

Punyashlok Ahilyadevi Holkar Solapur University, Solapur



Name of the Faculty: Science & Technology

(As per New Education Policy 2020)

Syllabus: Chemistry

Name of the Course: B.Sc. I (Sem. I & II)

(Syllabus to be implemented from June 2024)

Structure as per NEP-2020

B. Sc. I (Chemistry)

Level	Sem	Major		VSC/ SEC	OE/GE	IKS	CC	Total Credits	Cumulative Credits
		T	P						
4.5	I	2	2	SEC1-2	---	L1- 2 IKS(General) 2 VEC 1-2	CC1-2	22	44
		2	2						
		2	2						
	II	2	2	SEC2 -2	OE1 /GE1- 2	L2-2 VEC 2	CC2-2	22	
		2	2						
		2	2						
S.No.	Course Type		Paper Title						Credit
1.	Major		Chemistry-I (Physical and Inorganic Chemistry)						2
2.	Practical based on DSC1-1		Practical Lab – I						2
3.	Major		To be selected from Other than Chemistry						2
4.	Practical based on DSC2-1		Practical Lab – I						2
5	Major		To be selected from Other than Chemistry						2
6.	Practical based on DSC3-1		Practical Lab – I						2
7.	SEC		Chemistry Skill Enhancement Course-I (Water and Soil Analysis)						2
8.	IKS		General IKS						2
9.	AEC		English						2
10	VEC		Constitution of India						2
11	CC1		CC						2
			Total						22
12	Major		Chemistry-II (Organic and Analytical Chemistry)						2
13	Practical based on DSC1 -2		Practical Lab - II						2
14.	Major		To be selected from Other than Chemistry						2
15	Practical based on DSC2-2		Practical Lab – II						2
16.	Major		To be selected from Other than Chemistry						2
17	Practical based on DSC3-2		Practical Lab – II						2
18.	OE-I/GE-I		To be selected from the Basket of OE1/GE1						2
19	SEC		Chemistry Skill Enhancement Course-II(Food and Fertilizer Analysis)						2
20	AEC		English						2
21	VEC		Environmental Studies						2
22	CC2		CC						2
			Total						22

Abbreviations:

OE: Generic/ Open Electives

VSEC: Vocational Skill and Skill Enhancement Courses

SEC: Skill Enhancement Courses

AEC: Ability Enhancement Courses

FP: Field projects

CC: Co-curricular Courses

RP: Research Project

IKS: Indian Knowledge System

Semester I

Semester I

DSC 1-1

Title of the paper: Chemistry- I (Physical and Inorganic Chemistry)

Credit: 02, Theory: 30 Periods, Marks: 50

Course Objectives:	
•	To achieve knowledge of the gaseous states such as ideal and non-ideal gases, isotherm, and liquefaction of gases.
•	To acquire knowledge about rates of chemical reactions and distinguishing the reaction of a different order and their characteristics.
•	To proper understanding of covalent bonding using VBT and MOT approach.
•	To acquire knowledge of quantum mechanics, shapes of orbitals and periodic properties.
Unit 1:	
A	Gaseous State (07)
1.1	Ideal and Nonideal gases, Deviation from ideal behaviour.(Only Boyle's law),Causes of deviation from ideal behaviour, van der Waal's equation, explanation of real gas behaviour by van der Waal's equation.
1.2	Critical Phenomena: PV-Isotherms of real gases (Andrew's isotherms), continuity of state, Relationship between critical constants and van der Waal's constants.
1.3	Liquefaction of gases, Joule-Thomson effect.
1.4	Numerical Problems
B	Chemical Kinetics (08)
2.1	Chemical Kinetics and it's scope, Rate of reaction, Definition and units of rate constant. Factors affecting rate of reaction, Concentration, pressure, temperature and catalyst: with example of Ammonia synthesis by Haber's Process.
2.2	Order and Molecularity of reaction.
2.3	First order reaction: Derivation of Rate constant, Characteristics of first order reaction, Example: Decomposition of N_2O_5
2.4	Second order reaction: Derivation of rate constant for equal and unequal concentration of the reactants.Characteristics of Second order reaction, Example: Reaction between $K_2S_2O_8$ and KI
2.5	Pseudo-uni-molecular reaction, Example: Hydrolysis of methyl acetate in presence of an acid.

