

**GOVERNMENT DEGREE COLLEGE FOR WOMEN
BEGUMPET, HYDERABAD
(AUTONOMOUS)**

**Reaccredited with "B⁺" Grade by NAAC
CHOICE BASED CREDIT SYSTEM (CBCS)**



DEPARTMENT OF CHEMISTRY

**BOARD OF STUDIES MINUTES,
SYLLABUS AND MODEL PAPERS**

2021-2022

**ALLOCATION OF CREDITS FOR UNDER GRADUATES COURSES OF B.A./B.COM./B.SC./BBA
FOR THE ACADEMIC YEAR 2019 ONWARDS**

Allocation of credits for B.A/B.Com/B.Sc from 2019 onwards								
S.No.	Subject	Sem-1	Sem-2	Sem-3	Sem-4	Sem-5	Sem-6	Total
1	English	4	4	3	3	3	3	20
2	II Language	4	4	3	3	3	3	20
3	AECC	2	2					4
4	SEC			2	2			4
5	SEC			2	2			4
6	Generic Elective / Project	-	-	-	-	4	4	8
7	DSC/DSE	5	5	5	5	5	5	30
8	DSC/DSE	5	5	5	5	5	5	30
9	DSC/DSE	5	5	5	5	5	5	30
	Total	25	25	25	25	25	25	150
10	TSKC *					2	2	4
	Extra Curricular Activities(NCC/NSS/Sports/Martial Arts/Yoga & Meditation) *		1		1		1	3

NOTE: * Not included in SGPA/CGPA

**B.Sc., Chemistry, I&II Year, CBCS
Syllabus**

**Telangana State Council of Higher Education, Govt. of Telangana B.Sc., CBCS Common
Core Syllabi for all Universities in Telangana
PROPOSED SCHEME FOR CHOICE BASED CREDIT SYSTEM IN
B.Sc., Chemistry from 2019-2020**

FIRST YEAR- SEMESTER I				
CODE	COURSE TITLE	COURSE TYPE	HPW	CREDITS
BS 101	Ability Enhancement Compulsory Course AECC-1	ES	2	2
BS 102	English	CC-1A	4	4
BS 103	Second language	CC-2A	4	4
BS 104	Optional I	DSC-1A	4T+3P=7	4+1=5
BS 105	Optional II	DSC-2A	4T+3P=7	4+1=5
BS 106	Optional III- Chemistry - I	DSC-3A	4T	4
	Laboratory Course – I (Qualitative Analysis - Semi Micro Analysis of Mixtures)		= 7 3P	=5 1
	Total Credits		31	25
FIRST YEAR- SEMSTER II				
BS 201	Ability Enhancement Compulsory Course AECC-2	BCS	2	2
BS 202	English	CC-1B	4	4
BS 203	Second language	CC-2B	4	4
BS 204	Optional I	DSC-1B	4T+3P=7	4+1=5
BS 205	Optional II	DSC-2B	4T+3P=7	4+1=5
BS 206	Optional III- Chemistry - II	DSC-3B	4T	4
	Laboratory Course - II (Quantitative Analysis – Titrations)		= 7 3P	=5 1
	Total Credits		31	25
SECOND YEAR- SEMSTER III				
BS 301	i) Safety Rules in Chemistry Laboratory and Lab Reagents	SEC-1	2	2
	ii) Remedial methods for pollution, drinking water and Soil fertility	SEC-2	2	2
BS 302	English	CC-1C	3	3
BS 303	Second language	CC-2C	3	3
BS 304	Optional I	DSC-1C	4T+3P=7	4+1=5
BS 305	Optional II	DSC-2C	4T+3P=7	4+1=5
BS 306	Optional III- Chemistry - III			

	Laboratory Course - III (Synthesis of Organic compounds)	DSC-3C	4T = 7 3P	4 = 5 1
Total Credits			31	25
SECOND YEAR- SEMSTER IV				
BS 401	i) Materials and their Applications ii) Chemistry of Cosmetics and Food Processing	SEC-3 SEC-4	2 2	2 2
BS 402	English	CC-1D	3	3
BS 403	Second language	CC-2D	3	3
BS 404	Optional I	DSC-1D	4T+3P=7	4+1=5
BS 405	Optional II	DSC-2D	4T+3P=7	4+1=5
BS 406	Optional III- Chemistry - IV	DSC-3D	4T = 7 3P	4 = 5 1
	Laboratory Course - IV (Qualitative Analysis of Organic Compounds)			
Total Credits			31	25

* AECC: Ability Enhancement Compulsory Course, SEC: Skill Enhancement Course, DSC: Discipline Specific Course, GE: Generic Elective, ES: Environmental Science, BCS : Basic computer skills.

THIRD YEAR- SEMESTER-V				
CODE	COURSE TITLE	course TYPE	HPW	CREDITS
BS 501	Chemistry of Cosmetics, Food Processing, Pollution & Water Treatment Methods	GE	4	4
BS 502	English	CC-IE	3	3
BS 503	Second language	CC-2E	3	3
BS 504	Optional- I A/B	DSE -IE	-	4+1=5
BS 505	Optional- II A/B	DSE -2E	-	4+1=5
BS 506	Optional- III A/B A. Spectroscopy and Chromatography ✓ (or) B. Metallurgy, Dyes and Catalysis	DSE -3E	4T = 7 3P	4 = 5
	Laboratory Course -V Solvent Extractions, Chromatographic Techniques and Spectral Analysis			1
TOTAL				25

THIRD YEAR- SEMESTER - VI				
BS 601	Project in Chemistry/ Advanced Chemistry			4
BS 602	English	cc-1F	3	3
BS 603	Second language	CC-2F	3	3
BS 604	Optional- I A/D	DSE-1F	-	4+1=5
BS 605	Optional- II A/B	DSE -2F	-	4+1=5
BS 606	Optional- III A/B A. Medicinal Chemistry ✓ (or) B. Agricultural and Fuel Chemistry	DSE -3F	4T = 7 3P	4 1
	Laboratory Course -VI Experiments in Drug Estimations & Physical Chemistry			
				25
	TOTAL			150
	TOTAL Credits			

Programme Specific Outcome (PSO):

The students will understand the existence of matter in the universe as solids, liquids, and gases which are composed of molecules, atoms and subatomic particles.


Students will learn to estimate inorganic salt mixtures and organic compounds both qualitatively and quantitatively using the classical methods of analysis in practical classes.

Know the fundamental principles of organic/Inorganic /Physical /General chemistry and predict applications of all chemical reactions.

Construct, design, formulate, organise and synthesize new chemical compounds.

Present a paper in a scientific manner.


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpally, Nizamabad-503322.

Programme Outcomes

PO 1 Domain Expertise:

- Acquire comprehensive knowledge and skills.
- Make use of the knowledge in an innovative manner.
- Effectively apply the knowledge and skills to address various issues.

PO 2 Modern equipment Usage

- Use ICT effectively.
- Access, retrieve and use authenticated information.
- Access, retrieve and use authenticated information. Have knowledge of software applications to analyze data.

PO 3 Computing Skills and Ethics

- Develop rationale and scientific thinking processes.
- Use technology intelligently for communication, entertainment and for the benefit of mankind.
- Ensure ethical practices throughout one's endeavors for the wellbeing of the human race.

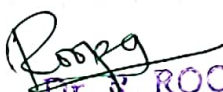
PO 4 Complex problem Investigation & Solving

- Predict and analyze problems.
- Frame hypotheses.
- Investigate and interpret empirical data.
- Plan and execute action.

PO 5 Perform effectively as Individuals and in Teams

- Work efficiently as an individual
- Cooperate, coordinate and perform effectively in diverse teams/groups


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. K. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D
Assistant Professor
Department of Pharmaceutical Chemistry
Jangana University
Pally, Nizamabad-503322.

