. Advance Inorganic Chemistry Vol-II Satya Prakash (S.Chand)
5. Concise Inorganic chemistry by J.D.Lee.
6. Metallic Corrosion By M.N. Desai
7. Advance Inorganic Chemistry J.E. Huhee

Hemchandracharya North Gujarat University, Patan

B.Sc. Chemistry

Semester : VI

Organic Chemistry

Paper : CC CH - 602

UNIT :- I : Electrophillic and free radical addition reaction

- Addition to carbon carbon double bond
- Markovnikov's rule
- Electrophillic addition, Orientation, Reactivity, Rearrangement, Dimerization, Alkylation
- Peroxide effect (Anti markovnikov's rule)
- Free radical addition, mechanism of peroxide initiated addition of HBr
- Syn and anti addition mechanism for addition of halogens
- Electrophillic addition to conjugated dienes (1:2 v/s 1:4 addition)
- Free radical addition to conjugated dienes, reactivity

UNIT :- II : Active Methylene Group Compounds

- Introduction of Tautomerism
- Determination of keto-enol tautomerism
- Differences between Tautomerism and resonance
- Synthesis and application of Ethyl aceto acetate and malonic ester

UNIT :- III : Nucleophillic Aromatic Substitutions

- Nucleophilic aromatic substitution [Bimolecular displacement (SN^2) mechanism]
- Elimination – Addition mechanism via benzyne
- Stability and properties of benzyne
- Evidences of Benzyne intermediate

Books Suggested (Organic Chemistry):

1. Organic chemistry by Morrison & Boyd Vth Edition
2. Advance organic chemistry by R.K.Bansal.
3. Organic chemistry by I.L.Finar Vol I & II Vth Edition
4. Organic chemistry by pine, Hendrikson, Cram and Hammond IVth edition...
5. Outline of chemical technology by Dryden IInd Edition
6. Synthetic organic chemistry by Gurdeep R Chatwal.
7. Advanced organic chemistry by Jerry March.
8. Organic reactions and their mechanisms IInd edition by P.S. Kalsi.
9. Organic chemistry of natural product Vol: I & II by Gurdeep R. Chatwal.
10. Advanced organic chemistry by Arun Bahal and B.S. Bahal.
11. Organic chemistry Vol, I, II, III by S.M.Mukherjee, S.P.Singh, R.P.Kapoor.

###

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : VI

Physical Chemistry

Paper : CC CH – 603

UNIT:- I : Thermodynamics

- Zeroth law of thermodynamics
- Absolute temperature scale
- Nernst heat theorem
- Third law of thermodynamics
- Determination of absolute entropy
- Experimental verification of third law
- Entropy change in chemical reactions.
- Concept of Fugacity and determination of Graphical Method
- Numerical

UNIT :- II : Photochemistry

- Introduction
- Difference between Thermal and Photochemical reaction
- The Law of Absorption, Lambert-Beer law
- Laws of Photochemistry,
 - (1) Grothus-Drappper law (2) Stark- Einstein law and it's deviation
- Quantum Efficiency or Quantum Yield
- Experimental determination of Quantum yield
- Reason of high and low Quantum yield
- Types of Photochemical reaction
 - (1) Photosensitized reaction (2) Photochemical equilibrium
- Qualitative description of fluorescence, phosphorescence and chemiluminescence's
- Flash Photolysis
- Numerical

UNIT :- III : Chemical Kinetics

- Effect of temperature on rate of reaction (Arrhenius equation)
- Concept of Activation energy
- Theories of reaction rate
 - (1) Collision theory
 - (2) Transition state theory
- Comparison of collision and transition state theory
- Theories of Unimolecular reaction
- Lindemann's theory
- Trimolecular reaction
- Trautz's Law
- Primary salt effect
- Secondary salt effect
- Numerical

Books Suggested (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.
4. Chemical Thermodynamics by R.P. Rastogi and R.R.Mishra.
5. Physical chemistry by atkins.
6. Essentials of Physical Chemistry by B. S. Bahal, Arun Bahal, G.D.Tuli,
7. Physical Chemistry by P.W. Atkins, 5th edn, Oxford 1994 7th edn-2002.
8. Physical Chemistry by R.A. Alberty and R.J.Silby, John Wiley 1995.
9. Physical Chemistry by G.H. Barrow, 5th edn, Mac Graw Hill, 1988, 6th edn, 1996.
10. Physical Chemistry by W.J.Moore, 4th edn, Orient Longmans 1969.