2.6	Numerical Problems
Unit 2:	
A	Covalent bonding: Valence Bond Theory (VBT) approach (07)
3.1	Types of chemical bonds
3.2	Valence Bond Theory: Heitler–London Theory and Pauling-Slater Theory: Merits and Demerits
3.3	Need of Hybridization with respect to BeCl_2 , BF_3 , SiCl_4
3.4	Types of hybridization and shapes of simple inorganic molecules: PCl_5 , SF_6
3.5	Valence Shell Electron Pair Repulsion (VSEPR) Theory w.r.t. NH_3 , H_2O
B	Covalent bonding: Molecular Orbital Theory (MOT) approach (08)
4.1	Atomic and Molecular orbitals.
4.2	L.C.A.O. Principle
4.3	Bonding, Antibonding and Nonbonding Molecular orbitals.
4.4	Conditions for successful overlap
4.5	Different types of overlap (s-s, s- p_x , p_x - p_x and p_y - p_y or p_z - p_z)
4.6	Energy level sequence of molecular orbitals for $n=1$ and $n=2$
4.7	M.O. Diagrams for: a) Homonuclear diatomic molecule. H_2 , Li_2 , Be_2 , C_2 , N_2 and O_2 b) Heteronuclear diatomic molecules CO and NO w.r.t. bond order, stability and magnetic properties.
	Course Outcomes:
CO1:	Get a better understanding of gaseous state.
CO2:	Understand the significance of rates of chemical reactions.
CO3:	Explain the deviations of gases from ideality
CO4:	Describe the hybridization concept
CO5:	Construct the MO diagrams for simple molecules
CO6:	Understand different types of orbitals
	Reference books:
1.	Chemical Kinetics by K.J. Laidler, Tata McGraw Hill Publishing Co. New Delhi.
2.	Physical Chemistry: S. Glasstone.
3.	Physical Chemistry: W.J. Moore (Orient Longman)
4.	Principles of Physical Chemistry: Maron Prutton
5.	University Chemistry: B. H. Mahan (Addison-Wesley Publ. Co.)

6.	Physical Chemistry Through problems: Dogra and Dogra (Wiley Eastern Ltd.,)
7.	Physical Chemistry: G. M. Barrow(Tata McGraw Hill)
8.	Essentials of Physical Chemistry: B.S. Bahl & G.D.Tuli (S. Chand)
9.	Principles of Physical Chemistry: B.R. Puri, L.R. Sharma and M.S. Patania, S.L.N. Chand & Co.1987
10.	Kinetics and Reaction Mechanisms by Frost and Pearson, Wiley, New York.
11.	University General Chemistry: C N R. Rao (McMillan)
12.	Advanced Inorganic Chemistry-Cotton and Wilkinson
13.	Inorganic Chemistry-J.E. Huheey
14.	Concepts and models of Inorganic Chemistry-Douglas & Mc-Daniel
15.	Principles of Inorganic Chemistry-Puri, Sharma
16.	New Concise Inorganic Chemistry-(ELBS)-J.D.Lee
17.	Textbook of Inorganic Chemistry- P.L.Soni
18.	Advanced Inorganic Chemistry-Satyaprakash, Tuli, Basu
19.	Theoretical Principles of Inorganic Chemistry-G. S. Manku
20.	Principles of Inorganic Chemistry-Puri, Sharma & Kalia
21.	Inorganic chemistry: Principles of structure and reactivity–J.E. Huheey
22.	Advanced Inorganic Chemistry, Vol.I– Gurudeep Raj
23.	A New Guide to Modern Valency Theory- G. J.Brown