- Prioritize common interest to individual interest.

PO 6 Efficient Communication & Life Skills

- Express thoughts in an effective manner
- Listen, understand and project views in a convincing manner.
- Decide appropriate media to share information
- Develop skills to present significant information clearly and concisely to interested groups.

PO 7 Environmental Sustainability

- Understand the Environmental challenges.
- Think critically on environmental sustainability measures.
- Propagate and follow environment friendly practices.

PO 8 Societal contribution

- Render service for the general good of the society.
- Involve voluntarily in social development activities at Regional, National, global levels.
- Have pride in volunteering to address societal issues viz: calamities, disasters, poverty, epidemics.
- Be a patriotic citizen to uphold the values of the nation

PO 9 Effective Project Management

- Identify the goals, objectives and components of a project and decide the appropriate time of completion.
- Plan, organize and direct the endeavors of teams to achieve the set targets in time.
- Be competent in identifying opportunities and develop strategies for contingencies.

Head
Department of Chemistry
UCA, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA


Dr. MAVURAPU
Assistant Professor, M.Sc. Ph.D
Department of Chemistry
Telangana State University
Dichpally, Nalgonda-50802.

MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA

I B.Sc. Chemistry syllabus
I Semester 60 Hrs (4 H/W)
(Syllabus with effect from 2019-20)

	Unit-I (Inorganic Chemistry)	15h
I	Chemical Bonding	8
II	P-Block Elements	7
	UNIT II Organic Chemistry	15h
I	Structural Theory in Organic Chemistry	5
II	Acyclic Hydrocarbons	6
III	Aromatic Hydrocarbons	4
	Unit-III Physical Chemistry	15h
I	Atomic structure and elementary quantum mechanics	3
II	Gaseous State	5
III	Liquid State and Solutions	4
IV	Solutions	3
	Unit-IV General Chemistry	15h
I	General Principles of Inorganic Qualitative Analysis	6
II	Isomerism	5
III	Solid state Chemistry	4


Department of Chemistry
UCS, Osmania University
Hyderabad-007


DR. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph
Assistant Professor
Department of Pharmaceutical Chemis
Telangana University
Dichpally, Nizamabad-503322.

Course OBJECTIVES:

The objective of B.Sc. Chemistry I is intended to provide:

- To predict the atomic structure, chemical bonding, and molecular geometry based on accepted models.
- To Characterize bonding between atoms, molecules, Interaction and energetics and to know hybridization and shapes of atomic, molecular orbitals, bond parameters, bond- distances and energies.
- To Predict structure of molecules.
- To understand the Basic of organic molecules, structure, bonding, reactivity and reaction mechanisms.
- To understand about the Electrophile, nucleophiles, free radicals, electronegativity, resonance, and intermediates along the reaction pathways.
- To know about atomic theory and its evolution.
- To Familiarization with various states of matter and Physical properties of each state of matter and laws related to describe the states.
- To know lattice parameters of Solids, and its calculation, application of symmetry, solid characteristics of simple salts.

**B. Sc. I Year CHEMISTRY
SEMESTER WISE SYLLABUS**

SEMESTER I

Paper – I

Chemistry - I

Unit-I (Inorganic Chemistry)

15 h (1 hr/week)

S1- I-1. Chemical Bonding


8 h


Ionic solids- lattice and solvation energy, solubility of ionic solids, Fajan's rule, polarity and polarizability of ions. VSPER Theory - Common hybridization- sp , sp^2 , sp^3 , sp^3d , sp^3d^2 and sp^3d^3 , shapes of molecules. Molecular orbital theory: Shapes and sign convention of atomic orbitals. Modes of bonds. Criteria for orbital overlap. LCAO concept. Pi and Sigma overlapping. Concept of Types of molecular orbitals- bonding, anti-bonding and non-bonding. MOED of Homo nuclear diatomics - H_2 , N_2 , O_2^- , O_2^{2-} , F_2 (unhybridized diagrams only) and hetero nuclear diatomics CO , CN^- , NO , NO^+ and HF . Bond order, stability and magnetic properties.

S1-I-2. P-Block Elements 1

7 h

Group-13: Structure of Diborane and higher Boranes (B_4H_{10} and B_5H_9), Boron nitrogen compounds ($B_3N_3H_6$ and BN) Lewis acid nature of BX_3 . Group - 14: Carbides-Classification - ionic, covalent, interstitial - Structures and reactivity. Industrial applications. Silicones - Classification - straight chain, cyclic and cross-linked. Group - 15: Nitrides - Classification - ionic, covalent and interstitial. Reactivity - hydrolysis. Reactions of hydrazine, hydroxyl amine, phosphazenes.


Head
Department of Chemistry
LCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry,
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Nizamabad-503322.



Unit - II (Organic Chemistry)

15h (1 hr/week)

S1-O-1: Structural Theory in Organic Chemistry

5 h

Bond polarization: Factors influencing the polarization of covalent bonds, electro negativity – inductive effect. Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions. Resonance - Mesomeric effect, application to (a) acidity of phenol. (b) acidity of carboxylic acids and basicity of anilines. Stability of carbo cations, carbanions and free radicals. Hyper conjugation and its application to stability of carbonium ions, free radicals and alkenes.

S1-O-2: Acyclic Hydrocarbons

6 h

Alkanes– Methods of preparation: From Grignard reagent, Kolbe synthesis. Chemical reactivity

- Inert nature, free radical substitution, Halogenation example- reactivity, selectivity and orientation.

Alkenes - Preparation of alkenes (with mechanism) (a) by dehydration of alcohols (b) dehydrohalogenation of alkyl halides (c) by dehalogenation of 1, 2 dihalides, Zaitsev's rule. Properties: Anti-addition of halogen and its mechanism. Addition of HX, Markonikov's rule, addition of H₂O, HOX, H₂SO₄ with mechanism and addition of HBr in the presence of peroxide (Anti – Markonikov's addition). Oxidation (cis –

additions) – hydroxylation by KMnO₄, OsO₄, Anti addition- per acids (via epoxidation) hydroboration, ozonolysis – location of double bond. Dienes – Types of dienes, reactions of conjugated dienes – 1, 2 and 1,4 addition of HBr to 1,3 – butadiene and Diels – Alder reaction.

Alkynes– Preparation by dehydro halogenation of vicinal dihalides, dehalogenation of tetrahalides. Physical Properties: Chemical reactivity – electrophilic addition of X₂, HX, H₂O (tautomerism), Oxidation (formation of enediol, 1, 2 diones and carboxylic acids) and reduction (Metal-ammonia reduction, catalytic hydrogenation).

Aromatic Hydrocarbons

4h

Introduction to aromaticity: Huckel's rule – Benzene, Naphthalene and Anthracene. Reactions - General mechanism of electrophilic substitution, mechanism of nitration, sulphonation and halogenation, Friedel Craft's alkylation and acylation. Orientation of aromatic substitution - Definition of ortho, para, and meta directing groups. Ring activating and deactivating groups with examples. Orientation – (i) activating groups: Amino, methoxy and alkyl groups. (ii) Deactivating groups - nitro, nitrile, carbonyl, carboxylic acid, sulphonic acid and halo groups.


Unit – III (Physical Chemistry)


15h (1 hr/week)


S1-P-1: Atomic structure and elementary quantum mechanics

3 h

Black body radiation, heat capacities of solids, Rayleigh Jeans law, Planck's radiation law, photoelectric effect, Limitations of classical mechanics, Compton Effect, de Broglie's hypothesis. Heisenberg's uncertainty principle.


