

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus 2012

S.Y.B.Sc., CBCS SEMESTER III & IV

CHEMISTRY THEORY

Paper-III - - - INORGANIC CHEMISTRY

Paper-IV - - - ORGANIC CHEMISTRY

Paper V - - - PHYSICAL CHEMISTRY

CHEMISTRY PRACTICALS

Based on Theory

Paper-III

Paper-IV

Paper- V

Veer-Narmad South Gujarat University, Surat

S.Y.B.Sc. SEMISTER-III

Chemistry

Paper-III [Inorganic Chemistry]

(syllabus - 2012)

50 Marks (External)

Total = 30 Hrs.

20 Marks (Internal
Exam.)

Time: 2 Hrs. (Uni.

UNIT - I

Topic - 1 Chemistry of Elements of first transition series: [6 Hrs.]

Characteristic properties of d-block elements, properties of the elements of the first transition series, their binary compounds and complexes illustrating relative stability of their oxidation states.

Topic - 2 Electronic Configuration of atom ; L-S coupling : [4 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+} and Co^{2+} , V, V^{+3} , Cl. -

UNIT - II

Topic - 1 Purification of Water: [5 Hrs.]

- 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

Topic - 2

Paper Chromatography: [5 Hrs.]

- Principle, chromatography
- Classification of chromatography according to mobile phase and stationary phase.
- Types of paper chromatography, one dimensional, two dimensional and radial paper

chromatography, Rf value, Use of paper chromatography in Inorganic analysis (I, IIA, IIIB, IV and halides)

UNIT - III

Topic - 1

Quantum Mechanics:

[10 Hrs.]

(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, Hermitian Operators.

Derivation of Hamiltonian equation, Hamiltonian Operators for H-atom H^{2+} , He^{2+} and Li.

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

Veer-Narmad South Gujarat University, Surat
S.Y.B.Sc. SEMESTER-III
Chemistry
Paper-IV [Organic Chemistry]
(syllabus - 2012)

50 Marks (External)
20 Marks (Internal)

Total = 30 Hrs.
Time : 2 Hrs.
(Uni. Exam.)

UNIT - I

Topic - 1

The General nature, Reaction mechanism of applications of following reaction : **[7 Hrs.]**

- (1) Michael reaction
- (2) Wolf-Kishner reduction
- (3) Wittig reaction
- (4) Fridel-Craft reaction
- (5) Mannich reaction
- (6) Benzoin reaction (condensation)
- (7) Reimer-Tiemann reaction
- (8) Aldol Condensation.

Topic – 2

Elimination Reaction :

[3 Hrs.]

Beta-elimination, E_2 mechanism, E_1 mechanism, stereo chemistry of elimination reactions, elimination Vs substitution. Alpha elimination: Generation of carbenes and ketenes.

UNIT - II

Topic - 1

Heterocyclic Compound :

[5 Hrs.]

Classification and nomenclature.

- (a) Benzopyrrole (Indole) : Occurrence, synthesis (Fischer Indole synthesis, Reissert synthesis), Electrophilic substitution (nitration, sulfonation, halogenation) reactions. Gattermann reaction Riemer Tiemann reaction, Mannich reaction.
 - (b) Benzofuran (Coumarone) : Occurrence, synthesis, substitution reactions (nitration, sulfonation, halogenation, acylation) reduction, reactions with ozone and sodium.
 - (c) Benzothiophene (thionaphthene) occurrence, synthesis, substitution reactions (nitration, sulfonation, bromination acylation, chloromethylation), reactions with phenyl lithium, carbon dioxide diazodiacetate, sodium and other sulfur, Raneynickel.
 - (d) Quinoline : Synthesis (Skraup's synthesis) reduction and oxidation of Quinoline, electrophilic substitution reactions, nitration sulfonation, halogenation, Friedel Craftt's reaction and nucleophilic substitution reactions.
 - (e) Isoquinoline : Synthesis (Bichler-Naieralsky reaction) electrophilic and nucleophilic reactions, oxidation and reduction reactions of isoquinoline.
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Topic-2

Polycyclic Aromatic Hydrocarbons :

[5 Hrs.]

Classification and nomenclature.

- (a) linear orthofused polycyclic hydrocarbons : Occurrence, synthesis of tetracene, pentacene and hexacene.
 - (b) Nonlinear orthofused polycyclic hydrocarbons Occurrence synthesis of 1, 2 - benzanthracene, 1, 2, 5, 6- dibenzanthracene, 1, 2- benzphenanthrene.
 - (c) ortho and perifused polycyclic hydrocarbons Occurrence and synthesis of pyrene, perylene and coronene.
 - (d) carcinogenic properties of polycyclic hydrocarbons.
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UNIT - III

Topic - 1

Carbohydrates :

[5 Hrs.]