Semester I

Title of the paper: Chemistry Practical Lab I

Credit: 02, Practical: 60 Periods, Marks: 50

Course Objectives:	
●	To develop practical skills in basic and conceptual Physical Chemistry.
●	To gain practical knowledge by applying the experimental methods to correlate with the theory.
●	To prepare students to determine rates of chemical reactions.
●	To develop students to learn measuring skills in practical.
●	To apply the analytical techniques and graphical analysis to the experimental data
List of Experiments	
Sr. No.	Name of the Practical
Physical Chemistry (Any two from Chemical Kinetics,)	
1.	Study of specific reaction rate of hydrolysis of methyl acetate in presence of HCl.
2.	Study of specific reaction rate of hydrolysis of methyl acetate in presence of H ₂ SO ₄
3.	Study of reaction between K ₂ S ₂ O ₈ and KI(Equal Concentrations)
4.	Determination of equivalent weight of Mg by Eudiometer.
5.	Determination of heat of ionization of weak acid.
Inorganic Chemistry Inorganic Quantitative Analysis: Volumetric Analysis (Any two)	
1.	To prepare a standard solution of Oxalic acid and determine the strength of Sodium hydroxide solution in terms of normality and Kg/dm ³
2.	To prepare a standard solution of Oxalic acid and determine the strength of Potassium permanganate solution in terms of normality and Kg/dm ³
3.	To prepare standard solution of Potassium dichromate and determine strength of Ferrous Ammonium Sulphate solution in terms of normality and Kg/dm ³ (Use internal indicator)
Inorganic preparation:	
1.	Preparation of ferrous ammonium sulphate
2.	Preparation of sodium cuprous thiosulphate
Course Outcomes:	
●	On successful completion of this practical course student will be able to:

●	handle various instruments.
●	correlate theoretical concepts with experiments.
●	develop awareness of minimizing errors.
●	develop basic skills of measurements
●	understand the theoretical principles of basic Practical chemistry.
	Reference Books:
1.	Practical book of Physical Chemistry: Nadkarni, Kothari & Lawande.
2.	Experimental Physical Chemistry: A.Findlay.
3.	Systematic Experimental Physical Chemistry: S.W. Rajbhoj, Chondhekar (Anjali Pub.)
4.	Experiments in Physical Chemistry: R.C. Das and B. Behra.(Tata Mc.Graw Hill)
5.	Advanced Practical Physical Chemistry: J.B. Yadav (Goel Publishing House)
6.	Practical Physical Chemistry: B.D. Khosala (R.Chand & Sons.)
7.	Experiments in Chemistry: D.V. Jahagirdar
8.	Vogel's Text Book of Quantitative Chemical Analysis (Longman ELBS Edition)
9.	

Semester I

SEC1: Chemistry Skill Enhancement Course I

(Water and Soil Analysis)

Credit: 02, Practical: 60 Periods, Marks: 50

	Course Objectives:
•	To develop practical skills in basic and conceptual Chemistry.
•	To gain practical knowledge by applying the experimental methods to correlate with the theory.
•	To prepare students to analyze water samples.
•	To develop students to learn measuring skills in practical.
•	To prepare students to analyze soil samples.
	List of Experiments
Sr. No.	List of the Practicals (any 10 practicals)
A	Water Analysis
1.	To determine pH of given water samples (at least 5 soil samples).
2.	To determine electrical conductivity (EC) of given water samples (at least 5 soil samples).
3.	To determine carbonates from given water sample.
4.	To determine bicarbonates from given water sample.
5.	To determine Ca and Mg from given water sample.
6.	To determine chlorides from given water sample.
7.	To determine available potassium from given water sample by Flame photometer.
8.	To determine available sodium from given water sample by Flame photometer.
B	Soil Analysis
9.	Drying and sieving of soil samples (at least 5 soil samples).
10.	To determine pH of given soil samples (at least 5 soil samples).
11.	To determine electrical conductivity (EC) of given soil samples (at least 5 soil samples).
12.	To determine available organic carbon from given soil sample by Walkley and Black method.
13.	To determine available phosphorous from given soil sample.
14.	To determine available nitrogen from given soil sample by Kjeldhal's method.

