।। सा विद्या या विमुक्तये ।।

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

"ज्ञानतीर्थ" परिसर, विष्णुपूरी, नांदेड - ४३१६०६ (महाराष्ट्र)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

"Dnyanteerth", Vishnupuri, Nanded - 431606 Maharashtra State (INDIA)

Established on 17th September 1994 – Recognized by the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'A' Grade

ACADEMIC (1-BOARD OF STUDIES) SECTION

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संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील द्वितीय वर्षाचे CBCS Pattern नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०२०–२१ पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, **दिनांक २० जून २०२० रोजी संपन्न झालेल्या ४७व्या मा. विद्या परिषद बैठकीतील विषय क्र.११/४७–२०२०**च्या ठरावानुसार प्रस्तुत विद्यापीठाच्या **संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील द्वितीय वर्षाचे** खालील विषयांचे **C.B.C.S. (Choice Based Credit System) Pattern** नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०२०–२१ पासून लागू करण्यात येत आहेत.

1. B.Sc.-II Year-Biophysics	2. B.Sc.-II Year-Bioinformatics
3. B.Sc.-II Year-Biotechnology	4. B.Sc.-II Year-Biotechnology (Vocational)
5. B.Sc.-II Year-Food Science	6. B.Sc.-II Year-Botany
7. B.Sc.-II Year-Horticulture	8. B.Sc.-II Year-Agro Chemical Fertilizers
9. B.Sc.-II Year-Analytical Chemistry	10. B.Sc.-II Year-Biochemistry
11. B.Sc.-II Year-Chemistry	12. B.Sc.-II Year-Dyes & Drugs Chemistry
13. B.Sc.-II Year-Industrial Chemistry	14. B.C.A. (Bachelor of Computer Application)-II Year
15. B.I.T. (Bachelor of Information Technology)-II Year	16. B.Sc.-II Year-Computer Science
17. B.Sc.-II Year-Network Technology	18. B.Sc.-II Year-Computer Application (Optional)
19. B.Sc.-II Year-Computer Science (Optional)	20. B.Sc.-II Year-Information Technology (Optional)
21. B.Sc.-II Year-Software Engineering	22. B.Sc.-II Year-Dairy Science
23. B.Sc.-II Year-Electronics	24. B.Sc.-II Year-Environmental Science
25. B.Sc.-II Year-Fishery Science	26. B.Sc.-II Year-Geology
27. B.Sc.-II Year-Mathematics	28. B.Sc.-II Year-Microbiology
29. B.Sc.-II year Agricultural Microbiology	30. B.Sc.-II Year-Physics
31. B.Sc.-II Year Statistics	32. B.Sc.-II Year-Zoology

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या **www.srtmun.ac.in** या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी.

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.
जा.क्र.: शैक्षणिक–१/परिपत्रक/पदवी–सीबीसीएस अभ्यासक्रम/२०२०–२१/**३३३**

दिनांक : १५.०७.२०२०.

स्वाक्षरित/–
उपकुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

प्रत माहिती व पुढील कार्यवाहीस्तव :
१) मा. कुलसचिव यांचे कार्यालय, प्रस्तुत विद्यापीठ.
२) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.

Swami Ramanand Teerth Marathwada University, Nanded

Faculty of Science & Technology

B. O. S. In Chemistry

B.Sc. Second Year

Semester III & IV

CBCS

In force from – 2020

B. Sc. Second Year (Semester III&IV)

Semester	Course No.	Name of the Course	Instruction Hrs./ week	Total period	CA	ESE	Total Marks	Credits
III	CCIC III (Section A)	Organic & Inorganic Chemistry Paper – VI	03	45	10	40	50	2
	CCIC III (Section B)	Physical & Inorganic Chemistry Paper-VII	03	45	10	40	50	2
	CCICP-II (CCIC-III& IV) (section A)	Practical's based on P-VI & P-VIII Paper-X	04 04	Practical's 8 8	05 05	20 20	25 25	1 1
	SECIC I	SEC I (Any one Skill from Optional)	02	02	**25**	25	50	(02) *
IV	CCIC IV (Section A)	Organic & Inorganic Chemistry Paper – VIII	03	45	10	40	50	2
	CCIC IV (Section B)	Physical & Inorganic Chemistry Paper-IX	03	45	10	40	50	2
	CCICP-III (CCIC-III&IV), (section B)	Practical's based on P-VII & P-IX Paper-XI	04 04	Practical's 08 08	05 05	20 20	25 25	1 1
	SECICII	SEC I (Any one Skill from Optional)	02	02	25	25	50	(02) *
Total credits semester III and IV:								**12(04) ***

Note:

ESE of CCICP II , CCICPE III & SECIC I, SCCIC II should be evaluated annually.

B. Sc. Second Year: Semester-III
Paper-VI, (CCC-III, Section A)
Organic & Inorganic Chemistry

Credits: 02 **Periods: 45**

Part-I (Organic Chemistry)

Unit: I

Name Reaction of Aldehydes and Ketones (With Mechanism): 12P

[A] Condensation Reactions.

1. Aldol Condensation Reaction.
2. Benzoin Condensation Reaction.
3. Knoevenagel Reaction.
4. Mannich Reaction.
5. Perkin Reaction.
6. Reformatsky Reaction.

[B] Reduction Reactions.

1. Clemmensen Reduction Reaction.
2. Meerwein-Pondorf-Verley reduction reaction.
3. Reduction with $LiAlH_4$.

[C] Oxidation Reactions.

1. Baeyer- Villiger Oxidation Reaction.
2. Oppenauer oxidation.

Unit: II

Aromatic Carboxylic and Sulphonic Acids. 06P

1. Introduction and Classification of Aromatic Carboxylic Acids.
2. Synthesis and Chemical Reactions of Following Acids.

[A] Benzoic Acid.

1. Preparations From: (a) Phenyl Cyanide, (b) Toluene.
2. Reactions of Benzoic Acids**:** a) Benzoyl halide formation b) Reduction. C) Nitration.

[B] Anthranilic Acid:

1. Preparations From: (a) Phthalimide, b) o-Nitrotoluene.
2. Reactions of Anthranilic Acids: a) Action of heat, b) Nitrous Acid, c) Action of acetic anhydride / acetyl chloride.

[C] Salicylic Acid:

1. Preparations From: (a) Kolbe's reaction. (b) Reimer-Tiemann reaction.
2. Reactions of Salicylic Acids: a) Bromination, b) Nitration, c) Decarboxylation, d) Reaction with Zn-dust.