Head
Department of Chemistry
UCS - Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA - DISTRICT A.P. INDIA


Dr. NAVUS
Assistant Professor
Department of
Chemistry



S1-P-2: Gaseous State

5 h

Deviation of real gases from Ideal behavior. van der Waals equation of state. Critical phenomenon. PV isotherms of real gases, continuity of state. Andrew's Isotherms of CO₂. The van der Waal's equation and critical state. Derivation of relationship between critical constants and van der Waal's constants. The law of corresponding states, reduced equation of states. Joule Thomson effect and inversion temperature of a gas. Liquifaction of gases: i) Linde's method based on Joule Thomson effect ii) Claude's method based on adiabatic expansion of a gas.

S1-P-3: Liquid State and Solutions

4 h

Liquid State

Intermolecular forces, structure of liquids (qualitative description). Structural differences between solids, liquids and gases. Surface tension and its determination using stalagmometer. Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer. Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only).

Solutions

3 h

Liquid - liquid mixtures, ideal liquid mixtures, Raoult's and Henry's laws. Non ideal systems, Azeotropes: HCl-H₂O and C₂H₅OH - H₂O systems. Fractional distillation, Partially miscible liquids: Phenol - Water, Trimethyl amine - Water and Nicotine - Water systems.

Unit - IV (General Chemistry)

15h (1 hr/week)

S1-G-1. General Principles of Inorganic Qualitative Analysis

6 h

Anion analysis: Theory of sodium carbonate extract, classification and reactions of anions- CO₃²⁻,

Cl⁻, Br⁻, I⁻, PO₄³⁻, BO₃³⁻, CH₃COO⁻, NO₃⁻. Interfering ions. Cation Analysis: Principles involved - Solubility product, common ion effect, general discussion for the separation and identification of group I individual cations (Hg²⁺, Ag⁺, Pb²⁺) with flow chart and chemical equations. Principle involved in separation of group II & IV cations. General discussion for the separation and identification of group II (Hg²⁺, Pb²⁺, Bi³⁺, Cd²⁺, Sb³⁺), III (Al³⁺, Fe³⁺), IV (Mn²⁺, Zn²⁺) individual cations with flow chart and chemical equations. General discussion for the separation and identification of group V individual cations (Ba²⁺, Sr²⁺, Ca²⁺) with flow chart and chemical equations. Theory of flame test. Identification of Group VI cations (Mg²⁺, NH₄⁺).

S1-G-2. Isomerism


5 h

Isomerism: Definition of isomers. Classification of isomers: Constitutional and Stereoisomers - definition and examples. Constitutional isomers: chain, functional and positional isomers. Stereoisomers: enantiomers and diastereomers - definitions and examples. Representation of stereoisomers - Wedge, Fischer projection, Sawhorse, Newmann formulae.

Conformational analysis: Classification of stereoisomers based on energy. Definition and examples Conformational and configurational isomers. Conformational analysis of ethane, n-butane, 1, 2-


Head

Department of Chemistry
 UCS, Osmania University
 Hyderabad-007


DR. R. ROOPA

Asst. Professor, Dept. of Chemistry
 MAHATMA GANDHI UNIVERSITY
 NALGONDA-508254, A.P. INDIA.


DR. MAVURAPU SATYANARAYA
 M.Sc

Assistant Professor
 Department of Pharmaceutical Chemistry
 Osmania University
 Nizamabad-5033



dichloroethane, 2-chloroethanol. Cyclic compounds: Baeyer's strain theory, Conformational analysis of cyclohexane, Cis-trans isomerism: E-Z Nomenclature

4 h

S1-G-3: Solid state Chemistry

Laws of Crystallography: (i) Law of Constancy of Interfacial angles (ii) Law of Symmetry-. Symmetry elements in crystals (iii) Law of rationality of indices. Definition of space lattice, unit cell. Bravais Lattices and Seven Crystal systems (a brief review). X-ray diffraction by crystals; Derivation of Bragg's equation. Determination of structure of NaCl, KCl and CsCl (Bragg's method and Powder method).

References

General reference: B.Sc I Year Chemistry: Semester I, Telugu Academy publication, Hyd

Unit- I

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications 1996.
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn.
3. Basic Inorganic Chemistry by F.A. Cotton, G. Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers 2001. Chem.
4. Inorganic Chemistry Principles of structure and reactivity by James E. Huhey, E.A. Keiter and R.L. Keiter 4th edn.
5. Chemistry of the elements by N.N. Greenwood and A. Earnshaw Pergamon Press 1989.
6. Inorganic Chemistry by Shriver and Atkins 3rd edn Oxford Press 1999.
7. Textbook of Inorganic Chemistry by R Gopalan.

Unit- II


1. Organic Chemistry by Morrison and Boyd.
2. Organic Chemistry by Graham Solomons.
3. Organic Chemistry by Bruce Yuranis Powla.
4. Organic Chemistry by L. G. Wade Jr.
5. Organic Chemistry by M. Jones, Jr
6. Organic Chemistry by John McMurry.
7. Organic Chemistry by Soni.
8. General Organic chemistry by Sachin Kumar Ghosh.
9. Organic Chemistry by C N Pillai.

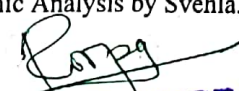
Unit III


1. Principles of physical chemistry by Prutton and Marron.
2. Text Book of Physical Chemistry by Soni and Dharmahara..
3. Text Book of Physical Chemistry by Puri and Sharma.
4. Text Book of Physical Chemistry by K. L. Kapoor.
5. Physical Chemistry through problems by S.K. Dogra.
6. Text Book of Physical Chemistry by R.P. Verma.
7. Elements of Physical Chemistry by Lewis Glasstone.

Unit IV

1. Qualitative analysis by Welcher and Hahn.
2. Vogel's Qualitative Inorganic Analysis by Svehla.


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA UNIVERSITY
NALGONDA, 502204, A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
M.Sc., Ph.D
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Nizamabad-503022




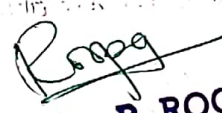
3. Text Book of Organic Chemistry by Morrison and Boyd.
4. Text Book of Organic Chemistry by Graham Solomons.
5. Text Book of Organic Chemistry by Bruice Yuranis Powla.
6. Text Book of Organic Chemistry by Soni.
7. Text Book of Physical Chemistry by Soni And Dharmahara.,
8. Text Book of Physical Chemistry by Puri And Sharma.
9. Text Book of Physical Chemistry by K. L. Kapoor.

Course Outcome :

After the successful completion of the course, students should be able to:

- Differentiate the type of bonds present in the given molecule.
- Identify hybridization, structure of molecule and their bond angles.
- Able to predict structure and applications of P-Block elements
- Interpret the Factors responsible for any Organic chemical reaction to take place.
- Identify the composition of matter which is made up of atoms and molecules.
- Able to predict conformation and configuration, asymmetric molecules and nomenclature.
- Describe the characteristics of states of matter and how states of matter are affected by the parameters (Pressure, Volume and Temperature)


Head
 Department of Chemistry
 UCS, Osmania University
 Hyderabad-007


Dr. R. ROOPA
 Asst. Professor, Dept. of Chemistry
 MAHATMA GANDHI UNIVERSITY
 NALGONDA - 508254. A.P. INDIA.


Dr. MAVURAPU SATYANARAYAN
 M.Sc. P
 Assistant Professor
 Department of Pharmaceutical Chem
 Telangana University
 Dichpally, Nizamabad-503322

Laboratory Course

Objectives:

- > Qualitative semimicro analysis of mixtures containing 2 anions and 2 cations.
- > Emphasis should be given on understanding of the chemistry of different reactions.

