Re-Accredited B++ 2.86 CGPA by NAAC
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
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-:પરિપત્ર:-

યુનિવર્સિટી સંલગ્ન વિજ્ઞાન વિદ્યાશાખા હેઠળની તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૬–૨૭ થી અમલમાં આવનાર B.Sc. Chemistry Sem.-3 નો સુધારેલ અભ્યાસક્રમ રસાયણશાસ્ત્ર વિષયની અભ્યાસ સમિતિના ચેરમેનશ્રીએ અભ્યાસ સમિતિવતી અને વિજ્ઞાન વિદ્યાશાખાના અધ્યક્ષશ્રીએ વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૨૪/૧૨/૨૦૨૪ ની સભાનાં ઠરાવ ક્રમાંકઃ૩૫૩ અન્વયે માન.કુલપતિશ્રીને આપેલ સત્તા અંતર્ગત માનનીય કુલપતિશ્રી દ્વારા મંજૂર કરેલ છે, જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

(બિડાણઃઉપર મુજબ)

ક્રમાંકઃઓથો./પરિપત્ર/૧૪૧૮૩/૨૦૨૬
તા.૨૩/૦૬/૨૦૨૬

કુલસચિવ

પ્રતિ,
(૧) યુનિવર્સિટી સંલગ્ન વિજ્ઞાન વિદ્યાશાખા હેઠળની તમામ કોલેજોનાં આચાર્યશ્રીઓ.
... આપશ્રીના વિભાગ/કોલેજના સંબંધિત શિક્ષકો/વિદ્યાર્થીઓને જાણ કરી અમલ કરવા સારૂ.
(૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.
(૩) પરીક્ષા નિયામકશ્રી,પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
.....તરફ જાણ તેમજ અમલ સારૂ.

Veer Narmad South Gujarat University,

Surat

Syllabus of B.Sc. SEM- III-Chemistry
As per NEP 2020

(Effective from June, 2026)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B. Sc. Chemistry

As per NEP 2020

B.Sc. Chemistry is an undergraduate degree program that focuses on the study of various aspects of chemistry, including its principles, theories, and practical applications. It is a comprehensive program that equips students with a solid foundation in the field of chemistry and prepares them for a wide range of career opportunities.

Upon completion of the program, graduates are expected to possess the following general outcomes:

- **Knowledge and Understanding**: Graduates will have a strong theoretical and practical knowledge of the fundamental concepts and theories in chemistry, including organic, inorganic, physical, and analytical chemistry.
- **Laboratory Skills:** Graduates will be proficient in laboratory techniques, including the handling of chemicals, operation of laboratory equipment, and conducting experiments safely and accurately.
- **Critical Thinking and Problem Solving**: Graduates will develop criticalthinking skills and the ability to analyse and solve complex problems in the field of chemistry. They will be adept at designing experiments, interpreting data, and drawing logical conclusions.
- **Communication Skills:** Graduates will be able to effectively communicate scientific ideas and findings through written reports, presentations, and scientific discussions. They will also possess strong teamwork skills, enabling them to collaborate with peers and professionals in the field.
- **Ethical and Professional Conduct:** Graduates will understand the importance of ethical conduct in scientific research and demonstrate professionalism in their interactions with colleagues, clients, and the broader community.

In addition to these general outcomes, B.Sc. Chemistry programs may also have specific outcomes tailored to meet the needs of the particular institution or program.

The specific outcomes:

- **Specialized Knowledge:** Graduates will have in-depth knowledge in specificsub-disciplines of chemistry, such as environmental chemistry, medicinal chemistry, dyes, or materials chemistry.
- **Research Skills:** Graduates will possess research skills and the ability to design and carry out independent research projects in chemistry.

- **Industrial Applications:** Graduates will be familiar with the applications of chemistry in various industries, such as pharmaceuticals, dyes, petrochemicals, materials science, and environmental science.
- **Advanced Instrumentation Skills:** Graduates will have hands-on experience with advanced analytical instruments used in chemical analysis, such as spectroscopy, chromatography, pH Metry and conductometry.
- **Advanced Computational Skills:** Graduates will be proficient in using computational tools and software for modelling chemical structures, predicting properties, and simulating chemical reactions.

Overall, the B. Sc. Chemistry program aims to provide students with a solid foundation in chemistry, preparing them for various careers in the chemical industry, research institutions, academia, and other related fields. It equips students with the necessary theoretical knowledge, practical skills, and critical thinking abilities to excel in the diverse and ever evolving field of chemistry.