15	To determine available potassium from given soil sample by Flame photometer.
16	To determine available micronutrients (Cu/Mn/Fe/Zn) from given soil sample by AAS.
Reference books	
1	Methods of soil analysis : Uttam Kumar and Mishra
2	Soil analysis – P B Singh
3	Principles of soil and water analysis- N Panda
4	Soil testing and analysis- Vinod Kumar et.al
5	Methods of soil and water analysis- S. S. Yadhav and et.al.
6	The Food Chemistry Laboratory: A Manual for Experimental Foods, Dietetics, and Food Scientists, by Connie M. Weaver (Author), James R. Daniel
7	IFT Experiments in Food Science Series : Food Chemistry Experiments, Institute of Food Technologists The Society for Food Science and Technology 221 N. LaSalle St., Suite 300, Chicago, IL 60601
8	Owen R Fennema's (2008) Food Chemistry 4th Edition, CRC Press Publishers.
9	Manual Of Methods Of Analysis Of Food Additives: Food Safety And Standards Authority Of India Ministry Of Health And Family Welfare Government Of India New Delhi 2016.

Semester I

IKS (General)

Title of the paper: IKS General

Credit: 02, Theory: 30 Periods, Marks: 50

Semester I

(CC1)

Title of the paper: CC

Credit: 02, Theory: 30 Periods, Marks: 50

NCC/NSS/Sports/Cultural/MOOCs/SWAYAM/YOGA/Health and Wellness

Semester II

DSC 1-2

Title of the paper: Chemistry-II (Organic and Analytical Chemistry)

Credit: 02, Theory: 30 Periods, Marks: 50

	Course Objectives:
•	To study nature of bonding in organic molecules.
•	To inculcate the detailed basics of reaction mechanism and various intermediates
•	To study the different types of electronic effects.
•	To understand the stereochemistry of organic compounds.
•	To inculcate imagination and critical thinking of 3 D structures of organic compounds.
•	To study the unsaturated and alicyclic compounds.
•	To study the concept of aromaticity, its applications and reactions.
•	To know the important physical properties of liquids like viscosity, surface tension and refractive index.
•	To gain knowledge of ionic bonding and ionic solids.
•	To proper understanding of covalent bonding using VBT and MOT approach.
Unit 1:	
A	Fundamentals of organic reaction mechanism (05)
1.1	Introduction of reaction mechanism.
1.2	Types of arrow notations: Single headed curved arrow, Half headed curved arrow and double headed arrow.
1.3	Types of bond breaking: Homolytic and Heterolytic
1.4	Types of reagents: Electrophilic and Nucleophilic
1.5	Types and sub-types of following organic reactions with definition and at least one example of each. a) Substitution b) Addition c) Elimination d) Rearrangement. (Mechanism is not expected)
1.6	Reactive Intermediates: Carbocations, Carbanions, Carbon free radicals, Carbenes, Nitrenes (Definition with suitable example, formation, structure, and relative stability)
B	Structure and Bonding (05)
2.1	Hybridization: sp^3 , sp^2 and p w.r.t. methane, ethylene and acetylene respectively
2.2	Bond length, Bond angle and Bond energy with factors affecting these properties w.r.t. sp^3 , sp^2 and sp hybridization.

2.3	Resonance effect w.r.t. phenol and nitrobenzene
2.4	Inductive effect,+I and –I
2.5	Strength of carboxylic acid w.r.t. inductive effect: Examples-a)Formic and acetic acid,
2.6	Hyperconjugation w.r.t. toluene
2.7	Steric effect w.r.t. mesitoic acid
C	Stereochemistry of organic compounds (05)
3.1	Types of stereo-isomerism: Optical isomerism, Geometrical isomerism and Conformational isomerism
3.2	Opticalactivity
3.3	Essential conditions for Optical activity i. Elements of symmetry ii. Chiral cente rw.r.t. lactic acid
3.4	Optical isomerism in lactic acid and tartaric acid
3.5	Enantiomers and diastereoisomers w.r.t. 2,3-dihydroxybutanoic acid
3.6	Racemic modification.
Unit 2:	
A	Physical properties of liquids (10)
4.1	Introduction, additive and constitutive properties
4.2	Viscosity, coefficient of viscosity, determination of viscosity by Ostwald's Viscometer
4.3	Surface tension:-Determination of surface tension by Drop–Weight method
4.4	Refractive index, Snell's law
4.5	Specific and molecular refractivity, Abbe's refractometer: Critical angle Principle, construction, working and advantages
B	Ionic Solids (05)
5.1	Ionic Bonding: a) Formation of ionic bond, Energetics of ionic bonding: Ionisation potential, Electron affinity and Lattice energy. b) Characteristics of ionic compounds. c) Born-Haber Cycle for Alkali metal halide (NaCl) d) Fajan's rules
5.2	Radius ratio and crystal structure. a) Definition: Radius ratio (r^+/r^-), Coordination number, Stoichiometry and unit cell. b) Concept and calculation of radius ratio (r^+/r^-) for ionic solid with octahedral geometry. c) Radius ratio effect on geometry d) Crystal structure of NaCl and CsCl unit cell, radius ratio, coordination number and stoichiometry.