I Practical (Inorganic Chemistry)

Paper I - Qualitative Analysis - Semi micro analysis of mixtures

45h (3 h / week)

Analysis of two anions (one simple, one interfering) and two cations in the given mixture.

Anions: CO_3^{2-} , SO_3^{2-} , S^{2-} , Cl^- , Br^- , I^- , CH_3COO^- , NO_3^- , PO_4^{3-} , BO_3^{3-} , SO_4^{2-} ..

Cations: Hg^{2+} , Ag^+ , Pb^{2+}

Hg^{2+} , Pb^{2+} , Bi^{3+} , Cd^{2+} , Cu^{2+} , $As^{3+}/5+$, $Sb^{3+}/5+$, $Sn^{2+}/4+$

Al^{3+} , Cr^{3+} , Fe^{3+}

Zn^{2+} , Ni^{2+} , Co^{2+} , Mn^{2+}

Ba^{2+} , Sr^{2+} , Ca^{2+}

Mg^{2+} , NH^+

II. Inorganic quantitative Analysis - Inorganic preparations.

1. Tetramine copper (II) sulphate
2. Potash alum $KAl(SO_4)_2 \cdot 12H_2O$

OUTCOMES:

After the successful completion of the course, students should be able to:

- > To get adapted with techniques involved in Qualitative semimicro analysis.
- > To get acknowledged with various chemical reactions of basic and acidic radicals.



Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007



Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA.



Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpally, Nizamabad-503322.

Government Degree College for Women, Begumpet, Hyderabad
Autonomous Accredited with "B" Grade by NAAC

Subject-Chemistry

Model Practical Question paper

B.sc I year Time: 3h

Semester I

Total marks=50marks

Scheme of Evaluation


Time: 3 Hrs


Total Marks-50


1. Brief procedure of writing one anion and cation
2. Solubility
3. Flame Test
4. Identification of two anions and two cations
5. Report of two anions and two cations
6. Record
7. Voice-Viva

10 Marks
04 Marks
02 Marks
4x5=20 marks
04 Marks
05 Marks
05 Marks

Minimum qualifying marks: 20 marks


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D
Assistant Professor
Department of Pharmaceutical Chemistry
Tejanga University
Dichpally, Nizamabad-503322.

GOVERNMENT DEGREE COLLEGE FOR WOMEN
BEGUMPET, HYDERABAD - 16
B.Sc. 1 YEAR MODEL INTERNAL QUESTION PAPER
Subject: CHEMISTRY
SEMESTER - 1

Time: 1 Hours

Max. Marks: 20

Section - A

I Short Answer questions

Answer any TWO of the following questions

2x5=10marks

1. Explain salient features of L.C.A.O method?
2. What is Diel's-Alder reaction? Give an example?
3. Write a note on de-Broglie's wave theory?
4. What is common ion effect ? Explain?

SECTION-B

II Essay questions


Answer any one question


1X10 = 10 Marks


5. Draw MOED of N_2 and O_2 . Explain the bond order, stability and magnetic properties?

(or)

6. Explain Freidel-Craft Alkylolation and Freidel-Craft Acylation of benzene with Mechanism?


Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA


Assistant Professor
Department of Pharmaceutical Chemistr
Telangana University
Dichpally, Nizamabad-503322.

GOVERNMENT DEGREE COLLEGE FOR WOMEN
BEGUMPET, HYDERABAD - 16
B.Sc. 1 YEAR SEMESTER MODEL QUESTION PAPER
Subject: CHEMISTRY
SEMESTER - 1

Time: 2 Hours

Max. Marks: 60
Min. Marks: 24

Section - A

I Short Answer questions

Answer any Five of the following questions

5x4=20marks

5. Explain salient features of L.C.A.O method?
6. What are carbides? Give the classification?
7. What is Diel's-Alder reaction? Give an example?
8. What is Huckels rule ?Give examples?
9. Write a note on de-Broglie's wave theory?
10. Describe the liquification of gas by lindes method?
11. What is common ion effect ? Explain?
12. Write the conformational isomers of 1,2-dichloroethane?


SECTION-B

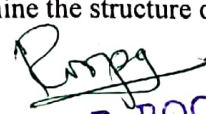
II Essay questions

Answer all questions choosing any one bit from each question

4X10 = 40 Marks

9. (a) Draw MOED of N_2 and O_2 . Explain the bond order, stability and magnetic properties?
(or)
(b) Write the reactions of Hydrazine and Hydroxylamine?
10. (a) What is inductive effect? Explain the acidic strength of carboxylic acids?
(or)
(b) Explain Freidel-Craft Alkylation and Freidel-Craft Acylation of benzene with Mechanism?
11. (a) Write the derivation of relation between critical constants and vanderwaal's constants?
(or)
(b) What is viscosity of liquid and write the method to determine viscosity?
12. (a) Write a note on Bayer's strain theory? Write the conformational isomers of cyclohexane?
(or)
(b) Derive Bragg's equation. Determine the structure of NaCl, KCl by bragg's method?


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Nizamabad-503322.



Revised
writing

Government Degree College for Women, Begumpet, Hyderabad
Autonomous Accredited with "B" Grade by NAAC

Subject-Chemistry

Model Practical Question paper

B.sc I year Time: 3h

Semester I

Total marks=50marks

Scheme of Evaluation


Total Marks-50

Time: 3 Hrs

- | | |
|--------------------------------------------------------|--------------|
| 1. Brief procedure writing for the Inorganic compounds | 10 Marks |
| 2. Solubility | 04 Marks |
| 3. Flame Test | 02 Marks |
| 4. Identification of two anions and two cations | 4x5=20 marks |
| 5. Report of two anions and two cations | 04 Marks |
| 6. Record | 05 Marks |
| 7. Voice-Viva | 05 Marks |

Minimum qualifying marks: 20 marks


Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254, A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpally, Nizamabad-503322.

I B.Sc. Chemistry syllabus


II Semester 60 Hrs (4 H/W)
(Syllabus with effect from 2019-20)

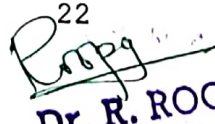
	UNIT-I Inorganic Chemistry	15h
I	p-Block elements-II	7
II	Chemistry of Zero group elements	2
III	Chemistry of d-Block elements	6
	UNIT II Organic Chemistry	15h
I	Halogen compounds	4
II	Hydroxy compounds and Ethers	6
III	Carbonyl Compounds	5
	Unit-III Physical Chemistry	15h
I	Electrochemistry	15
	Unit-IV General Chemistry	15h
I	Theory of Quantitative analysis	6
II	Stereoisomerism	5
III	Dilute Solutions and Collegative properties	4

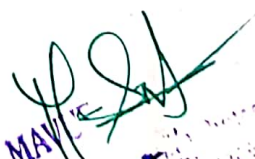
Course Objectives:

The objective of B.Sc. Chemistry II is intended to provide:

- Structure, bonding of p block materials and their oxides/compounds.
- Understanding chemistry of compounds of p block elements and their structures.
- Transition metals, its stability, color, oxidation states and complexes.
- Familiarization about classes of organic compounds and their methods of preparation and Basic uses of reaction mechanisms.


Head
Department of Chemistry
UOJ, O. J. S. University
Hyderabad-007

²²

Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254, A.P. INDIA.


Dr. MA...
Asst. Professor
Department of Chemistry
Tel: ...
Dichp...

- Name reactions, uses of various reagents and the mechanism of their action.
- Basic principle of laws of electrochemistry and understanding about chemical cells, electrodes and their functions.
- Stereochemistry of organic molecules – conformation and configuration, asymmetric molecules and nomenclature.
- Partial molar quantities and its attributes.
- Dilute solution and its properties.