[D] Phthalic Acid

1. Preparations From: (a) o-Xylene. (b) Naphthalene.
2. Reactions of Phthalic Acids: a) Action of heat b) Action of $PC1_5$ C) Action of ethanol.

[E] Benzene Sulphonic Acid.

1. Introduction.
2. Preparation of benzene sulphonic acid from benzene with mechanism.

3. Chemical Reactions of benzene sulphonic acid: a) Salt formation b) Formation of sulphonyl chloride, c) Formation of sulphonic ester and amide.
4. Replacement of sulphonic group by: a) Hydroxyl group. b) Cyano group, c) Hydrogen atom d) NH_2 –group.

Unit: III

[A] Introduction to Organometallic Compounds. 03P

1. Organomagnesium Compounds:

1. Preparation of Methyl Magnesium Bromide (CH_3MgBr).
2. Synthetic Applications: Ethanal, 2-Propanone, Ethanoic acid, Methanamine, Acetonitrile, Ethyl ethanoate.

2. Organolithium Compounds:

1. Preparation of Methyl Lithium (CH_3Li) from Methyl Iodide.
2. Synthetic applications: Ethanol, 1-Propanol, 2-Propanol, 2-Methyl-2-Propanol.

3. Organozinc Compounds:

1. Preparation of Diethyl Zinc [$(C_2H_5)_2Zn$] from ethyl iodide.
2. Synthetic applications: Ethane, 2-Butanol, Ethyl methyl ketone, Diethyl mercury.

[B] Organic Synthesis via Enolates: 04P

1. Introduction, Acidity of alpha hydrogen.
2. Synthesis of Ethyl Acetoacetate. [Claisen Condensation Reaction with Mechanism]
3. Ketol-Enol Tautomerism of ethyl acetoacetate.
4. Synthetic Applications of Ethyl Acetoacetate: a) Synthesis of alkyl ethyl acetoacetate by alkylation, b) Synthesis of 2-Butanone, c) Synthesis of Acetyl acetone, d) Synthesis of Propanoic acid, e) Synthesis of Succinic acid.

Unit: IV

Oils, Fats, Soaps and Detergents: 05P

Introduction, Chemical nature, General physical properties and chemical properties.

A] Oils and Fats:

a) Hydrolysis
b) Hydrogenation
c) Hydrogenolysis
d) trans-Esterification
e) Rancidity and autoxidation
f) Analysis of Fats and Oils i) Saponification value, ii) Iodine value

B] Soaps

1. Introduction,
2. Manufacture of soaps by i) Kettles process, ii) Hydrolyser process,
3. Cleansing action of soap.

C] Synthetic Detergents.

1. Introduction,
2. Synthetic detergent classification: i) Anionic, ii) Cationic, iii) Non-ionic.
3. Synthetic detergent versus soaps, Soft versus Hard detergents.

Part-II (Inorganic Chemistry)

Unit:-V

[A] Theory of Qualitative Analysis: 09P

a) Introduction: Definition of qualitative analysis, macro, micro and semimicro qualitative analysis, radicals, acidic and basic radicals.

b) Role of sodium carbonate extract in qualitative analysis.

c) Interfering radicals. Removal of interfering radicals such as oxalate, borate, fluoride and phosphate.

d) Use of solubility product, common ion effect and complex ion formation in the analysis of basic radicals: i) Separation of IIA and IIB, ii) Separation of II and IIIB, iii) Separation of IIIA and IIIB, iv) Separation of Zn^{++} and Mn^{++}, v) Separation of Co^{++} and Ni^{++} vi) Separation of Fe^{+++} and Al^{+++}, vii) Separation of Cu^{++} and Cd^{++}.

e) Use of organic reagents in qualitative analysis: i) 8-Hydroxy quinoline for aluminium, ii) α-Benzoinoxime for copper, iii) Dimethylglyoxime for Nickel, iv) 1,10-Phenonthroline for Iron, v) α-Nitroso-β-naphthol for cobalt.

[B] Non-aqueous Solvents: 06P

a) Introduction

b) Classification of Solvents.

c) Water as a universal solvent

d) Physical properties of solvent: Dipole moment, Dielectric Constant, Trouton's Constant, Viscosity. Melting Point & Boiling Point.

e) Reactions in liquid ammonia as solvent : Auto ionization, Acid-Base, Ammonolysis, Precipitation and ammonation.

f) Reactions in liquid SO_2: Autoionization, Acid-Base, Solvolysis, Precipitation and Solvation.

Reference books:

1. Organic chemistry by Morrison and Boyd, Print ice hall.
2. Organic chemistry by L.G. Wade. Print ice hall.
3. Organic chemistry Vol. I, II, III by S. M. Mukharji, S. P. Sing and R. P. Kapoor
4. Fundamental of organic chemistr y b y Solomon, John willey
5. A Text book of organic chemistry by Bahl and Bahl.
6. A Text book of organic chemistry by P. L. Soni.
7. A Text book of organic chemistry by Tewari Mehrotra.
8. Stereochemistry by P. S. Kalsi.
9. Organic chemistry by I. L. Finar.
10. Principles of Inorganic Chemistry by Puri, Sharma and Kaliya.
11. Advanced inorganic chemistry by Gurudeep Raj and ChatwalAnand.
12. Advanced inorganic chemistry vol. II by Satyaprakash, Tuli, Basu and Madan.
13. Inorganic Chemistry by Huheey, Keiter and Keiter.
14. Nuclear Chemistry by Arnikar.
15. Concise Inorganic Chemistry by J. D. Lee.
16. Vogel's Qualitative Inorganic Analysis (Seventh Eddition),
17. A text book of Practical Chemistry for B. Sc. By V. V. Nadkarny, A. N. Kothare and Y. V. Lawande.
18. Advanced practical inorganic Chemistry by O. P. Agarwal
19. Basic Inorganic Chemistry by F. A. Cotton, G. Wilkinson and P. L. Gaus.
20. Inorganic Chemistry by A. G. Sharp.
21. Inorganic Chemistry by G. L. Miessler and D. A. Tarr.
22. Chemistry for degree students by Dr. R.L. Madan, (S. Chand).
23. Modern Organic Chemistry by M. K. Jain and S. C. Sharma.

Objectives:

- Students are acquainted with various name reactions and their mechanism on aldehydes and ketones.
- Students are familiar with the synthesis and chemical transformations of aromatic carboxylic and sulphonic acids.
- Student develops the primary knowledge about organometallic compounds and their applications.
- Students understand the importance of ethyl acetoacetate an active methylene compound, its synthesis and applications.
- Students are recognizable with oils, fats, soaps and detergents used in day today life.
- Students known about the qualitative analysis of metals and their related salts.
- Students recognized the importance of solvents in chemical reactions.