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[Subject code-2403000503012001]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus effective from June, 2026
For
S. Y. B. Sc. Semester- III
Major Course
Chemistry Paper-III [Inorganic Chemistry]
Total credit: 02 (Theory-2)

Total Hrs: Theory-30

CH-MJ-301 (Theory)

Course Code	Total Credits of the Course	Title of the Course	Hours per Week
CH-MJ-301	2	Chemistry Paper-III [Inorganic Chemistry]	2 hrs.

Course Outcome: Having Completed this course, the learner will be able to understand	
1.	Understand the principles of quantum mechanics, electronic configurations, and water purification techniques.
2.	Apply quantum mechanical principles to determine electronic configurations and analyze water purification methods.
3.	Discuss, analyze and interpret chromatographic data for inorganic analysis.
4.	Evaluate the effectiveness of different methods of water purification.

(1) Quantum Mechanics [10Hrs.]

(A) Derivation of the time independent Schrodinger equation, Wave function and probability function, Well behaved wave function, Particle in one –dimensional box and its importance.

(B) Operators (definition and derivation), Linear operators, Commutator operators, Vector operators, Laplacian operators, Hamiltonian operators, Hermition operators. Derivation of Hamiltonian equation, Hamiltonian operators for H atom H_2^+, He^{2+} and Li.

(2) Electronic configuration of atom; L-S coupling: [5 Hrs.]

Introduction, L-S coupling, J-J coupling (introduction), Term symbol, Determination of microstate of P^2, P^3 system, Term symbol of C, N, O, Ni, Ni^{2+}, Fe, Fe^{2+}, Fe^{3+}, Cr, Cr^{3+}, Co^{2+} V, V^{3+} and Cl^-.

UNIT-II

(1) Purification of water [7 Hrs.]

Classification and composition of water (tap water, mineral water, portable water, distilled water). Different methods of purification of water for potable and industrial purposes, Soft and hard water. Desalination of sea water by reverse osmosis and electro dialysis.

(2) Paper chromatography: [8 Hrs.]

Principles of chromatography, Classification of chromatography according to mobile phase and stationary phase. Types of paper chromatography, one dimensional, two dimensional and radial paper chromatography, R_f value, Use of paper chromatography in inorganic analysis (I, IIA, IIIB, IV, and halides).

Reference Books:

1. Introductory Quantum Chemistry by A. K. Chandra, Tata Mc. Graw Hill Delhi.
2. Atomic Structure and Chemical Bond by Manos Chandra, Tata Mc. Graw Hill Pub. Co. Ltd.
3. Theoretical Inorganic Chemistry by M. C. Day & J. Selbin Affiliated, East West Pub. Pvt. Ltd.
4. Coordination Compounds (Studies in Modern Chemistry) S. F. A. Kettle, Nelson.
5. Inorganic Chemistry by (Principles of Structure and Reactivity) James E. Huhely, Harper International (NY).
6. Inorganic Chemistry by R. B. Heslop and P. L. Robinson Elsevier Pub. Co. NY.
7. Physical Methods Inorganic Chemistry by R. S. Drago, W.B.S. Saunders Co. London, Reinhold Pub. Co. NY.
8. Basic Concepts of Analytical Chemistry by S. M. Khopkar, Wiely Estern Ltd. New Delhi.
9. Quantitative Analysis Day & Underwood Prentice Hall of India, Pvt. Ltd.
10. Instrumental Method of Analysis B. K. Sharma, Krishna Pub. House, Merrut.
11. Principles of Inorganic Chemistry (Puri, Sharma, Kalia).
12. Enviornmental Chemistry, By S. K. Banerji. Prentice Hall India Pvt. Ltd.
13. Progressive Inorganic Chemistry, Suratkar, Thatte, Pandit, Ideal Book Service, Poona.
14. Advanced Inorganic Chemistry Vol. I & II by Gurudeep Raj, Goel Pub. House, Meerut.
15. Quantum Chemistry Ir. N. Levine, Prentice Hall.
16. Advanced Inorganic Chemistry by Cotton & Wilkinson John Wihn Wiely.
17. Introduction to Chromatography Theory and Practice by V. K. Srivastava and K. K. Srivastava - S. Chand Pub.
18. Environmental Chemistry by. A. K. De.
19. Industrial Chemistry by B. K. Sharma
20. Inorganic chemistry by Gray L. Miessler, Donald A. Tarr, 3rd addition, Pearson publication.
21. General and Inorganic chemistry (part-I & II) by R. Sarkar, Books and Allied (P) ltd.