B.Sc I Yr CHEMISTRY SEMESTER WISE SYLLABUS

SEMESTER II

Paper – II

Chemistry – II

Unit-I (Inorganic Chemistry)

15 h (1 hr/week)

S2-I-1 P-block Elements -II

7 h

Oxides: Types of oxides (a) Normal- acidic, basic amphoteric and neutral (b) Mixed (b) sub oxide d) peroxide e) superoxide. Structure of oxides of C, N, P, S and Cl - reactivity, thermal stability, hydrolysis.

Oxy acids: Structure and acidic nature of oxyacids of B, C, N, P, S, Cl and I. Redox properties of oxyacids of Nitrogen: HNO₂ (reaction with FeSO₄, KMnO₄, K₂Cr₂O₇), HNO₃ (reaction with H₂S, Cu), HNO₄ (reaction with KBr, Aniline), H₂N₂O₂ (reaction with KMnO₄). Redox properties of oxyacids of Phosphorus: H₃PO₂ (reaction with HgCl₂), H₃PO₃ (reaction with AgNO₃, CuSO₄). Redox properties of oxyacids of Sulphur: H₂SO₃ (reaction with KMnO₄, K₂Cr₂O₇), H₂SO₄ (reaction with Zn, Fe, Cu), H₂S₂O₃ (reaction with Cu, Au), H₂SO₅ (reaction with KI, FeSO₄), H₂S₂O₈ (reaction with FeSO₄, KI). Redox properties of oxy acids of Chlorine.

Interhalogens- Classification- general preparation- structures of AB, AB₃, AB₅ and AB₇ type and reactivity.

Pseudohalogens: Comparison with halogens.

S2-I-2: Chemistry of Zero group elements


2 h


Isolation of noble gases, Structure, bonding and reactivity of Xenon compounds – Oxides, Halides and Oxy-halides. Clathrate compounds and Anomalous behaviour of He (II)

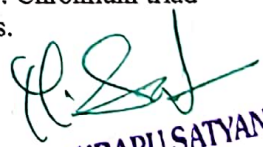
S2-I-3: Chemistry of d-block elements

6 h

Characteristics of d-block elements with special reference to electronic configuration, variable valence, ability to form complexes, magnetic properties & catalytic properties. Stability of various oxidation states and standard reduction potentials. Comparative treatment of second and third transition series with their 3d analogues. Study of Ti, Cr and Cu triads. Titanium triad – electronic configuration and reactivity of +3 and +4 states – oxides and halides. Chromium triad – reactivity of +3 and +6 states. Copper triad – reactivity of +1, +2 and +3 states.


Head
Department of Chemistry
UCA, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254, A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Hyderabad-503322.

Unit - II (Organic Chemistry)**15h(1 hr/week)****S2-O-1: Halogen compounds****4 h**

Classification: alkyl (primary, secondary, tertiary), aryl, aralkyl, allyl, vinyl, benzyl. Chemical reactivity - reduction, formation of RMgX, Nucleophilic substitution reactions - classification into S_N1 and S_N2 . Mechanism and energy profile diagrams of S_N1 and S_N2 reactions. Stereochemistry of S_N2 (Walden Inversion) 2-bromobutane, S_N1 (Racemisation) 1-bromo-1-phenylpropane Structure and reactivity - Ease of hydrolysis - comparison of alkyl, vinyl, allyl, aryl, and benzyl halides.

S2-O-2: Hydroxy compounds and ethers**6 h**

Alcohols: Preparation: 1° , 2° and 3° alcohols using Grignard reagent, Reduction of Carbonyl compounds, carboxylic acids and esters. Physical properties: H-bonding, Boiling point and Solubility. Reactions with Sodium, HX/ZnCl₂ (Lucas reagent), esterification, oxidation with PCC, alk. KMnO₄, acidic dichromates, conc. HNO₃ and Oppenauer oxidation (Mechanism).

Phenols: Preparation: (i) from diazonium salts of anilines, (ii) from benzene sulphonic acids and (iii) Cumene hydroperoxide .

Properties: Acidic nature, formation of phenoxide and reaction with R-X, electrophilic substitution; halogenations, Reimer Tiemann reaction (Mechanism), Kolbe reaction (Mechanism), Gattermann-Koch reaction, Azo-coupling reaction, Schotten-Boumann reaction, Houben-Hoesch condensation, .

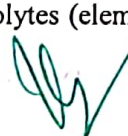
Ethers: Nomenclature, preparation by (a) Williamson's synthesis (b) from alkenes by the action of conc. H₂SO₄. Physical properties - Absence of Hydrogen bonding, insoluble in water, low boiling point. Chemical properties - inert nature, action of conc. H₂SO₄ and HI.

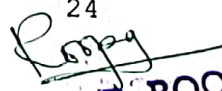
S2-O-3 Carbonyl compounds**5 h**

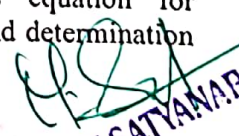
Preparation of aldehydes & ketones from acid chloride, 1,3-dithianes, nitriles and from carboxylic acids. Special methods of preparing aromatic aldehydes and ketones by (a) Oxidation of arenes (b) Hydrolysis of benzal halides Physical properties - absence of Hydrogen bonding. Reactivity of the carbonyl groups in aldehydes and ketones. Chemical reactivity: Addition of (a) NaHSO₃ (b) HCN (c) RMgX (d) NH₃ (e) RNH₂ (f) NH₂OH (g) PhNHNH₂ (h) 2,4-DNP (Schiff bases). Addition of H₂O to form hydrate, chloral hydrate (stable), addition of alcohols - hemiacetal and acetal formation. Cannizzaro reaction. Oxidation reactions - KMnO₄ oxidation and auto oxidation, reduction - catalytic hydrogenation, mechanism of Clemmenson's reduction, Wolf-kishner reduction, Meerwein Ponnoff Verly reduction. Reduction with LAH, NaBH₄.

Unit - III (Physical Chemistry)**15h(1 hr/week)****S2-P-1: Electrochemistry****15 h**

Electrical transport - conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance, variation of specific and equivalent conductance with dilution. Migration of ions and Kohlrausch's law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law - its uses and limitations. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination


Head
Department of Chemistry
UCC, Coimbatore University
Hyderabad-007

24

Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA - 508254. A.P. INDIA


Dr. MAVURAPU SATYANARAYANA
Assistant Professor
Department of Pharmaceutical
Tela Gandhi University
Nalgonda, Nizamabad-505322.



by Hittorf's method for attackable electrodes. Applications of conductivity measurements: Determination of degree of dissociation, determination of K_a of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations.

Electrolytic and Galvanic cells – reversible and irreversible cells, conventional representation of electrochemical cells. Electro motive force (EMF) of a cell and its measurement. Computation of EMF. Types of reversible electrodes- the gas electrode, metal-metal ion, metal-insoluble salt and redox electrodes. Electrode reactions, Nernst equation, cell EMF and Single electrode potential, Standard Hydrogen electrode – reference electrodes (calomel electrode) – standard electrode potential, sign conventions, electrochemical series and its significance. Applications of EMF measurements. Calculation of thermodynamic quantities of cell reactions (Gibbs free energy G , Helmholtz free energy and Equilibrium constant K). Determination of pH using hydrogen electrode, glass electrode and quinhydrone electrode. Solubility product of $AgCl$. Potentiometric titrations.

Unit – IV (General Chemistry)

15 h (1 hr/week)

S2-G-1: Theory of Quantitative Analysis

6 h

Volumetric Analysis: Introduction, standard solutions, indicators, end point, titration curves, Types of titrations: i) neutralization titration- principle, theory of acid base indicators, titration curves and selection of indicators- strong acid - strong base, strong acid –weak base, weak acid-strong base and weak acid –weak base. Theory of redox titrations - internal($KMnO_4$) and external indicators – use of diphenylamine and ferroin indicators. Theory of complexometric titrations – use of EBT, Murexide and Fast sulphone black indicators. Role of pH in complexometric titrations. Precipitation titrations – theory of adsorption indicators.