C	Qualitative and Quantitative Analysis	(06)
6.1	Qualitative analysis of Carbon, Hydrogen, Nitrogen & Sulphur	
6.2	Quantitative analysis of- - Carbon and hydrogen by Combustion method - Nitrogen by Kjeldahl's method - Halogen and Sulphur by Carius method.	
6.3	Determination of molecular weight of an acid by titration method.	
6.4	Empirical formula and molecular formula determination.	
6.5	Numerical Problems	
	Learning Outcomes:	
•	CO1: Understand the basics of bonding and able to draw correct structure of any organic molecule and comment on its stability.	
•	CO2: Able to predict the reactivity of organic molecules by the help of electronic effects.	
•	CO3: Understand the basics of bonding and able to draw correct structure of any organic molecule and comment on its stability.	
•	CO4: Understand the basic physical properties	
•	CO5: To acquaint with instruments like refractometer, stalagmometer and viscometer	
•	CO6: Explain ionic bonding and different parameters of crystal structure.	
	Reference books:	
1.	Organic Chemistry: Hendrickson, Cram, Hammond.	
2.	Organic Chemistry: Morrison and Boyd	
3.	Organic Chemistry: Volume I and III. L. Finar	
4.	Organic Chemistry: Pine	
5	Advanced Organic Chemistry: Sachinkumar Ghosh	
6	Advanced Organic Chemistry: B.S. Bahland Arun Bahl	
7	A Guide book to Mechanism in Organic Chemistry: Peter Sykes	
8	Stereochemistry of Organic Chemistry: Kalsi,	
9	Stereochemistry of Carbon Compounds: Eliel	
10	Textbook of Organic Chemistry: P. L. Sony	
11	Practical Organic Chemistry: A.I. Vogel	
12	Advanced Organic Chemistry: Reactions, Mechanism and Structure: Jerry March	
13	Organic Chemistry: M.R. Jain	
14	Organic Chemistry: J.M. Shaigel	
15	Svehla, G. Vogel's Qualitative Inorganic Analysis, Pearson Education, 2012.	

16	Mendham, J. Vogel's Quantitative Chemical Analysis, Pearson, 2009.
17	Harris, D.C. Quantitative Chemical Analysis, W.H. Freeman.
18	Dean, J.A. Analytical Chemistry Notebook, McGraw Hill.
19	Day, R.A. & Underwood, A.L. Quantitative Analysis, Prentice Hall of India
20	Gurudeep R Chatwal, Sham K Anand, Instrumental Methods of Chemical Analysis, Himalaya Publishing House.
21	Barrow, G.M. Physical Chemistry Tata McGraw Hill (2007).

Semester II

Title of the paper: Practical Lab II

Credit: 02, Practical: 60 Periods, Marks: 50

Course Objectives:	
•	To know the steps involved in organic compound identification
•	To understand the type of organic compound
•	To know about chromatography
•	To understand the estimation process
List of Experiments	
Sr. No.	Name of the Practical
	Organic Chemistry Organic Qualitative Analysis.
1.	Identification of at least four organic compounds with reactions including at least one from acids, phenols, bases and neutrals from the list of the compounds given below- <ul style="list-style-type: none">• Acids : Oxalic acid, Benzoic acid and Cinnamic acid• Phenols : β - Naphthol, Resorcinol.• Bases : Aniline, p - Toluidine.• Neutrals : Acetone, Ethyl acetate, Glucose, Chloroform, Chlorobenzene, m-dinitrobenzene, Thiourea.
	Note: A systematic study of an organic compound involves the following operations which should be taught in details with reactions in the detection of elements and functional group. <ol style="list-style-type: none">1) Preliminary tests and physical examination2) Determination of physical constant3) Detection of Elements4) Determination of functional group5) Comparison with literature6) Confirmatory Test7) Summary8) Result
Organic Preparation: (Any one)	
1.	<ol style="list-style-type: none">i) Preparation of benzoic acid from benzamide.ii) Preparation of dibenzal acetone from benzaldehyde and acetone. (Wt. of crude product is expected. M.P. of the recrystallized product is not expected.)
Analytical Chemistry	
	<ul style="list-style-type: none">• Determination of viscosity of given liquids A and B. (Density data of liquids, viscosity of water to be given.) [Any two liquids from, Acetone, CCl₄, Ethyl