[Subject code-2403000503022001]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus effective from June, 2026
For
S. Y. B. Sc. Semester- III

Major Course
Chemistry Paper-IV [Organic Chemistry]
Total credit: 02 (Theory-2)

Total Hrs: Theory-30

CH-MJ-302 (Theory)

Course Code	Total Credits of the Course	Title of the Course	Hours per Week
CH-MJ-302	2	Chemistry Paper-IV [Organic Chemistry]	2 hrs.

Course Outcome: Having Completed this course, the learner will be able to	
1.	Write the classification and nomenclature of heterocyclic compounds. Discuss and illustrate different synthesis methods and chemical properties and reactions of different classes of heterocyclic compounds.
2.	Discuss the preparation methods, physical properties and chemical reactions of different types of organic nitrogen compounds with appropriate examples and their applications in organic synthesis.
3.	Discuss and write nomenclature, methods of preparation and chemical reactions of diazonium salts. Write synthesis and uses of some common dyes and reagents.

Unit-I

(1) Heterocyclic compounds: **[8Hrs.]**

(A) Classification and nomenclature of Heterocyclic compounds

(B) Synthesis, Chemical properties and reactions of pyridine

(C) Skraup's synthesis and Friedlander synthesis of quinoline. Electrophilic substitution reactions, Nucleophilic substitution reactions, Oxidation reaction, Reduction reactions.

(D) Synthesis, Reactivity and importance of Imidazole and Benzimidazole.

(2) Organic Nitrogen compounds: **[7Hrs.]**

(i) Preparation and physical properties and chemical reactions of Nitriles, Isonitriles, Carbamates, Semicarbazides and their application in organic synthesis.

(ii) Structure and nomenclature of amines, Preparation of aryl amines, physical properties and chemical reactions.Gabriel-phthalimide reaction, Bromamide reaction.

Unit-II

(1) Diazonium salts: **[8Hrs.]**

(A) Nomenclature, Mechanism, method of preparation and Reactions of diazonium salts, Replacement reactions in which nitrogen atoms are eliminated and retained. Application of diazonium salts in the synthesis of aromatic compounds.

(B) Laws of coupling, coupling agents, Definition of diazoamino and aminoazo compounds.

(C) Synthesis and uses of Methyl Orange, Methyl Red, Congo Red and Eriochrome Black-T.

(2) Use of reagents: **[7Hrs.]**

Synthesis and applications of following reagents.

(A) Anhydrous aluminium chloride
(B) N-bromo succinimide
(C) Selenium dioxide
(D) Lithium aluminium hydride.
(E) Grignard reagent

Reference books:

(1) Organic Chemistry by R.T.Morison and R.N. Boyd, Prentice Hall India.
(2) Organic Chemistry vol-I & II by I.L.Finar.
(3) Organic Chemistry vol-I & II by B.K.Sharma, Goel pub. House, Merrut
(4) Reaction and reagents In Organic synthesis by O.P.Agrawal Goel pub. House, Merrut.
(5) Organic Chemistry by S.H.Pine
(6) Reaction Mechanism In Organic chemistry by S.M. Mukharji & S.P. Singh.
(7) Organic Chemistry by L.G. Wade Jr. Pretice Hall.

[Subject code-2503000503032002]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus effective from June, 2026
For
S. Y. B. Sc. Semester- III
Major Course
Chemistry Paper-V [Physical Chemistry and IKS]
Total credit: 04 (Theory-4)

Total Hrs: Theory-60

CH-MJ-303 (Theory)

Course Code	Total Credits of the Course	Title of the Course	Hours per Week
CH-MJ-303	4	(Physical Chemistry and IKS) Chemistry-V	4 hrs.