Outcomes:

- Learn the mechanism of name reactions.
- Know the Synthesis, and Reactions of Aromatic Carboxylic and Sulphonic acids.
- Know the Synthesis, and Reactions of Organometallic compounds.
- Learn the synthesis, mechanism, applications of active methylene compounds.
- Gathering basic knowledge of Oils, Fats, Soaps and Detergents.
- Understand the basic principle and application of Qualitative Analysis.
- Know the Classification, Properties of Non- aqueous solvents.

B. Sc. Second Year: Semester-III
Paper-VII, (CCC III, Section B)
Physical & Inorganic Chemistry

Credits:02 **Periods: 45**

Part I (Physical Chemistry)

Unit :- I **10.**
Atomic Structure and Wave Mechanics

1.1 Planck's quantum theory.
1.2 Photoelectric effect, explanation on the basis of quantum theory.
1.3 Compton Effect: Statement, explanation.
1.4 de-Broglie hypothesis; derivation of de-Broglie equation, explanation.
1.5 Davisson-Germer experiment.
1.6 Heisenberg's uncertainty principle: Statement, explanation.
1.7 Schrodinger wave equation; Derivation in time independent form and Laplacian operator form, Physical significance of wave function (Ψ) and (Ψ2).
1.8 Numerical on de-Broglie equation.

Unit :- II **05**
Thermodynamics:

2.1 Introduction to First law of thermodynamics.
2.2 Joule's law. Joule-Thomson effect.
2.3 Need for second law of thermodynamics.
2.4 Different statements of second law ofthermodynamics.
2.5Third law of thermodynamics, Nernst heat theorem.

Unit:- III
Concept-of-entropy: **06**

3.1 Introduction, Definition, Mathematical Expression, Unit.Entropy as a state function.
3.2 Entropy change in Physical transformations:
(i) Fusion of a solid. (ii) Vaporization of aliquid. (iii) Transition from one crystalline form to another.
3.3 Entropy changes for an ideal gas as a function of V and T and as a function of P and T.
3.4 Physical significance of entropy.
3.5 Numerical on entropy change in physical transformations.

Unit:- IV **09**
Phase equilibrium

4.1 Phase rule, Statement and explanation of the terms-phase, component and degree of freedom.
4.2 Phase equilibria of one component system**:** Water system, Sulphursystem.
4.3 Phase equilibria of two component system: Pb-Ag system, significance of lead – silver system.
4.4Solubility of partially miscible liquids: Critical solution temperature (CST) OR Consolute temperature, upper critical solution temperature (UCST).Lowers critical solution temperature(LCST).
4.5 Phenol water system. Effect of impurities on critical solution temperature.

Part II (Inorganic Chemistry)

Unit:- V

[A] Nuclear Chemistry: . . 10

a) Introduction, composition of nucleus and nuclear size.
b) Classification of nuclides: Isotopes, isobars, isotones, isotones and isomers.
c) Nuclear Stability: Odd and even number of protons and neutrons, N/Z ratio, magic number, packing fractions (Numerical), mass defect (Numerical), nuclear binding energy (Numerical) and mean nuclear binding energy (Numerical).
d) Release of nuclear energy:
i) Nuclear fission reaction, nuclear fuels and plutonium bomb.
ii) Nuclear fusion reaction, the energy of sun, hydrogen bomb.
e) Definition of radioactivity, characteristics of α, β, and γ particles, group displacement law.
f) Application of radioisotopes in medicine, agriculture, industry, and carbon dating.

[B] Theory of Gravimetric Analysis. . 05

a) Introduction , definition of gravimetric analysis.
b) Steps involved in gravimetric analysis
c) Precipitation, Conditions for Precipitation
d) Types of precipitates.
e) Factors affecting precipitation such as temperature and pH, Solubility and Solubility Product.
f) Different Steps involved in gravimetric analysis:
i) Precipitation, ii) Digestion , iii) Filtration & Washing, iv) Drying,v) Ignition &Inceneration, vi) Weighing.

Reference Books:

1. Physical Chemistry by G. M. Barrow (Tata Mc-Graw Hill publishing Co., Ltd.)
2. Elements of Physical Chemistry by S. Glasstone& D. Lewis (D.van nostrand co. Inc.)
3. Physical Chemistry by W. J. Moore (Orient Longman).
4. Principles of Physical Chemistry by S. H. Maron and C. F. Prutton. (Oxford & IBH Publishing Co.)
5. University General Chemistry by C. N. R. Rao (Mc-Millan).
6. Elements of Physical Chemistry by P. W. Atkins. (Oxford University Press).
7. Physical Chemistry by R. A. Alberty (Wiley Eastern Ltd.).
8. Physical Chemistry through problems by S. K. Dogra, D. Dogra(Wiley Eastern Ltd)
9. Principles of Physical Chemistry by Puri, Sharma and Pathania (Vishal Publication Jallandher,Delhi)
10. Physical Chemistry by A. J. Mee. ELBS & Heinemann Educational Books Ltd.
11. Essentials of Physical Chemistry by ArunBhal, B. S. Bahl and G. D. Tuli. (S. Chand)
12. Chemical Kinetics by K. J. Laidler (Tata Mc-Graw Hill Publishing Co. Ltd).
13. Text Book of Physical Chemistry by Soni-Dharmarha.
14. A Text Book Physical Chemistry by S. Glasstone, (Mac Millan.)
15. Advanced Physical Chemistry by D.N.Bajpai. (S.Chand)
16. Advanced Physical Chemistry by Gurdeep Raj.(Goel publishing house, Meerut).
17. Principles of Inorganic Chemistry by Puri, Sharma and Kaliya.
18. Advanced inorganic chemistry by Gurudeep Raj and ChatwalAnand.
19. Advanced inorganic chemistry vol. II by Satyaprakash, Tuli, Basu and Madan.
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OBJECTIVES:

- Aim of this course to offer a broad view on the fundamental Atomic structure and wave. Mechanics to understand the principles, hypothesis, derivations, expressions and laws.
- The course introduces the students to the concept of entropy and laws of thermodynamics.
- This course gives the knowledge about atomic nuclear structure & its energy.
- The course introduced the separation method of gravimetric analysis.

OUTCOMES:

After completion of these courses students should be able to,

- Write an expression of Davisson-Germer experiment.
- Derive Schrondinger wave equation.
- Understand De-Broglie's hypothesis and uncertainty principle.
- Solve the numerical problems based on De-Broglie.
- Understand concept of entropy.
- Understand statements of first, second and third law of thermodynamics.
- Know the meaning of phase, component and degree of freedom.
- Know the nuclear structure & different energy of nuclear.
- Understand the different steps & procedure in the gravimetric separation method.