	<p>alcohol, Ethylene glycol and n-propyl alcohol]</p> <ul style="list-style-type: none"> Determination of refractive index and specific refraction of given liquids.[Any two liquids from, CCl₄, CHCl₃, benzene, xylene, toluene, ethyl alcohol]
1.	<p>Estimations:(any one)</p> <p>i) Estimation of aniline ii) Estimation of acetamide iii) Estimation of Aspirin</p> <p>Qualitative Analysis:</p> <ul style="list-style-type: none"> Spot Tests: Detection of following cations using spot tests: Cu²⁺, Co²⁺, Ni²⁺, Fe³⁺, Zn²⁺, Mg²⁺, Al³⁺, Pb²⁺. Chromatography: Separation and identification of cations by Paper Chromatographic technique from the following mixtures : <ul style="list-style-type: none"> Ni²⁺+Cu²⁺ Ni²⁺+Co²⁺ Cu²⁺ +Co²⁺
	Reference Books:
	Experiments in Chemistry: D.V. Jahagirdar
	Vogel's Text Book of Quantitative Chemical Analysis (Longman ELBS Edition)
	Basic Concepts in Analytical Chemistry (Wiley Eastern Ltd.) : S. M. Khopkar
	Handbook of Organic Qualitative Analysis: Clarke
	Comprehensive Practical Organic Chemistry- Quantitative Analysis by V.K. Ahluwalia, Sunita Dhingra, University Press. Distributor - Orient LongmanLtd.,
	Comprehensive Practical Organic Chemistry preparation and Quantitative Analysis.:V.K. Ahluwalia, Renu Agarwal, University Press. Distributor- OrientLongmanLtd.,
	A laboratory Hand-Book of organic Qualitative Analysis and separation: V. S. Kulkarni, Dastane Ramchandra and Co.Pune.

Semester II

(OE-I/GE-I)

Title of the paper: Environmental Chemistry

Credit: 02, Theory: 30 Periods, Marks: 50

	Course Objectives:
•	To know basic terms in air pollution
•	To understand air pollutants
•	To know various sources of water pollution
•	To understand the methods of treatment for water pollution
Unit I	
1	Air Pollution (08)
1.1	Introduction: Meaning of terms: Environment, Pollution, Pollutant, Threshold Limit Value (TLV), Dissolved Oxygen (DO), Chemical Oxygen Demand (COD) and Biological Oxygen Demand (BOD).
1.2	Types of Pollution (only introduction): Air pollution, Water pollution, Sound pollution, Soil pollution, Automobile pollution and Nuclear pollution.
1.3	Air Pollution: Classification of air pollutants, Oxides of carbon, Sulphur and Nitrogen as air pollutants with respect to source and health hazards.
2	Soil and Sound Pollution (07)
2.1	Soil Pollution: Sources, effects and control and management.
2.2	Sound Pollution: Sources, effects and control and management
Unit II:	Water Pollution (15)
3.1	Introduction: Resources of water, Types of water pollutants, Water Pollution and its sources (brief account)
3.2	Treatment of water: (A) Potable Water: Parameters of potability of water Step-I: Removal of suspended matter: (a) Prolonged storage, (b) Screening, (c) Sedimentation, (d) Coagulation, (e) Filtration. Step-II: Removal of germs and bacteria- Physical and Chemical methods. Physical Methods : (a) Boiling (b) Exposure to UV or Sunlight (c) Distillation. Chemical Methods : (a) Chlorination, (b) Fluorination, (c) Ozonisation, (d) Aeration, (e) Use of KMnO ₄ . (B) Industrial Water: Mention names of the methods only, Ion exchange method in detail. (C) Municipal Sewage: Meaning of sewage, Mention the names of methods, Activated sludge process in detail.