Purpose of Course	To explore India's ancient contributions to chemistry and metallurgy through the lens of Prof. P. C. Ray's pioneering work, and to build a foundational and applied understanding of reaction kinetics, photochemistry, and electrochemistry with relevance to both historical and modern contexts.
Objective of Course	Students will study ancient metallurgical techniques and Ayurvedic chemistry, learn the principles of chemical kinetics and photochemistry, and apply electrochemical concepts such as conductance, transport numbers, and ionic equilibria through both theoretical and problem-based learning.
Course Outcomes	**CO1**-Remembering: After completing this course, Students will able to recall Prof. P. C. Ray's contributions and ancient metallurgical techniques, and document them through practical demonstrations, experiments, or group-based activities. **C02**-Understanding: Students will develop an understanding of Ayurvedic chemistry and traditional technologies, connecting ancient Indian science to present-day chemical principles. **CO3**-Application: Students will develop an understanding of Ayurvedic chemistry and traditional technologies, connecting ancient Indian science to present-day chemical principles. **C04**-Analysis: Students will gain the ability to analyse scientific data on photochemical and electrochemical reactions, identifying factors that affect reaction behaviours. **CO5**-Evaluation: Students will evaluate traditional and modern electrochemical practices through experimental work and collaborative analysis, drawing evidence-based conclusions about their scientific and societal impact. **C06**-Creation: After studying this course, students will be able to synthesize ideas from ancient Indian science and modern chemistry to propose innovative, sustainable chemical solutions.

Mapping Between COs and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
	CO1	✓	✓	✓		✓	✓		✓
	CO2	✓		✓	✓		✓	✓	✓
	CO3	✓	✓	✓	✓	✓		✓	
	CO4	✓		✓	✓	✓	✓	✓	
	CO5	✓	✓	✓	✓	✓	✓		✓
	CO6	✓			✓	✓	✓	✓	✓

Unit – 1

Prof. P. C. Ray: A Pioneer in Reviving Ancient Indian Metallurgy and Chemistry [15 Hrs.]

Contribution: Prof. Prafulla Chandra Ray, the "Father of Indian Chemistry," highlighted India's advanced metallurgical practices and linked ancient mining and metalworking techniques showcasing India's scientific achievements and inspiring modern research.

- Wootz steel: The rise and fall of a great Indian technology.
- Mining and ore extraction.
- Metal and metal working technology.
- Gold extraction process.
- Zinc production.
- Copper mining and extraction process.
- Extraction of copper for Ayurvedic purposes.
- Copper alloys, Mercury, Lead and silver.
- Iron and steel in India.

Unit – 2

Panchmahabhuta and organic compounds [15 Hrs.]

- Introduction to Ayurveda & Organic Chemistry.
- Chemical composition of Ayurvedic herbs.
- Scientific validation of Ayurvedic Principles.
- Applications & Future directions.

Unit - 3

[A] Theories of reaction rate [6 Hrs.]

- Derivation of Arrhenius equation.
- Collision theory of reaction rate.
- Energy of activation including determination.
- Effect of catalysis on energy activation.
- Numerical problems.

[B] Photochemistry [9 Hrs.]

- Introduction of photochemistry.
- Basics of electromagnetic radiations and photons.
- Thermal and photochemical law (Grothaus Draper's law (b) Lambert: Beer's law, (c) Einstein's law of photochemical equivalence.
- Quantum yield or quantum efficiency, Numerical.
- Primary and secondary photochemical reactions.
- Factors affecting quantum yield (i.e. temperature, light intensity and inert gases), isomeric changes, polymerization
- Photosensitization
- Photophysical process (Fluorescence, Phosphorescence), Chemiluminescence
- Factors affecting Fluorescence, Phosphorescence.

unit -4

Electrolytes [15 Hrs.]

- lons in solution, Formation of ions in solution
- Metallic conductance.
- Electrolytic conductance, Electrolysis.
- Migration of ions.
- Transport number of ions and its determination by moving boundary method.

- Numerical problems.
- Kohlrausch law of ionic conductance.

- Application of Kohlrausch law to

(a) Determination of degree of dissociation of weak electrolyte.

(b) Determination of equivalent conductivity of weak electrolyte at infinite dilution.

(c) Determination of solubility and solubility product of sparingly soluble salts.

(d) Determination of ionic product of water.