Gravimetric analysis- Introduction, nucleation, precipitation, growth of precipitate, filtration and washing, drying and incineration of precipitate, coprecipitation and post precipitation. Determination of Ni^{2+}

S2-G-2: Stereoisomerism


5 h

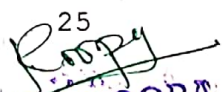
Optical activity: Definition, wave nature of light, plane polarised light, optical rotation and specific rotation, chiral centers. Chiral molecules: definition and criteria - absence of plane, center and S_n axis of symmetry – asymmetric and dissymmetric molecules. Examples of asymmetric molecules (Glyceraldehyde, Lactic acid, Alanine) and dissymmetric molecules (trans-1,2-dichlorocyclopropane). Molecules with constitutionally symmetrical chiral carbons (Tartaric acid) Molecules with constitutionally unsymmetrical chiral carbons (2,3dibromopentane). D, L configuration – examples. R, S – configuration: Cahn-Ingold-Prelog rules, examples for asymmetric and dissymmetric molecules.

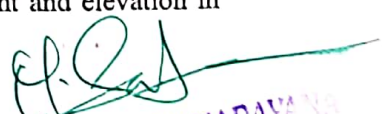
S2-G-3: Dilute Solutions & Colligative Properties

4 h

Dilute Solutions, Colligative Properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis - laws of osmotic pressure, its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in


Head
Department of Chemistry
UO, Osmania University
Hyderabad-007

²⁵

DR. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254, A.P. INDIA.


DR. MAVURAPU SATYANARAYANA
Asst. Professor,
Department of Physical Chemistry
Osmania University
Nizampally, Nizamabad-503322.



boiling point and depression in freezing point.

References

General reference: B.Sc I Year Chemistry : Semester II, Telugu Academy publication, Hyd

Unit I

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications 1996.
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn.
3. Basic Inorganic Chemistry by F.A. Cotton, G. Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers 2001.
4. Chemistry of the elements by N.N. Greenwood and A. Earnshaw Pergamon Press 1989.
5. Inorganic Chemistry by Shriver and Atkins 3rd edn Oxford Press 1999.
6. Inorganic Chemistry Principles of structure and reactivity by James E. Huhey, E.A. Keiter and R.L. Keiter 4th Edn.
7. Textbook of inorganic chemistry by R Gopalan.

Unit II


1. Organic Chemistry by Morrison and Boyd.
2. Organic Chemistry by Graham Solomons.
3. Organic Chemistry by Bruce Yuranis Powla.
4. Organic Chemistry by L. G. Wade Jr.
5. Organic Chemistry by M. Jones, Jr
6. Organic Chemistry by John McMurry.
7. Organic Chemistry by Soni.
8. General Organic chemistry by Sachin Kumar Ghosh.
9. Organic Chemistry by C N pillai

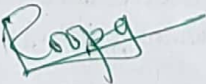
Unit III


1. Physical chemistry by P W Atkins
2. Principles of physical chemistry by Prutton and Marron.
3. Text Book of Physical Chemistry by Soni and Dharmahara.
4. Text Book of Physical Chemistry by Puri and Sharma
5. Text Book of Physical Chemistry by K. L. Kapoor
6. Physical Chemistry through problems by S.K. Dogra.
7. Elements of Physical Chemistry by Lewis and Glasstone.
8. Material science by Kakani & Kakani

Unit IV

1. Vogel's Text Book of Quantitative Analysis by G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney 5th edn Addison Wesley Longman Inc. 1999.
2. Quantitative Analysis by Day and Underwood Prentice Hall (India) VI Edn..
3. Nano: The Essentials by T. Pradeep, McGraw-Hill Education.
4. Chemistry of nanomaterials: Synthesis, Properties and applications by CNR Rao et.al.
5. Nanostructured Materials and Nanotechnology, edited by Hari Singh Nalwa, Academic Press
6. Practical chemistry by V K Ahluwalia, Sunitha Dhingra and Adarsh Gulati.


Head
Department of Chemistry
UCS, Gamanla University
Hyderabad-007


26
Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254, A.P. INDIA


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D.
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Bichpani, Nizamabad-509322



OUTCOMES :After the successful completion of the course, students should be able to:

- To get acquainted with application of VSEPR theory in explaining structure and bonding.
- To interpret nature of compounds of p-block elements.
- To understand about the inert nature of Zero group elements, factors responsible for their reactivity and explaining structure and bonding.
- To get acquainted with characteristics of d block elements.
- To understand about the preparations, physical & chemical properties of classes of organic compounds.
- To know the basic principles of electrochemistry and its applications in daily life.
- To understand the nature of dilute solutions and its properties.

Laboratory Course **45hrs (3 h / week)**
Paper II- Quantitative Analysis

Objectives of practicals

- The objective of B.Sc. Chemistry Practical - II is intended to provide:
- To get acknowledged with techniques involved in quantitative analysis of products:
- To get acknowledged with techniques involved in Redox titrations and Complexometric titrations.
- To get acknowledged with techniques involved in preparation methods of inorganic metal complexes.

I. Analysis Acid - Base titrations

1. Estimation of Carbonate in Washing Soda.
2. Estimation of Bicarbonate in Baking Soda.
3. Estimation of Carbonate and Bicarbonate in the Mixture.
4. Estimation of Alkali content in Antacid using HCl.
5. Estimation of NH_4^+ by back titration

II.Redox Titrations

1. Determination of Fe(II) using $K_2Cr_2O_7$
2. Determination of Fe(II) using $KMnO_4$ with sodium oxalate as primary standard.

III.Complexometric Titrations

1. Estimation of Mg^{2+}

IV.Inorganic preparatios

1. Bis (dimethylglyoximato) Nickel(II)
2. Hexamine cobalt(III) Chloride

OUTCOMES

- After the successful completion of the course, students should be able to:
- To get adapted with techniques involved in Quantitative analysis of products.
- To get acknowledged with techniques involved in preparation methods of inorganic metal complexes.

27

R. Roopa

Head
Department of Chemistry
UC8, Osmania University
Hyderabad-007

Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254, A.P. INDIA.

Dr. MAHARAJU SATYANARAYANA
M.Sc. Ph.D.
Assistant Professor
Department of Medical Chemistry
Telangana University
Dichpally, Nizamabad-503322.



Government Degree College for Women, Begumpet, Hyderabad
Autonomous Accredited with "B+" Grade by NAAC

I B.Sc
Paper code 203

II Semester

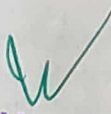
Paper- II (Practicals)
No. of Credits - 01

Practical Model Question Paper

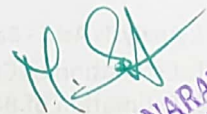
Duration : 3 Hours

Total Marks : 50

- I. Write Brief procedure for the preparation of Inorganic compound. (5M)
- II. Write principle, indicator and colour change at end point in the ____ (5M)
- III. Estimate the amount in the given following experiments (30M)
- IV. Viva (5M)
- V. Record (5M)


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P.


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpally, Nizamabad-503322.