B. Sc. Second Year: Semester- III &IV
CCCP II (CCC III & IV, Section A)
Practical based on P-VI & P-VIII
Laboratory Course- Paper-X

Credits: 02 **Periods: 120**

Note: At least sixteen experiments should be taken.

Part-I (Organic Chemistry)

1. Only demonstration

i) Determination of Rf values of O, M and P-nitro aniline.
ii) Separation of benzene and water by distillation method.

2. Qualitative analysis: Identification of following organic compounds.
(Two from each of the following)

a) Acids: Benzoic acid, Phthalic acid, Salicylic acid, Cinnamic acid, o-chloro benzoic acid.
b) Base: Aniline, P-nitroaniline, m-nitroaniline , resorcinol, P-toludiene.
c) Phenols: Phenol, α-naphthol, β-naphthol, p-cresol, m-nitrophenol.
d) Neutral: Naphthalene, Anthracene, Acetanilide, m-dinitrobenzene, Nitrobenzene.

3. **Quantitative analysis: (estimation) any four.**

a) Estimation of glycine by Sorenson's method.
b) Estimation of phenol by bromination method.
C) Estimation of glucose by iodination method.
d) Estimation of unsaturation (cinnamic acid).
e) Estimation of saponification value of an oil.
f) Estimation of iodine value of an oil.
g) Estimation of vitamin-C
h) Estimation of formaldehyde.

Part-II (Inorganic Chemistry)

1) Determine volumetrically the amounts of sodium carbonate and sodium hydroxide present together in the given solution provided 0.1 N HCl solution
2) Determine the percentage of $CaCO_3$ in the chalk sample, provided 1 N HCl and 0.1N NaOH
3) Estimate the strength of the given sample of $KMnO_4$ Solution in g/lit. Prepare a standard solution of N/10 Mohr's salt or N/10 Sodium Oxalate solution
4) Estimate volumetrically the strength of Ferrous and ferric ion in the given solution provided N/10 $KMnO_4$ Solution
5) Determine the strength in g/lit of each of HCl and HNO_3 present together in the given solution. Provided N/10 NaOH and N/20 $AgNO_3$
6) Determination of Nickel using murexide as an indicator (Direct method)
7) Prepare standard solution of Zn ion standardize the give EDTA solution and estimate the amount of unknown Zn ion concentration
8) To determine the total, permanent and temporary hardness of water by complexometric method using EDTA.

Objectives:

- To trained the thin layer chromatography and distillation techniques.
- Become skilled for qualitative analysis of organic compounds.
- Taught to do the quantitative analysis by estimations of organic molecules.
- Gain the practical knowledge for volumetric analysis.

Outcomes:

- Learn basics of thin layer chromatography and distillation.
- Learn fundamentals of organic qualitative analysis.
- Learn about organic estimations.
- Basics of volumetric analysis.

B. Sc. Second Year: Semester-IV

Paper-VIII, (CCC IV, Section A)
Organic & Inorganic Chemistry

Credits: 02 **Periods: 45**

Part-I (Organic Chemistry)

Unit:-I
Stereochemistry: **10P**

1. Introduction
2. Concept and Types of isomerism (a) Structural isomerism, (b) Stereoisomerism.
3. Types of Structural isomerism.
4. Types of Stereoisomerism.
5. Optical Isomerism**:** a) Concept of Asymmetric Carbon atom, Chiral centre, b) Optical Activity (Plane polarized light, dextro and laevo forms, racemic mixture), c) Element of Symmetry [Plane, Centre, and Axis], d) Concept of Enantiomers, e) Concept of Diastereomers, f) Racemic Modification, g) Resolution, h) Relative specification of configuration (D and L Notations), i) Absolute specification of configuration (R and S notations) [Examples: i) Lactic acid, ii) Glyceraldehyde, iii) Bromo chloro iodomethane, iv) 2-Chlorobutane, v) 1-Bromo-1-Chloro ethanol, vi) 1-Chloro ethylamine, vii) 1-Chloro-1-propanol, viii) Glyceric acid, ix) α-Deutero ethyl bromide, x) 1-Phenyl ethanol, xi) Mendelic acid, xii) 1-Phenyl ethylchloride, xiii) Lactonitrile, xiv) α-Bromo propanoic acid, xv) 2-Iodo octane and xvi) Cinnamic acid dibromide].
6. Geometrical Isomerism (Cis-trans isomerism), E and Z System of nomenclature [Examples: i) Meleic acid, ii) 1-Chloro-2-bromo-2-iodoethene, iii) 3-Hexene, iv) 1,2-Diphenylethene, v) 2-Pentene, vi) 1-Deuterium hexane, vii) 3-Methyl-3-haxene, viii) Phenyl oxime, ix) 1-Bromo-1,2-dichloroethene, x) 2-Chloro-3-methyl-2-pentenoic acid, xi) Cinnamic acid and xii) Crotonic acid.

Unit:-II
Carbohydrates: **08P**

1. Introduction, Definition, Classification and Nomenclature.
2. Reactions of Monosaccharide (Glucose): a) Addition reactions, b) Ether formation,
c) Reduction of glucose, d) Oxidation of glucose, e) Osazone formation with mechanism.
4. Open and cyclic structure of glucose.
5. Mutarotation with Mechanism.
6. Epimerization.
7. Inter-conversions: a) Glucose to Fructose, b) Fructose to Glucose, c) Glucose to Mannose,
d) Glucose to Arabinose (Ruff Degradation), e) Arabinose to Glucose (Killiani synthesis).
8. Manufacturing of sucrose (sugar) from sugar cane.

Unit:-III
Nitrogen Containing Organic Compounds: **08P**

A] Aromatic Nitro Compounds:

1. Introduction, Nomenclature,
2. Preparation of Nitrobenzene from benzene
3. Physical and Chemical properties of Nitrobenzene.
4. Electrophilic substitution reactions.

5. Reductions: a) in acidic medium, b) In neutral medium, c) In alkaline medium, d) Electrolytic reduction.

B] Aromatic amines:

1. Introduction, Classification, Nomenclature,
2. Methods of preparations of aniline from i) chlorobenzene, ii) phenol, iii), nitrobenzene, iv) from phthalimide
3. Chemical properties: i) Diazotization reaction, ii) Action of carbon disulphide, iii) Action of benzoyl chloride, iv) Formation of Schiff's base, v) Carbylamine reaction, vi) Formation of p-nitroacetanilide
4. Effect of substituent ($-NO_2$, $-OCH_3$, $-CH_3$) on the basicity of aniline.