- (a) Determination of configuration of D (+) glucose & D (-) fructose - method of ascending and descending sugar series.
- (b) Objections against open chain structure of D (+) glucose & D (-) fructose - ring structure of them, determination of size of the ring of glucose and fructose.
- (c) Methods of methylating sugars.

Topic-2

Compound Containing Reactive Methylene Group :

[5 Hrs.]

- (a) Malonic ester : preparation from acetic acid and its synthetic applications (n-butiric acid, n- caproic acid, succinic acid, adipic acid cinnamic acid, barbituric acid).
 - (b) Acetoacetic ester (ethylacetoacetate) preparation and synthetic applications (butanone, 1,3 and 1,4 diketone, alicyclic compound).
 - (c) Keto-enol tautomerism : factors affecting Keto-enol tautomerism and its mechanism.
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Reference Books :

- (1) Organic Chemistry by R. T. Morrison 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 & S. 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 S. M. Mukharji & S. P. Singh.
- (7) Organic Chemistry by L. G. Wade Jr. Prentice Hall.

Veer Narmad South Gujarat University, Surat

Second Year B.Sc : Semester-III

Chemistry : Paper-V[PHYSICAL CHEMISTRY]

Syllabus

50 Marks (External)

20 Marks (Internal)

Total = 30 Hrs.

Time : 2 Hrs.

(Uni. Exam.)

Unit-I

[A] THEORIES OF REACTION RATE

[4

Hour]

Derivation of Arrhenius equation.

Collision theory of reaction rate, Energy of activation including determination, effect of catalysis on energy of activation.

Numerical Problems

[B] PHOTOCHEMISTRY

[6

Hour]

Introduction to photochemistry, Basics of electromagnetic radiations, photons, Thermal and Photochemical Laws

(a) Grothus Draper's Law

(b) Lambert Beer's Law

(c) Einstein's Law of photochemical equivalence. Quantum yield or efficiency.

Experimental determination of Quantum yields. Reasons of Low and high quantum yield.

Primary and secondary photochemical reactions. Factors affecting quantum yield.(i.e..temperature, light intensity and inert gases).

Isomeric changes, polymerization, Photosensitization, Photophysical processes [Fluorescence, Phosphorescence] Chemiluminescence. Factor affecting Fluorescence, Phosphorescence

Numerical Problems

Unit II

ELECTROLYTES OR ELECTRO CHEMISTRY [10 Hour]

Ions in solutions, formation of ion in solution metallic conductance, Electrolytic conductance, electrolysis Migration of ions, Transport number of ions and its Determination by moving boundary method.

Kohlraush law of ionic conductance. Application of Kohlraush 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

Unit III

MOLECULAR SPECTROSCOPY [10 Hour]

Electromagnetic radiation with wavelength and energy. Radio frequency, Microwave, IR, UV/visible region,

Pure rotational spectra, Vibrational and Vibrational-Rotational spectra, Raman spectra.

Rotational spectra, calculation of bond-length. Vibrational rotational spectra, Hook's law, vibrational energy level.

Numerical Problems.

References:

1. Physical Chemistry by Gurdeep Raj.
2. Physical Chemistry by K.L.Kapoor Vol.-I to IV. [Pub.Macmilan]
3. Advanced Physical Chemistry by D.N.Bajpai.
4. Text book of Physical Chemistry by S.C.Khetarpal & Yogeshwar Sharma. [Pub. R-Chand]
5. Physical Chemistry by Puri & Sharma [S. Nagin & Co.]
6. A Text Book of Physical Chemistry by A.S.Negi & Anand [New Age International]
7. Physical Chemistry by P.L.Soni & O.P.Dharmraj.
8. Physical Chemistry by B.K.Sharma.
9. Essential of Physical Chemistry by Bahl Tuli & Bahl.
- 10.Elemental Physical Chemistry by Glasston & Lewis.
- 11.Physical Chemistry by K.K. Sharma, L.K.Sharma [Vikas Publication House, New Delhi]

Veer Narmad South Gujarat University, Surat

S.Y.B.Sc. CHEMISTRY : Semester III & IV

Marks Distribution

Paper	External Marks	Internal Marks	Total Marks
Paper-III	50	20	70
Paper-IV	50	20	70
Paper-V	50	20	70
Practical	60	30	90
			300

Internal Marks Distribution :