	Course Outcomes:
•	CO1: Understand the basic terminology of air pollution
•	CO2: Know different types of pollution
•	CO3: Understand radioactive waste management
•	CO4: Explain the methods of treatment of water
•	CO5: Know various physical and chemical methods of removal of germs and bacteria
	Reference books:
1.	Environmental Chemistry - A.K. De
2.	Environmental pollution analysis - S.M. Khopkar
3.	Industrial Chemistry : Rogers
4.	Industrial Chemistry : R.K.Das
5.	Industrial Chemistry : B. K. Sharma

Semester II

Skill Enhancement Course (SEC 2)

Chemistry Skill Enhancement Course-II (Fertilizer and Food Analysis)

Credit: 02, Practicals: 60 Hours Marks: 50

	Learning Objectives:
	Students will be able to-
•	create awareness among students in understanding the basic of analysis
•	ability to do analysis of soil and water samples
•	encourage student for self-employment.
•	ensure the quality of water and soil
	List of Experiments
Sr. No.	Name of the Practical (Any Eight practicals)
A	Food and Fertilizer analysis
1	Estimation of sodium benzoate
2	Estimation of carbohydrate
3	Estimation of sweeteners
4	Identification of hydrocolloids
5	Estimation of other food additives
6	Quantitative estimation of protein
7	Iodine estimation from salt
8	Quantitative estimation of anti-nutritional factors
10	Estimation of contaminants
11	Food adulteration
12	Hardness of Water
13	Acidity of milk/lassi
14	Estimation of Vitamin C
15	Vinegar sample analysis
16	Fertilizer samples analysis
17	Estimation of amount of Sodium from the given fertilizer sample by cation exchange method
18	Estimation of amount of Magnesium and Zinc from the given fertilizer sample by anion exchange method

19	Estimation of amount of Aluminium form Potash ion volumetric method
	Reference Books:
1.	Methods of soil analysis : Uttam Kumar and Mishra
2.	Soil analysis – P B Singh
3.	Principles of soil and water analysis- N Panda
4.	Soil testing and analysis- Vinod Kumar et.al
5.	Methods of soil and water analysis- S. S. Yadhav and et.al.

Semester II
(CC2)
Title of the paper: CC2
Credit: 02, Theory: 30 Periods, Marks: 50

NCC/NSS/Sports/Cultural/MOOCs/SWAYAM/YOGA/Health and Wellness

UA

Punyashlok Ahilyadevi Holkar Solapur University, Solapur.

Faculty of Science & Technology.

Nature of Question Paper for CBCS Pattern

B. Sc. / B.C.A (Part- I) w.e.f. AY 2024-25

Time:

Total Marks: 30

Instructions

- 1) All Questions are compulsory
- 2) Figure to right indicate full marks.

Q.1 Choose correct alternative. (MCQ)

06 Marks

1)

- a) b) c) d)

2)

- a) b) c) d)

3)

- a) b) c) d)

4)

- a) b) c) d)

5)

- a) b) c) d)

6)

- a) b) c) d)

Q.2. Answer the following. (Any three)

6 (2+2+2)

A)

B)

C)

D)

E)

Q.3. Answer the following (Any two).

6 (3+3)

A)

B)

C)

Q.4. Answer the following (Any two).

6 (3+3)

A)

B)

C)

Q.5. Answer the following (Any one).

6 Marks

A)

B)

CA

Punyashlok Ahilyadevi Holkar Solapur University, Solapur.

Faculty of Science & Technology.

Nature of Question Paper for CBCS Pattern

B. Sc. / B.C.A. (Part- I) w.e.f. AY 2024-25

Time:

Total Marks: 20

- **Internal Evaluation System for 20 Marks**

- Choose any two of the following
 - Home Assignment / Unit Test / Tutorial /Seminar
-

- **Pattern of Examination:**

- External Evaluation + Internal Evaluation
- 30 Marks + 20 Marks = 50 Marks

- **Passing Criteria:**

- Written Exam – 12 out of 30
 - Continuous Assessment (CA) – 08 out of 20
-