C] Diazomethane:

1. Introduction.
2. Methods of Preparation from: i) N-nitroso-N-methylurethane, ii) Nitrous oxide and methyl lithium.
3. Reactions of Diazomethane: i) Action of heat, ii) Reaction with mineral acid, iii) Reaction with phenol, iv) Reaction with ethanol and ethanamine, v) Ring expansion (cyclopentanone to cyclohexanone).

D] Urea:

1. Synthesis of urea by a) Wohlers methods and b) From CO_2.
2. Reactions: a) Action of heat, b) Action of nitrous acid, c) Hydrolysis, d) Action of thionyl chloride, e) Action of formaldehyde, f) Action of hydrazine, g) Action of acetyl chloride, h) Salt formation.

Unit:-IV
Applications of Reagents in Organic Synthesis: 04P

A] Osmium Tetraoxide [OsO_4]:
1. Introduction, Preparation.
2. Reactions: a) In the formation of Cis-l,2-diol, b) Acralaldehyde to glyceraldehyde, c) Cis- hydroxylation of maleic acid, d) 9, 10-dihydroxylation of phenanthrene.

B] Ozone [O_3]:
1. Preparation.
2. Reactions: a) Synthesis of aldehydes and ketones, b) Synthesis of dialdehydes and hydroxyl aldehydes, c) In degradation of alcohols.

C] Selenium Dioxide.[SeO_2]:
1. Preparation.
2. Reactions: a) Oxidation of reactive methylene group into Carbonyl group, b) In dehydrogenation reactions, c) allylic hydroxylation and oxidation.

D] Boron Trifluoride [BF_3]

1. Preparation.
2. Reactions, in the formation of: a) acids, b) esters c) diketones, d) Nitration, e) Sulphonation, f) Rearrangement reaction.

Part II (Inorganic Chemistry)

Unit:-V

[A] Chemistry of d-Block Elements: 07P

a) Introduction of d-block Elements
b) General Characteristics of d-Block Elements.
c) Electronic Configuration of First Transition Series Elements.
d) Properties of First Transition Elements: Size, Colour, Metallic, Magnetic, Catalytic properties and complex formation
e) Electronic Configuration of Second & Third Transition Series Elements.
f) Comparison of Second & Third Transition Series Elements with first transition series elements.

[B] Chemistry of f-Block Elements: 08P

1. Lanthanides:

a) Electronic Configuration.
b) Lanthanide Contraction, Consequences of Lanthanide Contraction and cause of lanthanide contraction.
c) Magnetic Properties of Lanthanides.
d) Variation in properties of lanthanides.
e) Comparison of Characteristics of d & f-block elements.
f) Extraction of Lanthanides by ion exchange method.
g) Applications of Lanthanides.

2. Actinides:

a) Electronic Configuration.
b) Properties of Actinides.
c) Comparison with Lanthanides.
d) Extraction of Uranium from Pitchblend.
e) Physical & Chemical Properties of Uranium.

Reference Books:

1. Organic Chemistry by Morrison and Boyd, Print ice hall.
2. Organic Chemistry by L.G. Wade. Print ice hall.
3. Organic Chemistry Vol. I, II, III by S. M. Mukharji, S. P. Sing and R. P. Kapoor
4. Fundamental of organic chemistry by Solomon, John willey
5. A Text book of organic chemistry by Bahl and Bahl.
6. A Text book of organic chemistry by P. L. Soni.
7. Synthetic Organic Chemistry, by: G. R. Chatwal.
8. Organic Chemistry, Reactions, Rearrangements and Reagents, by: O. P. Agarwal
9. Reaction, Rearrangement and Reagents, by: S. N. Sanyal
10. Organic Chemistry 05th edition, by: A. K. Pine.
11. Organic Chemistry, by: Solomons Fryhle
12. A Text book of organic chemistry by Tewari Mehrotra.
13. Stereochemistr y by P. S. Kalsi. [07th edition]
14. Organic chemistry [volume-I] by I. L. Finar.
15. Principles of Inorganic Chemistry by Puri, Sharma and Kaliya.
16. Advanced inorganic chemistry by Gurudeep Raj and ChatwalAnand.
17. Advanced inorganic chemistry vol. II by Satyaprakash, Tuli, Basu and Madan.
18. Inorganic Chemistry by Huheey, Keiter and Keiter.
19. Nuclear Chemistry by Arnikar.
20. Concise Inorganic Chemistry by J. D. Lee.

21. Vogel's Qualitative Inorganic Analysis (Seventh Edition),
21. A text book of Practical Chemistry for B. Sc. By V. V. Nadkarny, A. N. Kothare and Y. V. Lawande.
22. Advanced practical inorganic Chemistry by O. P. Agarwal
23. Basic Inorganic Chemistry by F. A. Cotton, G. Wilkinson and P. L. Gaus.
24. Inorganic Chemistry by A. G. Sharp.
25. Inorganic Chemistry by G. L. Miessler and D. A. Tarr.
26. Chemistry for degree students [B. Sc. II], by Dr. R.L. Madan, (S. Chand).
27. Modern Organic Chemistry by M. K. Jain and S. C. Sharma.

Objectives:

- To gain knowledge of the stereochemistry with different aspects like Structural, Conformational, Optical and Geometrical Isomerism.
- To study the basic concepts about the carbohydrates especially with glucose.
- To known the importance of Nitrogen Containing Organic Compounds.
- To understand the synthesis and application of Reagents in Organic Synthesis.
- To study the Chemistry of d-Block Elements.
- To study the Chemistry of f-Block Elements.

Outcomes:

- Learn the stereoisomerism of Chiral compounds.
- Know the Classification, and Reactions of carbohydrates.
- Know the Synthesis, and Reactions of Nitrogen Compounds.
- Gathering **a**pplications of Reagents in Organic Synthesis.
- Understand the Characteristics of d-Block Elements.
- Know the Characteristics of d-Block Elements.

B. Sc. Second Year: Semester-IV
Paper-IX, (CCC IV, SectionB)
Physical & Inorganic Chemistry

Credits:02 **Periods: 45**

Part I (Physical Chemistry)

Unit:-I Chemical-Kinetics: - **10**

1.1 Introduction: Rate of reaction, Definition and units of rate constant, Factors affecting rate of reaction, Order and Molecularity of reaction.
1.2 Zero order reaction: Rate expression and Characteristics.
1.3 First order reaction: Rate expression and Characteristics.
1.4 Pseudounimolecular reactions.
1.5 Second order reaction: Derivation of rate constant for equal and unequal concentrations of the reactants.
1.6 Characteristics of second order reaction.
1.7 Methods of determination of order of a reaction.
1.8 Arrhenius equation.
1.9 Numericals on half-life method.