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : VI

Structural – Analytical Chemistry

Paper : CC CH - 604

UNIT :- I : Term symbol & spectra of d^1 - d^9 Octahedral complexes

(A)Term Symbol

- LS couplings
- J J coupling
- Determination of ground state term by hund's rules
- Determination of term symbol for all state for p^2 & d^2 configuration by pigeon hole diagram

(B)Spectra of d^1 & d^9 octahedral complexes

- Selection rules & intensities transitions
- Orgel diagram for d^1 - d^9 , d^2 - d^8 , d^3 - d^7 , d^4 - d^6 octahedral & tetrahedral complexes
explanation of d^1 & d^9 spectra(only introduction-no application)

UNIT :- II : IR spectra & Numericals based on UV, IR and NMR Spectra

(A) Infrared spectroscopy.

- Introduction
- Molecular vibrations (Fundamental vibrations of AX_2 type molecules)
- Characteristics of IR spectroscopy
- Sample techniques
- Fingerprint zone
- Effect of IR in geometrical isomerism
- IR spectra & H-bonding
- Factor affecting on $>C=O$ group frequencies
- Differentiate two compounds by the IR frequencies.

(B) Problems pertaining to the structure elucidation of organic compounds using UV, IR & NMR spectroscopic techniques (one out of two)

UNIT :- III : Chromatography

- Introduction
- Types of chromatography
- Column chromatography
- Paper chromatography
- Thin layer chromatography

- Ion exchange chromatography
- Van-dimtter equatorn-only equation
- examples
- HPLC principle
- Application of chromatography

Suggested books: (structural chemistry)

1. Chemical application of group theory by F.A.Cotton
2. Chemical bonding and introduction by K.C.Patel, R.D.Patel and Raval
3. Application of group theory to chemistry by Bhattacharya
4. Symmetry in chemistry by Jafle and Orchin
5. Advance inorganic chemistry by cotton & Wilkinson
6. Basic principles of spectroscopy by R.Chand
7. Organic chemistry Vol. 1 by S.M.Mukherji, S.P.Shingh, Kapoor
8. Spectroscopy organic compounds VIth edition by P.S.kalsi
9. Organic chemistry by Morrison and Boyd
10. Spectrometric identification of organic compounds IVth edition by Silverstain, Bassler and Morrill.
11. Application of absorption spectroscopy of organic compounds by John R. Dyer
12. Spectroscopic method in organic chemistry Vth edition by Dudley H. Williams & Ian Fleming
13. Physical methods for chemist Ruwssell S. Drago
14. Organic spectroscopy by Williams & Kemp
15. Organic spectroscopy by V.R.Dani
16. Qualitative Analysis R.A.Day & A.L.Underwood
17. Analytical Chemistry G.D. Christain
18. Fundamentals of Analytical Chemistry D.A.Skoog, D.M. West & F.J.Holler
19. Principales of Analytical Chemistry J.H. Kennedy
20. Analytical Chemistry – Principals & Techniques L.G.Hargis

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : VI

Polymer Chemistry

Paper : SE CH – 605 A

UNIT:- I : Polymers – 1

- Introduction
- Classification and Nomenclature of polymers
- Isomerism of polymers
- Chain growth polymerization – Introduction
- Mechanism of free-radical, Cationic and Anionic polymerization
- Kinetics of free radical, Cationic and Anionic polymerization
- Mechanism and Kinetics polycondensation