GOVERNMENT DEGREE COLLEGE FOR WOMEN
BEGUMPET, HYDERABAD - 16
B.Sc. 1 YEAR MODEL QUESTION PAPER
Subject: **CHEMISTRY**
SEMESTER - 2

Time: 2 Hours

Max. Marks: 60
Min. Marks: 24

Section - A

I Answer any Five of the following questions


5x4=20marks

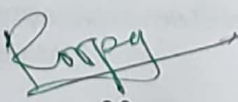
1. Write a note on amphoteric oxides?
2. Explain the structures of XeF_2 and XeF_4 ?
3. Compare the reactivity of allyl, Vinyl halides?
4. Write any two preparation methods of alcohols?
5. Write about Debye-Huckel-Onsager's equation for strong electrolytes?
6. Explain Nernst equation?
7. What is coprecipitation?
8. Write a note on acid base indicators?


SECTION-B

II Answer all questions choosing any one bit from each question 4X10 = 40 Marks

9. (a) Explain the magnetic and catalytic properties of transition elements?
(or)
(b) What are polyhalides? Explain the structures of ICl_2^- , ICl_4^- , I_3^- ?
10. (a) Write Reimer Tiemann reaction with mechanism?
(or)
(b) Explain Cannizaro reaction with Mechanism?
11. (a) What is transport number? Determine the transport number using Hittorf's Method?
(or)
(b) Write about Standard Hydrogen electrode?
12. (a) Discuss the Cahn-Ingold-Prelog rules, with examples for R, S notations for asymmetric and disymmetric molecules?
(or)
(b) What is Raoult's law? Derive a relation between relative lowering of vapor pressure and molar mass of the solute?


Head
Department of Chemistry
UCB, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254, A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D.
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpally, Nizamabad-503322.



II B.Sc. Chemistry syllabus

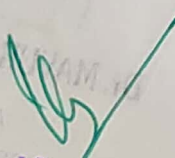
III Semester 60 Hrs (4 H/W)

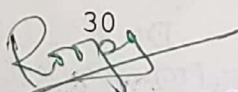
(Syllabus with effect from 2019-20)


	UNIT-I Inorganic Chemistry	15h
I	Chemistry of f-block elements	5
II	Coordination Compounds-I	6
III	Metal carbonyls and Organometallic Chemistry	4
	UNIT II Organic Chemistry	15h
I	Carboxylic acids and derivatives	5
II	Nitrohydrocarbons	3
III	Amines, Cyanides and Isocyanides	7
	Unit-III Physical Chemistry	15h
I	Thermodynamics –I	10
II	Thermodynamics –II	5
	Unit-IV General Chemistry	15h
I	Evaluation of analytical data	4
II	Carbanions-I	5
III	Phase Rule	6

Course Objectives:

- To learn the sources, importance, separation techniques of lanthanides
- To understand the basics of formation of coordination compounds from various theories
- Learn the preparation and properties of metal carbonyls and organo metallic compounds


Head
 Department of Chemistry
 UCS, Osmania University
 Hyderabad-500078

30

Dr. R. ROOPA
 Asst. Professor, Dept. of Chemistry
 MAHATMA GANDHI UNIVERSITY
 NALGONDA - 508254. A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
 M.Sc., Ph.D.
 Assistant Professor
 Department of Pharmaceutical Chemistry
 Telangana University
 Bichchal, Nizamabad-502307



- Understand the fundamental properties and reactivity of carboxylic compounds, nitrohydro compounds, amines, cyanides and isocyanides
- Understand the various laws of thermodynamic
- Basics of phase rule, number of components and degrees of freedom, eutectic point, eutectic mixture, Water system, Pb-Ag system, NaCl system and freezing mixtures.
- Evaluation of the analytical data
- Reactions involving active methylene compounds
- Synthesis of various organic compounds

**B.Sc. II Year CHEMISTRY
SEMESTER WISE SYLLABUS
SEMESTER III
Paper-III**

Chemistry - III

Unit-I (Inorganic Chemistry)

15 h (1 hr/week)

S3-I-1: Chemistry of f-block elements:

5 h

Chemistry of Lanthanides: Position in periodic table, Electronic structure, oxidation state, ionic and atomic radii- lanthanide contraction- cause and consequences, anomalous behavior of post lanthanides-complexation- type of donor ligands preferred. Magnetic properties- para magnetism. Colour and spectra, f-f transitions –occurrence and separation– ion exchange method, solvent extraction.

Chemistry of actinides- general features – electronic configuration, oxidation state, actinide contraction, colour and complex formation. Comparison with lanthanides.

Additional Inputs: Comparison between f – Block and d-Block elements

S3-I-2: Coordination Compounds-I

6 h

Simple inorganic molecules and coordination complexes. Nomenclature – IUPAC rules, Coordination number, coordination geometries of metal ions, types of ligands. 2. Brief review of Werner's theory, Sidgwick's electronic interpretation and EAN rule and their limitations. (Valence bond theory (VBT) – postulates and application to (a) tetrahedral complexes $[\text{Ni}(\text{NH}_3)_4]^{2+}$ $[\text{NiCl}_4]^{2-}$ and $[\text{Ni}(\text{CO})_4]$ (b) Square planar complexes $[\text{Ni}(\text{CN})_4]^{2-}$, $[\text{Cu}(\text{NH}_3)_4]^{2+}$, $[\text{PtCl}_4]^{2-}$ (c) Octahedral complexes $[\text{Fe}(\text{CN})_6]^{4-}$, $[\text{Fe}(\text{CN})_6]^{3-}$ $[\text{FeF}_6]^{3-}$, $[\text{Co}(\text{NH}_3)_6]^{3+}$, $[\text{CoF}_6]^{3-}$. Limitations of VBT. 3. Isomerism in coordination compounds, stereo isomerism – (a) Geometrical isomerism in (i) square planar metal complexes of the type $[\text{MA}_2\text{B}_2]$ $[\text{MA}_2\text{BC}]$ $[\text{M}(\text{AB})_2]$ $[\text{MABCD}]$ (ii) Octahedral metal complexes of the type $[\text{MA}_4\text{B}_2]$, $[\text{M}(\text{AA})_2\text{B}_2]$ $[\text{MA}_3\text{B}_3]$ using suitable examples, (b) Optical isomerism in (i). Tetrahedral complexes $[\text{MABCD}]$ (ii). Octahedral complexes $[\text{M}(\text{AA})_2\text{B}_2]$, $[\text{M}(\text{AA})_3]$ using suitable examples. Structural isomerism: ionization, linkage, coordination ligand isomerism using suitable examples.

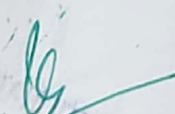
Additional Inputs: Hydration isomerism

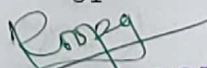
S3-I-3: Metal carbonyls and Organometallic Chemistry

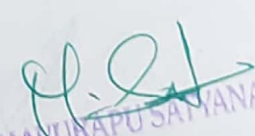
4 h

Metal carbonyls: Preparation and properties of $\text{Ni}(\text{CO})_4$. Structural features of $\text{Ni}(\text{CO})_4$, $\text{Fe}(\text{CO})_5$, $\text{Fe}_2(\text{CO})_9$, $\text{Fe}_3(\text{CO})_{12}$ and $\text{Cr}(\text{CO})_6$ -18 valence electron rule.

31


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA -508254. A.P. INDIA.


Dr. M. V. S. NARAYANA
M.Sc. Ph.D.
Assistant Professor
Department of Pharmaceutical Chemistry
T. Y. S. R. University
Hyderabad-503322.



Definition, nomenclature and classification of organometallic compounds. Methods of preparation, properties and applications of alkyl and aryl compounds of Li, Mg & Al.