Exam Type	Test	Assignment/ Journal (5%)	Presence (5%)	Total Marks
Theory	40	10	10	60
Practical	22	4	4	30

Veer Narmad South Gujarat University
B. Sc. Semester - III
New Syllabus in Chemistry
Industrial Chemistry
Generic Elective Course
(Effective from June-2012)
Total 45 Hrs

Unit-I

- A. Synthetic fibers with flowsheet diagram: (15 hrs)
(1) Coprolactam, Nylone-6 (2) HMDA, Adipic acid, Nylone-66 (3) Nylone-12
(4) Tetrafluoroethylene, Teflon (5) Nylone-6, 10 (6) DMT Ethylene Glycol, Terylene
- B. Synthetic Rubber with Flowsheet diagram:
(1) Butadiene, Styrene, Buna-S (2) Acrylonitrile, Buna-N (3) Chloroprene Neoprene
(4) Isoprene, Polyisoprene (5) Silicone Rubber (6) Poly Urethane Rubber
- C. Plastics and Resins with flowsheet diagram:
(1) Ureaformaldehyde resin, Bakelite (2) Vinyl Chloride, PVC (3) Vinyl alcohol, Poly vinyl alcohol
(4) Melamine and melamine resin (5) Bis Phenol A, Epoxy Resin (6) Propylene Polypropylene

Unit-II

- A) Insecticides: (15 hrs)
(1) D.D.T (2) B.H.C (3) 2,4-D (4) 2,4,5-T (5) Aldrin (6) Malathion (7) MCPA
- B) Detergents:
(1) Propyleneteramer (2) ABS (3) LAS
(4) Isoprene, Polyisoprene (5) Silicone Rubber (6) Poly Urethane Rubber
- C) Explosive:
(1) RDX (2) Nitrocellulose (3) Glyceryl trinitrate (4) Trinitro Phenol (5) TNT (6) Ammitol

Unit-III

- A) Synthetic drugs with flowsheet diagram: (15 hrs)
(1) Novacaine (2) Noavlgin (3) Paludrine (4) Paracetamol (5) Sulphathizaole
(6) Benadryl (Diphenyl Hydramine)
- B) Synthetic dyes with flowsheet diagram:
(1) 3-Phenyl, 7-methoxy coumarine (2) Blankophore-B (3) Erichrome Black T
(4) Eosin (5) Alizarine (6) Indanthrene Khaki GG
- C) Synthetic Perfume:
(1) Coumarin (2) Vanilline (3) Muskxylene (4) Musketone (5) Musk Ambrette
- D) Phenol:
(1) Rashing process (2) Cumene process (3) Dow-Toluene air oxidation process
- E) Acetylene
(1) Wulff Process (2) Sachsse Process

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus 2012

S.Y.B.Sc., CBCS SEMESTER III & IV

CHEMISTRY THEORY

Paper-III - - - INORGANIC CHEMISTRY

Paper-IV - - - ORGANIC CHEMISTRY

Paper V - - - PHYSICAL CHEMISTRY

CHEMISTRY PRACTICALS

Based on Theory

Paper-III

Paper-IV

Paper- V

Veer-Narmad South Gujarat University, Surat

S.Y.B.Sc. SEMISTER-IV

Chemistry

Paper-III [Inorganic Chemistry]

(syllabus - 2012)

50 Marks (External)

Total = 30 Hrs.

20 Marks (Internal)

Time: 2 Hrs. (Uni. Exam.)

UNIT-I

Topic - 1

Chemistry of Lanthanide and Actinide Elements : [10
Hrs.]

(A) Lanthanide and Actinide Elements, Electronic configuration, Sources.

- Occurrence, Extraction by solvent and ion exchange, Properties (Spectral and Magnetic).

(B) • Lanthanide contraction, Use of Lanthanide compounds.

- Industrial use Uranium and Plutonium, Misch metal.
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UNIT-II

Topic-I

Hydrogen Bonding : [5 Hrs.]

Theory of hydrogen bonding, classification, importance of hydrogen bonding in ice,

Effect of hydrogen bonding in various fields.

Topic-II Theory of Bonding in Metal Complexes:
[5 Hrs.]

- Theory of bonding in metal complexes (CFT)
- CFSE and its calculations.
- Factors affecting.
- Application of CFT (1) Magnetic Properties

(2) Spectral Properties

UNIT-III

Topic-I

Ion-exchange chromatography: [6
Hrs.]

- Synthesis and Characterization of ion exchanger, Basic requirements of ion exchange resin. Types of ion-exchange resin.
- Technique of ion exchange, Application of ion exchange for Separation.

Topic -II

Bio-Inorganic: Role of metal complexes in Biological systems : [4
Hrs.]