- Numerical problems

Reference books:

1) A History of Hindu Chemistry from the Earliest Times to the Middle of the Sixteenth Century A.D. by Prof. P.C. Ray, (1902) published by The Bengal Chemical and Pharmaceutical Works.
2) History of Science and Technology in Ancient India: Volume II - Metal Technology by Debiprasad Chattopadhyaya (1986) published by Firma KLM, Calcutta.
3) The Rustless Wonder: A Study of the Iron Pillar at Delhi
4) Introduction to Indian knowledge system concepts and Applications by B. Mahadevan, Vinayak Rajat Bhatt, Nagendra Pavana R.N.
5) Baldev Upadhya, Samskrta Sastrom ka Itihas, Chowkhambha, Varansi, 2010.
6) D.M. Bose, S. N. Sen and B. V. Subbarayappa, Eds. A Concise History of Science of India, 2nd edition, University press, Hydrabad, 2010.
7) Astangahrdaya Vol. 1 Sutrasthana and Sarirasthana, Translated by K. R. Srikantha Murthy, Vol 1 Krishnadas Academy, Varansi, 1991.
8) Dharampal, Some aspects of earlier Indian Society and polity and their relevance today, New quest Publications, Pune, 1987.
9) Dharampal, Indian science and technology in the eighteenth century; Some contemporary European accounts, Dharampal classic series, Rashtrotthana Sahitya, Bengaluru, 2021
10) Physical chemistry by Gurdeep Raj.
11) Physical chemistry by K.L. Kapoor
12) Advance physical chemistry by D.N. Bajpai
13) A textbook of physical chemistry by A. S. Negi & Anand
14) A textbook of physical chemistry by S. C. Khetpal & Yogesh Sharma.

15) Physical chemistry by Puri, Sharma, and Pathania
16) Elemental physical chemistry by Glasston & Lewis
17) Physical chemistry by B.K. Sharma
18) Essential of physical chemistry by Bahl, Tuli & Bahl
19) Physical chemistry by K.K. Sharma & I.K.Sharma
20) Physical chemistry by P.L.Soni & O.P.Dharamraj

[Subject code-2403000503012002]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus effective from June, 2026
For
S. Y. B. Sc. Semester- III

Chemistry Major Course Practical

Gravimetric & Volumetric Estimation
Total credit: 02

Total Hrs: Practical: 60

CHP-MJ-301

Course Code	Total Credits Of the Course	Title of the Course	Hours per Week
CHP-MJ-301	2	Gravimetric & Volumetric Estimation	4 hrs.

1.	Apply analytical techniques including gravimetric and volumetric methods to accurately determine the concentration of metals and other compounds in various chemical solutions, demonstrating proficiency in quantitative chemical analysis and laboratory skills.

Gravimetric Estimation: (Any Three)

(1) Fe^{2+} as Fe_2O_3 (Given solution of $Fe\text{-}NH_4\text{-}SO_4 + H_2SO_4$)

(2) Ba^{2+} as $BaSO_4$ (Given solution of $BaCl_2\ 2H_2O$ +HCl)

(3) Ni^{2+}as $Ni(DMG)_2$ (Given solution of $NiCl_2\ 6H_2O$ +HCl)

(4) Al^{+3} as Al_2O_3 from $Al_2(SO_4)_3$

Volumetric Estimation: (Any Four)

(1) To determine the amount of Nickel by EDTA.

(2) To determine the amount of Copper by EDTA.

(3) To determine the amount of Zinc by EDTA.

(4) Determination of total hardness of water by EDTA.

(5) Estimation of Bismuth

(6) Estimation of Cu^{+} (Volumetrically) from Brass Alloy

(7) Estimation of chlorine in Bleaching Powder

(8) % Purity of Mn^{+}

(9) Estimation of Fe from Hematite

(10) Estimation of Aluminium by back titration.

[Subject code-2403000503022002]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus effective from June, 2026

For
S. Y. B. Sc. Semester- III

Chemistry Major Course practical

Organic Spotting & Physical Exercise

Total credit: 02

Total Hrs: Practical: 60

CHP-MJ-302

Course Code	Total Credits of the Course	Title of the Course	Hours per Week
CHP-MJ-302	2	Organic Spotting & Physical Exercise	4 hrs.

Course Outcome: Having Completed this course, the learner will be able to understand	
1.	Identify and classify a diverse range of organic compounds through qualitative analysis, applying knowledge of functional groups and chemical properties, thereby enhancing proficiency in organic chemistry laboratory techniques and analysis.
2.	Develop proficiency in experimental techniques such as pH-metry, conductometric titrations, viscosity measurements, chemical kinetics, and partition coefficient determination to analyze physical properties of substances, fostering practical skills

ORGANIC SPOTTING [Minimum 08 organic substances]

ACID : Salicylic acid, Cinnamic acid, Phenyl acetic acid, Sulphanilic acid.