UNIT:- II : Polymers - 2

- Polymerization Techniques
- Concept of Averages
 - Number average molecular weight
 - Weight average molecular weight
 - Viscosity average molecular weight
- Molecular weight and Degree of polymerization
- Poly dispersity and molecular weight distribution
- Methods for determination of molecular weight
- Membrane Osmometry, Viscometry and Light Scattering

Reference Books:

1. Principles of polymers Science by P.Bahadur and N.V.Sastry.(Second Edition)
2. Polymer Science by V.R.Gowariker, N.V.Vashwanathan and Jaydev Shreedhar.

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : VI

Chemistry of Portland Cement

Paper : SE CH – 605 B

UNIT :- I :

- Introduction
- History of Portland Cement
- Types of Portland Cement
- Other Types of Portland Cement
- Indian Standard Institute (ISI) Specification of Cement

UNIT :- II :

- Manufacturing process of Portland Cement
- Reaction in the kiln
- Mixing of Additives to cement
- Setting of Cement
- Growth of Cement Industry in India

References Books :

1. Industrial Chemistry by B.K.Sharma

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : VI

Food Additives

Paper : SE CH – 605 C

UNIT :- I :

- Introduction
- Food Additives and functionalities
- Food additives regulations
 - GRAS
 - The Delaney clause
 - Unintentional
- Assessment of Food Additives

UNIT :- II :

- Classification of Food additives
- Mechanism and chemistry of
 - Flavoring Agents
 - Emulsifiers
 - Acidulants
 - Antioxidants
 - Thickeners
 - Sweeteners
 - Food colours
 - Preservatives
 - Aroma
- Functional classes Food Additives
- List of Authorized Food Additives
- Risk benefit Ratio

Reference Books:

1. Food Chemistry by Alex V. Ramani, MJP Publications, 2009
2. CRC Handbook of Food Additives 2nd Edition, Volume No. II, 2011
3. Tanya Louise Ditschun and Carl K. Winter 2000
4. Food and Safety and authority of Ireland Published by guidance of Food Additives 2010

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : VI

Soaps and Detergents

Paper : SE CH – 605 D

UNIT :- I : Soaps

- Soap and its manufacture
- General consideration in soap making
- Manufacture of soap
- Toilet and transparent soap, metal soaps, other soaps
- Oil to be used for soaps
- Cleansing action of soaps
- Recovery of glycerin from spent lye

UNIT :- II : Detergents

- Introduction
- Principal groups of synthetic detergents
- Classification of surface active agents
- Anionic detergents
- Nonionic detergents
- Alkyl sulphates, alkyl aryl sulphonates, alkyl sulphonates, amide sulphonates
- Miscellaneous compounds
- Cationic detergents
- Biodegradability of surfactants
- Detergents containing enzymes
- Eco-friendly detergents
- Zeolites
- Manufacture of shampoos

Reference Books :

1. Industrial Chemistry By B. K. Sharma
2. Dryden's Outlines of Chemical Technology, 3rd Edition , East-West Press

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : VI

Forensic Chemistry & Toxicology

Paper : SE CH – 605 E

UNIT :- I : Introduction of Forensic science, Law, Crime

- Introduction Definition, and Scope of Forensic Science
- History and development, Needs and Principles
- Police and Forensic sciences Laboratory
- Definition, Theories and Prevention of Crime
- Structure of Police, Police & Forensic Scientist
- Relationship with reference to Crime Investigation

UNIT :- II : Forensic Chemistry & Toxicology

- Introduction of Forensic chemistry
- Types of cases received for analysis
- Overview of Forensic chemical analysis
- Forensic analysis of Beverages
 - Alcoholic Beverages (Alcohol, Chloroform)
 - Non-Alcoholic Beverages
- Examination of Chemicals (Phenolphthalein) used in Bribe Trap cases
- Analysis of Adulterated Food
- Introduction of Toxicology
- Classification of Toxicology
- Extraction of Poisons
- Analysis of Poisons

Reference Books:

1. Forensic science in criminal investigation and trials, 4th edition by Dr.B.R.Sharma, Universal law Publishing co. pvt. ltd.