- Introduction, Role of metal ion in different biological processes, Essential, beneficial and toxic metals, Metallo - Porphyrins, Hemoglobin - as Carrier of O₂ and as Carrier of CO₂.
- Myoglobin, Chlorophyll.

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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.
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16. Advanced Inorganic Chemistry by Cotton & Wilkinson John Wihn Wiely.
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19. Industrial Chemistry by B. K. Sharma

Veer-Narmad South Gujarat University, Surat
S.Y.B.Sc. SEMESTER-IV
Chemistry
Paper-IV [Organic Chemistry]
(syllabus - 2012)

50 Marks (External)
20 Marks (Internal)

Total = 30 Hrs.
Time : 2 Hrs.
(Uni. Exam.)

UNIT - I

Topic - 1

Diazonium Salts :

[4 Hrs.]

- (a) Mechanism of diazotisation, reagents for checking completion of diazotisation.
- (b) Nomenclature of Diazonium salts.
- (c) Reactions of Diazonium salts, replacement reactions in which nitrogen is eliminated, its application in the synthesis of aromatic compounds, reaction in which nitrogen atom are retained.
- (d) Laws of coupling, coupling agents, synthesis of diazomino and aminazo compounds.

Topic-2

Organic nitrogen compounds :

[6 Hrs.]

- (a) Preparation and physical properties and chemical reactions of nitriles, isonitriles, carbamates, semi carbazides and their application in synthetic organic chemistry.
- (b) Structure and nomenclature of amines, preparation of aryl amines, physical properties and chemical reactions. Gabriel-phthalimide reaction, Hofmann Bromamide reaction.

UNIT – II

Topic – 1

Carboxylic acid and its derivatives:

[4 Hrs.]

Structure and nomenclature of acid chloride, ester, amides of monocarboxylic acid; method of formation of monocarboxylic acid derivatives and chemical reactions.

Topic-2

(A) Vitamins and Hormones :

[3 Hrs.]

Their definitions, classification, analytical and synthetic evidences to prove the structure of Ascorbic acid and Adrenaline

(B) Use of Reagents :**[3 Hrs.]**

- (a) Anhydrous aluminium chloride
 - (b) NBS
 - (c) Grignard reagents
 - (d) Lithium aluminium hydride
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UNIT – III**Topic - 1****Organic Sulfur Compound :****[4 Hrs.]**

- (a) Aliphatic sulfur compounds : nomenclature, general methods of preparation and reaction of mercaptans, thioethers, sulfinic and sulfonic acid.
- (b) Aromatic sulfonic acid : nomenclature, preparation, reactions and uses of sulfonic acids of toluene.

Topic - 2**Electromagnetic Spectrum****[6 Hrs.]**

UV and visible spectroscopy, ultraviolet absorption spectroscopy, absorption laws (Beer-Lambert law) terminology used in UV and visible spectra, molar absorptivity, types of electronic transitions, effect of conjugation, concept of Chromophore and Auxochrome and Hypsochromic shifts UV spectra of conjugated enes and enones, effect of solvent substitution on electronic transition. Problems based on calculation of λ_{\max} for conjugated dienes and unsaturated carbonyl compounds and substituted Benzene derivatives using relevant rule.

Reference Books :

- (1) Organic Chemistry by R. T. Morrison 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 & S. K. Sharma Goel Pub. House, Merrut.
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- (7) Organic Chemistry by L. G. Wade Jr. P

Veer Narmad South Gujarat University, Surat

Second Year B. Sc. : Semester-IV

Chemistry : Paper-V[PHYSICAL CHEMISTRY]

Syllabus

50 Marks (External)

20 Marks (Internal)

Total = 30 Hrs.

Time : 2 Hrs.

(Uni. Exam.)

Unit-I

[A] PARTITION CO-EFFICIENT

[4 Hour]

Explanation of Nernst distribution law and its conditions for the validity.

Complications arising in distribution law:

- (a) Association of solute in one of the phases.
- (b) Dissociation of solute in one of the phases.
- (c) Dissociation of solute in both the phase.

Derivation of distribution law from Kinetic Consideration explanation of solvent extraction process.

Numerical Problems

[B] ADSORPTION

[6 Hour]

Adsorption and Absorption , Heat of adsorption, Characteristics of adsorption, Physical adsorption and Chemical Adsorption.

Distinction between physical adsorption and chemical adsorption. Freundlich's adsorption isotherm, Langmuir's adsorption isotherm. Catalysis, General features of catalysis.

Heterogeneous catalysis, Adsorption theory of catalysis.