PHENOL: α -Naphthol, β -Naphthol, o-Nitrophenol

BASE: o-Nitroaniline, m-Nitroaniline, p-Nitroaniline, p-Toludine, p-Chloroaniline,

Diphenyl amine, Dimethylaniline, Diethylaniline

NEUTRAL:

ALDEHYDE: Glucose, Benzaldehyde

KETONE: Methylethylketone, Acetophenone

ESTER: Ethylacetate, Butylacetate

ALCOHOL: Ethanol, Butanol

HYDROCARBON: Anthracene, Naphthalene, Diphenyl

NITRO HYDROCARBON: m-Dinitrobenzene,Nitrobenzene

HALOGENATED HYDROCARBON: Chlorobenzene, Bromobenzene, p-Dichlorobenzene

AMIDE: Benzamide, Thiourea

ANILIDE: Acetanilide

PHYSICAL EXERCISES: (Any Four)

(At least 2 electrical instrumental exercise should be performed per Semester)

1. pH metry: To determine the normality of weak acid pH-metrically using strong base. [$CH_3COOH \rightarrow NaOH$]

2 Conductometric Titration: To determine the normality of strong acid condutometrically using strong base [$HCl \rightarrow NaOH$]

3 Conductometric Titration: To determine the solubility of $PbSO_4$.

4 Viscosity : To determine the viscosity of the liquids and the % of unknown mixture 'C'.

5. Chemical kinetics- Ester hydrolysis: To study the hydrolysis of methyl acetate at two different concentrations in 0.5N HCl. [mono molecular reaction]
6. Partition co-efficient

[Subject code for Theory-2403000503042001]

[Subject code for Practical-2403000503042002]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus effective from June, 2026
For
S. Y. B. Sc. Semester- III

Multidisciplinary Course (MDC)
Petrochemicals
Total credit: 02 (Theory-2)

Total Hrs: Theory-30

CH-MDC-301 (Theory)

Course Code	Total Credits of the Course	Title of the Course	Hours per Week
CH-MDC-301	2	Petrochemicals	2 hrs.

Course Outcome: Having Completed this course, the learner will be able to understand	
1.	Recall the types of petrochemicals derived from the C1 cut of petroleum and list the primary industrial applications of each petrochemical and explain the chemical processes involved in the manufacture of Methanol, Synthesis gas, and other specified petrochemicals from C1 cut of petroleum.
2.	Explain the combustion properties and energy efficiency of different types of fuels used in industrial applications.

UNIT – I **15 Hrs**

Petrochemicals obtained from C1 cut of petroleum manufacture and application of Methanol, Synthesis gas, Ammonia, HCN, Formaldehyde, Hexamethylene tetramine, Chlorinated methanes, Perchloro ethylene, CS_2.

UNIT – II **15 Hrs**

Industrial Fuels: Introduction, Characteristics of Ideal Fuel, Classification of Fuel: Natural Solid fuels- Coal, other natural fuels, Artificial fuels: Artificial Solid fuels: Wood charcoal, coke, Briquette, Artificial Liquid fuels: Petrol, ethyl alcohol, Methyl alcohol, Artificial fuel from waste, Hydrogen- Fuel of tomorrow, Fuel for rocket (Hydrazine).

Reference Books:

1) Introduction to petrochemicals by Sukumar Maiti oxford and IBH pubs co. New Delhi.
2) A text on petrochemicals by Dr. B. K. Bhaskar Rao, Khanna pubs. New Delhi.

3) Chemicals from petroleum by A. L. Wadams (ELBS and John Murray London)
4) Petrochemicals by S. L. Venkatewarn (Colour pubs. Pvt. Ltd. Bombay)
5) Petrochemicals digest by MGK Manon (Asia Publishing house Bombay)
6) Hand book of industrial chemicals Vol-I by K. M. Shah (Multi tech publishing co. 15 Yogesh, Hingwala lane, Ghatkoper (E) Bombay-400077)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus effective from June, 2026
For
S. Y. B. Sc. Semester- III

Multidisciplinary Course (MDC) Practical
Total credit: 02

Total Hrs: Practical: 60

CHP-MDC-301

Course Code	Total Credits of the Course	Title of the Course	Hours per Week
CHP-MDC-301	2	Chemistry practicals	4 hrs.