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : VI

Laboratory Course

LC CH - 607

(Inorganic, Organic, Physical Chemistry)

Inorganic Chemistry practical

Qualitative analysis (Minimum 10)

Inorganic mixture should be comprised of six radicals.

Candidate if required should be guided once for the wrong group and marks deducted for wrong group. Maximum of five marks can be deducted for wrong group.

There shall be no deduction of marks for reporting wrong radicals

Organic Chemistry practical

(A) Estimation of functional groups: (Minimum 03)

- (1) Estimation of Ester
- (2) Estimation of Amide
- (3) Estimation of Ascorbic acid
- (4) Estimation of Aspirin

(B) Synthesis of Organic Compounds (Minimum 05)

- (1) Preparation of m-Dinitro benzene from Nitrobenzene
- (2) Preparation of p-Nitro acetanilide from Acetanilide
- (3) Preparation of Acetanilide from Aniline
- (4) Preparation of Aspirine from Salicylic acid
- (5) Preparation of Di-benzal acetone from Benzaldehyde
- (6) Preparation of 2,4,6-Tribromo aniline from Aniline

Physical Chemistry

[Instruments]: (Minimum 05)

1. To determine concentration of the given Iodide solution by Potentiometric titration against 0.1N KMnO_4 solution.
2. To determine formal redox potential of $\text{Fe}^{+2}/\text{Fe}^{+3}$ by Potentiometry.
3. To determine the concentration of the **nitrite** in the given solution by Colourimetric estimation method.
4. To determine the concentration of unknown solution from given $\text{K}_2\text{Cr}_2\text{O}_7$ by Colourimetry.
5. To determine the Solubility product and solubility of sparingly soluble salt of BaSO_4 by Conductometry.
6. To determine the strength of strong and weak base in a given mixture using a pH meter.

[B] Kinetics, Adsorption & Polymer (Minimum 03)

7. To study the reaction between KBrO_3 and KI at two different temperature and calculate the temperature coefficient and the energy of activation.
8. To study the absorption of Acetic Acid on Charcoal and prove the validity of freundlich equation.
9. To determination of molecular weight of high polymer (i.e. polystyrene) by Viscosity mesasurent.
10. To study the rate constant of the reaction between $\text{K}_2\text{S}_2\text{O}_8$ and KI and study the influence of ionic strength on the rate constant

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : VI

Pattern of University Practical Exam

Time: 10:30am to 6:00pm (Including 30 minutes recess) Total Marks: 200

First Day

(A) Inorganic (50 marks)

- Inorganic Qualitative Mixture

(B) Organic (50 marks)

- Estimation (25 Marks) & Preparation (25 Marks)

Second Day

(C) Physical (50 marks)

- Any one exercise should be selected for each candidate from syllabus.

(D) Viva-Voce and Journal

- **Viva-Voce on practical base (40 marks)**

- Inorganic13 marks
- Organic13 marks
- Physical14 marks

- **Journal (10 marks)**

- **Note: Without Certified practical record a student will not be permitted to appear at practical examination.**

Hemchandracharya North Gujarat University, Patan

B. Sc. Chemistry

Semester : VI

Suggested batch distribution for practical exam

First Day:

10:30am to 2:00pm	2:30pm to 6:00pm
Inorganic: A	Inorganic: B
Organic: B	Organic: C
Physical: C	Physical: A

Second Day :

10:30am to 2:00pm	2:30pm to 6:00pm
Inorganic: C	Inorganic viva- All students (A,B & C batch)
Organic: A	Organic viva- All students (A,B & C batch)
Physical: B	Physical viva- All students (A,B & C batch)

Batch distribution (for 24 students)

A = 1 to 8
B = 9 to 16
C = 17 to 24

Best wishes