Unit II

THERMODYNAMICS :

[10 Hour]

1. Free energy or work function [Gibbs free energy (G) and Helmholtz free energy (A)]

Derivation of $G = G^0 + RT \ln p$. Relation of ΔG and equilibrium constant K_P (Vant Hoff isotherm)

Derivation of Clapeyron and Clapeyron- Clausius equation.

Application of Clapeyron – Clausius equation in the derivation of Molal elevation constant & Molal depression constant.

Numerical Problems

Unit III

[A] CONDUCTOMETRIC TITRATIONS :

[5 Hour]

Principle, Types of conductometric titrations

- (a) Strong acid V/s strong base
- (b) Strong acid V/s weak base
- (c) Weak acid V/s strong base
- (d) Weak acid V/s weak base
- (e) Mixture of strong acid and weak acid V/s strong base
- (f) Precipitation titrations of
 - (i) BaCl_2 V/s K_2CrO_4
 - (ii) NaCl V/s AgNO_3

Advantages of conductometric titrations over indicator method.

[B] IONIC EQUILIBRIA

[5 Hour]

Relation between degree of hydrolysis, Hydrolysis constant and pH of solutions of

(a) Salts of weak acid and strong base

(b) Salts of strong acid and weak base

(c) Salts of weak acid and weak base

Theories of acid-base indicators. Oswald and Quinonoid theories, choice of indicators, indicator exponent and useful range of pH of an indicator.

Numerical Problems

References:

1. Physical Chemistry by Gurdeep Raj.
2. Physical Chemistry by K. L. Kapoor Vol.-I to IV. [Pub. Macmilan]
3. Advanced Physical Chemistry by D. N. Bajpai.
4. Text book of Physical Chemistry by S. C. Khetarpal & Yogeshwar Sharma. [Pub. R-Chand]
5. Physical Chemistry by Puri & Sharma [S. Nagin & Co.]
6. A Text Book of Physical Chemistry by A.S.Negi & Anand [New Age International]
7. Physical Chemistry by P. L. Soni & O. P. Dharmraj.
8. Physical Chemistry by B. K. Sharma.
9. Essential of Physical Chemistry by Bahl Tuli & Bahl.
10. Elemental Physical Chemistry by Glasston & Lewis.
11. Physical Chemistry by K. K. Sharma, L. K. Sharma [Vikas Publication House, New Delhi]

Veer Narmad South Gujarat University, Surat

S.Y.B.Sc. CHEMISTRY : Semester III & IV

Marks Distribution

Paper	External Marks	Internal Marks	Total Marks
Paper-III	50	20	70
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Paper-V	50	20	70
Practical	60	30	90
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Internal Marks Distribution :

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Theory	40	10	10	60
Practical	22	4	4	30

Veer Narmad South Gujarat University
B. Sc. - Semester IV
New Syllabus in Chemistry
Industrial Chemistry
Generic Elective Course
(Effective from June-2012)

Total-45 Hrs.

Unit-I

- A. Inorganic Chemicals : (15 hrs)
(1) Red Phosphorus (2) Sodium hexametaphosphate(3) PCl_5
(4) Phosphoric acid
- B. Lime, Cement and Refractories
- C. Industrial Preparation and used of
(1) Potassium permanganate(2) Potassium dichromate (3)Titanium dioxide
(4) Bleaching powder by Bachmann's method (5) White lead by dutch method

Unit-II

- A) Fertilizers: (15 hrs)
Definition and classification of fertilizers, Direct and indirect fertilizers, natural and synthetic fertilizer, Symptoms of deficiency of some elements like N ,P and K ,Industrial preparation of:
a. Urea from natural gas
b. Single and triple super phosphate of lime
c. Ammonium sulphate
Hazardous effect of used of Fertilizers and its preventive measures, mixed ertilizers,complex Fertilizers, Fertilizers grads, Fertilizers ratio, Fertilizers condition, Fertilizers filter.
- B) Industrial Fuels:
Natural fuels, Synthetic fuels, Hydrogen- fuel of Tomorrow ,fuel for rocket (hydrazines)

Unit-III

- A) Glasses ,Classification, Properties and uses of glasses (15 hrs)
- B) Non Ferryalloys :
Monel metal, Duralumin, Wood metal, Babbit metal, Phosphorous bronze, Brass, Germansilver.
- C) Fermentation industry:
Manufacturing of Industrial alcohol, Absolute alcohol, beers, wines and liquors, Butyl alcohols and acetone,vinegar and acetic acid, Citric acid, Lactic acid, mono sodium glutamate, lysine, Dihydrxy acetone.