Unit:-II Electrochemistry:- **06**

2.1 Introduction, Types of conductors: electronic and electrolytic.
2.2 Conductance of electrolytes: Conductance, Specificresistance, Specific conductance, Equivalent conductance, Molecular conductance and their units.
2.3 Variation of specific and equivalent conductance with dilution, Equivalent conductance atinfinite dilution. Effect of temperature on conductance.
2.4 Strong and weak electrolyte. Arrhenius theory of electrolytic dissociation and its limitations.
2.5 Debye-Huckel theory of strong electrolytes. Relaxation effect and electrophoretic effect,
2.6 Debye-Huckel Onsager's equation and its verification.
2.7 Numericals on Specific conductance, Equivalent conductance and cell constant.

Unit:-III Electrochemistry:-II **06**

3.1 Kohlrausch's law, Applications of Kohlrausch's law:
i) Determination of equivalent conductance at infinite dilution of weak electrolytes.
ii) Determination of degree of dissociation.
iii) Determination of solubility of sparingly soluble salts.
iv) Determination of absolute ionic mobility.
v) Determination of ionic product of water.
3.2 Conductometric titrations:
(i) Strong acid against strong base. (ii) Strong acid against weak base (iii) Weak acid against strong base. (iv)weak acid against weak base(v) Precipitation titration
3.3 Advantages of conductometric titrations.

Unit:-IV Photochemistry:- **08**

4.1 Introduction to photochemistry, types of chemical reactions, difference between thermal and photochemical reactions.
4.2 Lambert-Beer Law: Light absorption by solution, molar extinction coefficient.
4.3 Laws of photochemistry: Grothus-Drapper law, Stark-Einstein law of photochemical equivalence.
4.4 Quantum yield, experimental determination of quantum yield. High and low quantum yield reactions. Reasons for high and low quantum yield.
4.5 Jablonski diagram with qualitative description ofphotochemical process, Fluorescence, phosphorescence, Photosensitized reactions. Chemiluminescence.
4.6 Numericals on quantum yield.

Part II (Inorganic Chemistry)

Unit:-V

[A] Chemistry of Non-transition elements **05**

a) Silicates: Definition, Basic Unit of silicate and classification on the basis of basic unit and their characteristics.

b) Zeolite: Definition, preparation, classification and applications. Ultramarine.

c) Carbide: Definition, classification, preparation, properties and structure of ionic or salt like carbides (CaC2), Metallic carbide (TiC) and covalent carbides (SiC).

d) Fullerene: Preparation, properties, structure and applications.

[B] Chemistry of Halogen compounds **10**

a) **Inter-halogen compounds:**

i)Definition, preparation and structure of XY, XY3, XY5, and XY7 types of inter-halogen compounds.

ii) Pseudo-halogen: Definition, preparation and properties.

b) **Polyhalides:** definition, preparation, properties & structure of ICl2-, & ICl^{4-}

c) **Oxides of halogens:** Preparation, structure & uses of F2O, Cl2O, Cl2O7, & I2O5.

d) **Oxyacids of halogens:** Introduction, oxidation state, structure strength and stability.

Reference Books:

1. Physical Chemistry by G. M. Barrow (Tata Mc-Graw Hill publishing Co., Ltd.)
2. Elements of Physical Chemistry by S. Glasstone& D. Lewis (D.van nostrand co. Inc.)
3. Physical Chemistry by W. J. Moore (Orient Longman).
4. University General Chemistry by C. N. R. Rao (Mc-Millan).
5. Elements of Physical Chemistry by P. W. Atkins. (Oxford University Press).
6. Physical Chemistry by R. A. Alberty (Wiley Eastern Ltd.).
7. Physical Chemistry through problems by S. K. Dogra, D. Dogra(Wiley Eastern Ltd)21
8. Principles of Physical Chemistry by Puri, Sharma and Pathania (VishalPublication)
9. Physical Chemistry by A. J. Mee. ELBS & Heinemann Educational Books Ltd.
10. Essentials of Physical Chemistry by ArunBhal, B. S. Bahl and G. D. Tuli. (S. Chand)
11. Chemical Kinetics by K. J. Laidler (Tata Mc-Graw Hill Publishing Co. Ltd).
12. Text Book of Physical Chemistry by Soni-Dharmarha.
13. A Text Book Physical Chemistry by S. Glasstone, (Mac Millan.)
14. Advanced Physical Chemistry by D.N.Bajpai. (S.Chand)
15. Advanced Physical Chemistry by Gurdeep Raj.(Goel publishing house, Meerut).
16. Principles of Inorganic Chemistry by Puri, Sharma and Kaliya.
17. Advanced inorganic chemistry by Gurudeep Raj and ChatwalAnand.
18. Advanced inorganic chemistry vol. II by Satyaprakash, Tuli, Basu and Madan.
19. Inorganic Chemistry by Huheey, Keiter and Keiter.
20. Concise Inorganic Chemistry by J. D. Lee.
21 A text book of Practical Chemistry for B. Sc. By V. V. Nadkarny, A. N. Kothare and Y. V. Lawande.
22. Advanced practical inorganic Chemistry by O. P. Agarwal
23. Basic Inorganic Chemistry by F. A. Cotton, G. Wilkinson and P. L. Gaus.
24. Inorganic Chemistry by A. G. Sharp.
25. Inorganic Chemistry by G. L. Miessler and D. A. Tarr.
26. Chemistry for degree students by Dr. R.L. Madan, (S. Chand)
27. Principles of Inorganic Chemistry by Puri, Sharma and Kaliya.
28. Advanced inorganic chemistry by Gurudeep Raj and ChatwalAnand.
29. Chemistry for degree students by Dr. R.L. Madan, (S. Chand)

OBJECTIVES:

- The course also provides adequate knowledge on the basis of concept of photochemistry.
- The course also creates awareness among the students about rate of reactions and what factors affect the rate of chemical reaction.
- The courses provide adequate knowledge about electrolytes, conductance, statements, laws, conductometric titrations and its advantages.
- The course also creates awareness among the students about compounds of Non Transition elements.
- The course also creates awareness among the students about the compounds of inter halogen.