Course Outcome: Having Completed this course, the learner will be able to understand	
1.	Demonstrate proficiency in performing organic preparations
2.	Analyze and classify a variety of water-insoluble organic solid binary mixtures using appropriate separation and identification techniques.

(A) Organic Preparation: (Minimum 5)

1. Nitration of Salicylic acid
2. Bromination of Aniline
3. m-Dinitrobenzene from Nitrobenzene
4. Osazone derivative from Glucose
5. Naphthalene picrate from Naphthalene.
6. Phenyl hydrazone derivative of Ketone

N.B. Preparation should be submitted with sample and justification (M.P. & C.T.)

(B) Type of water insoluble organic solid binary mixture (Minimum 6 Mixtures)

[Subject code for Theory-2403000503062001]

[Subject code for Practical-2403000503062002]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus effective from June, 2026
For
S. Y. B. Sc. Semester- III

Skill Enhancement Course (SEC)
Chemistry in Consumer Protection
Total credit: 01 (Theory-1)

Total Hrs: Theory-15

CH-SEC-301 (Theory)

Course Code	Total Credits of the Course	Title of the Course	Hours per Week
CH-SEC-301	1	Chemistry in Consumer Protection	1 hr

Course Outcome: Having Completed this course, the learner will be able to understand	
1.	Define adulteration and elucidate the reasons behind food adulteration and classify adulterants commonly found in food items
2.	Discuss methods for detecting adulterants in different food categories using chemical tests and instrumental techniques and Apply chemical knowledge and practical skills to identify specific adulterants in various food products through laboratory experiments.

UNIT-I **[15 hrs]**

Chemistry in Consumer Protection:

Define Adulteration; Reasons of Adulteration, Types of Adulterants, Discussion Methods for detection of different adulterants in some common food items

(1) Milk

(2) Milk products: Sweet curd, Rabdi, Khoa & its product, Chhana or Paneer, Ghee, Cottage cheese, condensed milk, Khoa, Ghee, Butter

(3) Oil and Fats Oil and Fats, Mustard oil, Edible oil, Coconut oil

(4) Sweetening agents: Sugar, Pithi sugar, Honey, Jaggery, Bura sugar

(5) Food grain and their product: (Wheat, Rice, Maize, Jowar, Bajra, Chhana and Barley etc.), Maida, Wheat flour, Besan, Suji (Rawa) Dal whole and Spilt, pulses

(6) Spices: Wholes pices, Black Pepper, Cloves, Mustard seed and Powdered spices

(7) Turmeric whole and Turmeric powder

(8) Chilli powder, Asafoetida,

(9) Miscellaneous Product: Common salt, Tea, Coffee powder

Reference Books:

(1) http://www.fssi.gov.in/Portals/0/pdf/Final-test-manual-part-II

(2) Vogel's qualitative Inorganic analysis

(3) Vogel's qualitative Organic analysis

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus effective from June, 2026

For
S. Y. B. Sc. Semester- III

Skill Enhancement Course (SEC) Practical

Total credit: 01 (Practical-1)

Total Hrs: Practical-30

CHP-SEC-301 (Practical)

Course Code	Total Credits of the Course	Title of the Course	Hours per Week
CHP-SEC-301	1	SEC Practical	2 hr

Course Outcome: Having Completed this course, the learner will be able to understand	
1.	Analyze experimental results to determine the presence and quantity of adulterants in food samples.
2.	Interpret data obtained from qualitative tests to make informed decisions regarding the purity and authenticity of food products.

PRACTICALS

(1) Identification of adulterants in milk products (Sweet curd, Rabdi, Khoa & its product, Chhana or Paneer, Ghee, Cottage cheese, condensed milk, Khoa, Ghee, Butter)

(2) Identification of adulterants in Oil and fats (Mustard oil, Edible oil, Coconut oil)

(3) Identification of adulterants in Sweetening agents (Sugar, Pithi sugar, Honey, Jaggery, Bura sugar)

(4) Identification of adulterants in Spices (Wholes pices, Black Pepper, Cloves, Mustard seed and Powdered spices)

(5) Identification of adulterants in Tea and Coffee powder

(6) Identification of adulterants in Turmeric and Chili powder

(7) Identification of adulterants in Asafoetida

Note: Identification to be performed from each category (Any 7)

Reference Books:

(1) http://www.fssi.gov.in/Portals/0/pdf/Final-test-manual-part-II
(2) Vogel's qualitative Inorganic analysis
(3) Vogel's qualitative Organic analysis