OUTCOMES:

After completion of these courses students should be able to,

- Know the rate constant and factors affecting rate of reactions.
- Write an expression for rate constant (K) for first order, second order reaction.
- Know the terms cell constant, specific conductivity, equivalent conductivity and molar conductivity.
- Know the applications of Kohlrausch's law.
- Compare between thermal and photochemical reactions.
- Discuss different types of photochemical process.
- Know the preparation, properties, structure & application of different compounds.
- Discuss different inter halogen compounds by preparation, properties, structure and uses.

B. Sc. Second Year: Semester- III &IV
CCCP III (CCC III & IV, Section B)
Practical based on P-VII & P-IX
Laboratory Course- Paper-XI

Credits:02 **periods: 120**

Note: At least sixteen experiments should be taken.

Part I (Physical Chemistry)

Instrumental :

1. Determine the normality and strength of strong acid (HCl / H2SO4 / HNO3) conductometrically using standard solution of strong base (NaOH / KOH).
2. Determine the normality and strength of weak acid (CH3COOH / HCOOH) conductometrically using standard solution of strong base (NaOH / KOH).
3. To determine the solubility of a sparingly soluble salts (BaSO4 / PbSO4 / AgCl) conductometrically at room temperature.
4. Determine the normality and strength of strong acid (HCl / H2SO4 / HNO3) potentiometrically using standard solution of strong base (NaOH / KOH).
5. Determine redox potential of Fe^{3+}/ Fe2+ / or Sn4+/Sn3+ or Ce4+ / Ce3+ system by titrating it with standard K2Cr2 O7 / KMnO4 potentiometrically
6. Verification of Lamberts-Beer's law using KMnO4 / NiSO4 / K2Cr2 O7 / CuSO4 Colorimetrically and determine concentration of unknown solution.
7. Determine the concentration of Cu^{++}ion in given solution, titrating with EDTA by colorimetric measurements.
8. To determine pKa value of the given organic acid by pH measurements.

Non-Instrumental

1. To study the effect of addition of electrolyte (KCl / NaCl) on solubility of weak organic acid at room temperature.
2. Determine energy of activation of reaction between KI and K2S2O8 .
3. Determine the parachor of p-dichloro benzene by stalgmometer method.
4. To determine the composition of the given mixture consisting of two miscible liquids, A & B by viscosity measurement.
5. Determine partition coefficient of iodine between carbon tetrachloride and water.
6. Determine the solubility of benzoic acid in water at different temperatures and hence its heat of solution.
7. To study the effect of solute (NaCl / Succinic acid) on the CST of phenol- water system and hence, determine amount of solute in given sample of phenol – water composition.
8. To find out the enthalpy of neutralization of weak acid/weak base against strong base/strong acid And determine the enthalpy of ionization of weak acid/ weak base.
9. To study the kinetics of dissolution of magnesium metal in dil.HCl
10. To study the kinetics of decomposition of sodium thiosulphate by a mineral acid

Part II (Inorganic Chemistry)

Separation of binary mixtures and estimation of any one by volumetric method:

1. $Cu^{++} + Zn^{++}$
2. $Ba^{++} + Ca^{++}$
3. $Mn^{++} + Zn^{++}$
4. $Fe^{++} + Al^{+++}$

Reference books:

1 Text book on practical Chemistry, by K. S. Mukherjee
2 Laboratory Manual of Organic chemistry Raj. K. Bansal.
3 Advanced practical organic chemistry, by: Vishnoi.
4 Experimental organic chemistry by: Sing.
5 Experimental Physical Chemistry by A. Findlay.Longman.
6 Advanced Practical Physical Chemistry by J.B. Yadav. (Goel Publishing house, Meerut).26
7 Experiments in Physical Chemistry by R. C. Das and B. Behra. Tata Mc Graw Hill.
8 Advanced experimental Chemistry Vol. I. Physical by J.N. Gurtu and R. Kapoor. S.Chand& Co.
9 Experiments in Physical Chemistry by J. C. Ghosh, BharatiBhavan.
10 Practical book of Physical Chemistry – by Nadkarni Kothari &Lawande. Bombay Popular Prakashan.
12 Systematic Experimental Physical Chemistry–by S.W. Rajbhoj,Chondhekar. Anjali Publication.
13 Practical Physical Chemisty – by B. D. Khosala& V. C. Garg. R. Chand& Sons.
14 Experiments in Chemistry by D. V. Jagirdar.
15 Practical Chemistry, Physical – Inorganic – Organic and Viva – voce by BalwantRaiSatija. Allied Publishers Pvt. Ltd.
16 College Practical Chemistry by H. N. Patel, S. R. Jakali, H. P. Subhedar, Miss. S. P. Turakhia. Himalaya Publishing House, Mumbai.
17 College Practical Chemistry by Patel, Jakali, Mohandas, Israney, Turakhia. Himalaya Publishing Housing, Mumbai.
18 Experimental Physical Chemistry by A. Findlay.Longman.
19 Practical chemistry (ForB.Sc.I,II, III year) by O. P.Pandey, D.N. Bajpai, S. Giri, S. Chand& Co.
20 University practical chemistry by P. C. Kamboj ,Vishal publishing co.
21 Advanced Practical Inorganic Chemistry by Gurdeep Raj.(Goel Publishing house, Meerut).
22 Advanced Practical Organic Chemistry by Dr O. P.Agarwal. (Goel Publishing house, Meerut

OBJECTIVES:

- Aims of the laboratory course is to create awareness among the students to gain skills of measurement of physical properties like EMF, conductance, pH, optical density using instruments.
- Separation Groups in Qualitative Analysis.

Outcomes:

After completion of this course students should be able to,

- Calculate normality and strength of the solution using potentiometer and conductivity meter.
- Find pk_a value on pH meter.
- Verify Lamberts-Beer's law colorimetrically and determine unknown concentration of the solution.
- Determine energy of activation.
- Determine heat of solution.
- Study the effect of solute on CST of phenol-water system.
- Determine the enthalpy of ionization of weak acid / weak base.
- Determine partition coefficient.
- Separations of elements from each other & analysis by volumetric method.

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure
B. Sc. second year (Semester- III)
Semester Pattern effective from June -2020
Chemistry

Skill Enhancement Course SECC-I (A)

Food Processing And Food Adulteration: 2 Credits

Unit I Food Processing: 15 periods

1.1) Introduction, common food processing techniques: mincing, macerating, cooking, baking, boiling blanching, double steaming, frying, roasting.

1.2) Food processing an Indian prospective: Policy initiatives, Opportunities, Indian food processing industry, Research methodology, Analysis methods.

Unit II Food Preservation: 20 periods

1.3) Basic principles of food preservation- drying, canning, pickling smoking packing.

1.4) Food preserving through Irradiation: Food irradiation, Radurization, Radicidation, Radappertization . Technologies : electron beam irradiation, Gamma radiation , x-ray radiation

1.5) Modern methods of food Preservation: Freeze drying, sodium benzoate , mechanism of food preservation, saccharin, saccharin and cancer.

1.6) Role preservatives in food processing : Phenylphenol, benzethonium chloride , calcium benzoate, sodium benzoate, calcium tartrate, dimethyl dicarbonate, ethylparaben, glycolic acid, hexamine.

Unit III Food adulteration: 10 periods

1.7) Detection of common food adulterants in : Spices, grains, oils, milk and milk products , food colors, tea , coffee.

Reference books

1) Food Preservation ---M.K.Singh (discovery publishing house Daryagang ,New delhi)
2) Food Science ----Shalini Pathak (Sonali Publications, Daryagang ,New delhi)
3) Food Processing --- M.K.Singh (discovery publishing house Daryagang ,New delhi)
4) Hand book of analysis and quality control for fruit and vegetable products : ----S.Ranganna II edition
5) Milk and milk products ---- S.Mahindra –APH Publishing house Daryagang ,New delhi
6) Food Microbiology -----W.C.Frazier/D.C.Westhoff –Tata mcgraw hill
7) Food Chemistry -----Shalini Saxena --Raga publication Daryagang ,New delhi
8) Rapid detection of food adulterants and contaminants ----Shyam Zha
9) Handbook of adulteration and safety --- Sumeet Malik

OR

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure
B. Sc. second year (Semester- III)
Semester Pattern effective from June -2020
Chemistry

Skill Enhancement Course SECC-I (A)

Water Pollution

Unit I Pollution: **10 periods**

Pollution: - Introduction, Definition, Sources & effect of water pollution. Control measures of water pollutions.

Unit II Analysis of water pollution:- Theory & Practically: **20 periods**

Physical Parameters

a) Temperature
b) Electrical Conductance
c) Total Suspended Solids
d) Total dissolved Solids
e) Total Solids
f) Oil & Greases.

Unit III Chemical Parameters: **10 periods**

a) P^H
b) Dissolve Oxygen
c) Chemical Oxygen demand
d) Bio-Chemical Oxygen demand
e) Hardness
f) Chloride
g) Sulphate

Unit IV Biological aspects. **05 periods**

Reference books

1. Environmental Pollution -A.K. De
2. Environmental Pollution - Khitoliya R.K.
3. Water Pollution -Salpekar Aradhana
4. Introducation to Waste Water Treatment Process -Jindal M.
5. Water Pollution -Sharma B.K.
6. Environmental Chemistry -Sharma B.K
7. Environmental Chemistry -Bhagi Ajaykumar
8. Environmental Chemistry-Kaver H.
9. Environmental Chemistry-Banerji S.K.
10. Water Pollution - Kudesia V.P.

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure
B. Sc. second year (Semester- IV)
Semester Pattern effective from June -2020
Chemistry

Skill Enhancement Course SECC-II (B)

PREPARATION OF SOLUTIONS AND ITS STANDARDISATION

Unit I. Introduction: 05 Periods

1.1 Solute, solvent, solution, types of solutions, Homogeneous solution, Heterogeneous solution.

1.2 Concentration of solution, dilute solution, standard solution.

Unit II. Ways of expressing the concentration of solutions and their preparation.

10 Periods

1.3

Percentage by mass (% w/W)	Percentage by volume (% v/V)
Mole fraction (x)	Molarity (M)
Molality (m)	Normality (N)
Parts per million (Ppm)	Parts per thousand (Ppt)

Unit III. Preparation of standard solutions 15 Periods

1.4 Preparation of any standard solutions from stock solution.

1.5 **Numerical**.

(a) Molarity, Molality, Normality, Mole fraction, ppm, ppt.

(b) Determination of concentration of mixing different concentrations and volume of same solution.

(c) Determination of compositions of mixture in terms of mole fraction.

Unit IV Standardisation of solutions 15 Periods

1.6

Standardisation of $KMnO_4$ solution.	Standardistion of HCl solution.
Standardisation of NaOH solution.	Standardisation of EDTA solution.
Standardisation of $K_2 Cr_2O_7$ solution.	

Reference books

1. Advanced practical of physical chemistry, Gurudeep Raj – Goel Publishing, House.
2. Advanced practical of inorganic chemistry Gurudeep Raj – Goel Publishing, House.
3. Systematic Experimantal physical chemistry. S.W. Rajbhoj, Dr. T.K. Chondhekar, Anjali Publication Aurangabad.
4. Essentials of physical chemistry, Arun Bahl, B.S. Bahl, G.D. Tuli(S.chand)
5. Practical chemistry by Dr. O.P. Pandey D.N. Bajpai, Dr. S. Giri (S.Chand)
6. Advanced practical physical chemistry, J.B. Yadav, Goel Publishing, House.
7. Advanced practical inorganic chemistry, O.P. Agrawal.
8. A Text book of practical chemistry for B.Sc, V.V. Nadkarny, A.N. Kothare and Y.V. Lawande.

OR

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure
B. Sc. second year (Semester- IV)
Semester Pattern effective from June -2017
Chemistry

Skill Enhancement Course SECC-II (B)

ANALYTICAL METHODS AND CHROMATOGRAPHY

Unit I Introduction **05 Periods**

Types of analysis

Analytical methods

Analytical Instruments

Difference between Classical and analytical methods

Criteria for selecting an analytical methods

Organic reagents used in inorganic analysis

Safety in the analytical laboratory

Unit II. Instrumental methods: **20 Periods**

Conductimetry: Principle and applications

pH metry: Principle and applications

Potentiometry : Principle and applications.

Colorimetry / Spectrophotometry : Principle and applications.

Refractometry : Principle and applications.

Unit III Introduction and applications of Chromatographic techniques: 20 Periods

Paper Chromatography

Thin layer Chromatography (TLC)

Column Chromatography

REFERENCE BOOKS

1. Analytical Chemistry; by H. Kaur, Pragati prakashan, Meerut

2. Modern Analytical Chemistry by Alka L.Gupta, Pragati prakashan, Meerut

3. A.I.Vogel, A Text Book of Quantitative Inorganic Analysis, including elementary instrumental analysis, 2nd edition, London, Longman (1972)

4. S.M.Khopkar, Basic concepts of Analytical Chemistry

5. S.A.Skoog and D.W.West, Fundamental of Analytical Chemistry