Additional Inputs: Structure of $\text{Fe}(\text{CO})_5$

Unit - II (Organic Chemistry)

15h (1 hr/week)

S3-O-1: Carboxylic acids and derivatives

5 h

Preparation: a) Hydrolysis of Nitriles, amides and esters. b) Carbonation of Grignard reagents. Special methods of preparation of Aromatic Acids - Oxidation of Arenes. Physical properties- hydrogen bonding, dimeric association,. Chemical properties – Reactions involving H, OH and COOH groups -salt formation, anhydride formation, Acid halide formation, Esterification (mechanism) & Amide formation. Reduction of acid to the corresponding primary alcohol - via ester or acid chloride. Degradation of carboxylic acids by Huns Diecker reaction, Schmidt reaction (Decarboxylation). Arndt – Eistert synthesis, Halogenation by Hell – Volhard - Zelensky reaction. Carboxylic acid Derivatives – Hydrolysis and Amonolysis of acid halides, Acid anhydrides and esters (mechanism of ester hydrolysis by base and acid). Hydrolysis and dehydration of amides.

Additional Inputs: Comparison of acidic strength of carboxylic acid and alcohol

S3-O-2: Nitrohydrocarbons

3 h

Preparation of Nitroalkanes. Reactivity - halogenation, reaction with HNO_2 (Nitrous acid), Nef reaction, reduction. Aromatic Nitrohydrocarbons: Preparation of Nitrobenzene by Nitration. Physical properties, chemical reactivity –Reduction of Nitrobenzenes in different media.

Additional Inputs: Acidic nature of α -Hydrogen of Nitrohydrocarbons


S3-O-3: Amines, Cyanides and Isocyanides

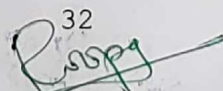
7 h

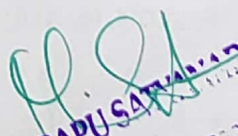
Amines: classification into 1^o, 2^o, 3^o Amines and Quarternary ammonium compounds. Preparative methods – Ammonolysis of alkyl halides, Gabriel synthesis, Hoffman's bromamide reaction (mechanism). Reduction of Amides and Schmidt reaction. Physical properties. Use of amine salts as phase transfer catalysts. Chemical Properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation. Reaction with Nitrous acid of 1^o, 2^o, 3^o (Aliphatic and aromatic amines). Electrophilic substitutions of Aromatic amines – Bromination and Nitration, oxidation of aryl and 3^o Amines, diazotisation. Diazonium salts: Preparation with mechanism. Synthetic importance – a) Replacement of diazonium group by – OH, X (Cl)-Sandmeyer and Gatterman reaction, by fluorine (Schiemann's reaction), by iodine, CN, NO₂, H and aryl groups. Coupling Reaction of diazonium salts. i) with phenols ii) with anilines. Reduction to phenyl hydrazines.

Cyanides and isocyanides: Structure. Preparation of cyanides from a) Alkyl halides b) from amides c) from aldoximes. Preparation of isocyanides from Alkyl halides and Amines. Properties of cyanides and isocyanides, a) hydrolysis b) addition of Grignard reagent iii) reduction iv) oxidation.

Additional Inputs: Basic strength of aliphatic amines and aromatic amines


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007.

32

Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry,
MAHATMA GANDHI UNIVERSITY,
NALGONDA-508254. A.P. INDIA.


Dr. MAVURAPU SANKAR
Assistant Professor
Department of Physical Chemistry
Telangana
Dhikhal, Nizamabad

Unit III (Physical Chemistry)
S3-P-1: Thermodynamics –I

15 h (1 hr/week)
10 h

A brief review of - Energy, work and heat units, mechanical equivalent of heat, definition of system, surroundings. First law of thermodynamics statement- various forms mathematical expression. Thermodynamic quantities- extensive properties and intensive properties, state function and path functions. Energy as a state function and exact differential. Work of expansion and heat absorbed as path function.

Expression for work of expansion, sign convention problems on first law. Heat changes at constant pressure and heat changes at constant volume. Enthalpy. Heat capacities at constant pressure and constant volume. Derivation of $C_p - C_v = R$. Isothermal adiabatic processes. Reversible and irreversible processes. Reversible change and maximum work. Derivation of expression for maximum work for isothermal reversible process. Problems. Internal energy of an ideal gas. Joules experiment. Joule-Thompson coefficient. Adiabatic changes in ideal gas, derivation of equation, $PV^\gamma = \text{constant}$. P-V curves for isothermal and adiabatic processes. Heat of a reaction at constant volume and at constant pressure, relation between ΔH and ΔV . Variation of heat of reaction with temperature. Kirchhoff's equation and problems. Limitations of first law and need for second law. Statement of second law of thermodynamics. Cyclic process. Heat engine, Carnot's theorem, Carnot's cycle. Derivation of efficiency of heat engine. Problems. Thermodynamic scale of temperature.

S3-P-2: Thermodynamics-II

5 h

Entropy: Definition from Carnot's cycle. Entropy as a state function. Entropy as a measure of disorder. Sign of entropy change for spontaneous and non-spontaneous processes & equilibrium processes. Entropy changes in i) Reversible isothermal process, ii) Reversible adiabatic process, iii) Phase change, iv) Reversible change of state of an ideal gas. Problems. Entropy of mixing of ideal gases. Free energy Gibbs' function (G) and Helmholtz's function (A) as thermodynamic quantities. Concept of maximum work and network ΔG as Criteria for spontaneity. Derivation of equation $\Delta G = \Delta H - T\Delta S$. Significance of the equation. Gibbs equations and Maxwell relations. Variation of G with P, V and T.

Unit – IV (General Chemistry)

15 h (1 hr/week)

S3-G-1 Evaluation of analytical data

4 h

Significant figures, accuracy and precision. Errors-classification of errors- determinate and indeterminate errors, absolute and relative errors. Problems based on mean, median, range, standard deviation.

Additional Inputs: Gross errors

S3-G-2: Carbanions-I

5 h

Introduction, acidic nature of α -hydrogens and tautomerism in carbonyl compounds, nitro hydrocarbons, ethyl acetoacetate, diethyl malonate. Terminal alkynes. Stability of carbanions Reactions : Aldol reaction, Perkin reaction, Benzoin condensation, haloform reaction, conversion of smaller alkynes to higher alkynes.

Additional Inputs: Acidic nature of α -Hydrogen of different organic compounds

Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007

Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254, A.P. INDIA

Dr. MAVURAPU SATYANARAYANA
M.Sc. F
Assistant Professor
Department of Pharmaceutical Chemistry
University
Dichpally, Nizamabad-503322.

S3-G-3: Phase Rule

Statement and meaning of the terms – Phase, Component and Degrees of freedom, Gibb's Phase rule, phase equilibria of one component system – water system. Phase equilibria of two- component system – Solid-Liquid equilibria, simple eutectic –Pb-Ag system, desilverisation of lead. Solid solutions – compound with congruent melting point – Mg-Zn system and incongruent melting point – NaCl-H₂O system.

Additional Inputs: Applications of phase rule

References

General reference: B.Sc II Year Chemistry: Semester III, Telugu Academy publication, Hyd

Unit- I

1. Analytical chemistry by G. L. David Krupadanam, D. Vijaya Prasad, K. Varaprasada Rao, K.L.N. Reddy and C. Sudhakar
2. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications(1996).
3. Concise Inorganic Chemistry by J.D. Lee 3rd edn Van Nostrand Reinhold Company(1977)
4. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers (2001).
5. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th edn. (2006)
6. Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press(1989).
7. Inorganic Chemistry by Shriver and Atkins 3rd edn Oxford Press (1999).
8. Textbook of Inorganic Chemistry by R Gopalan(Universities Press(2012)
9. College Practical chemistry by V K Ahluwalia, Sunitha Dhingra and Adarsh Gulati Universities Press (India) Limited(2012)

Unit- II

1. Text book of organic chemistry by Soni. Sultan Chand & Sons; Twenty Ninth edition (2012)
2. General Organic chemistry by Sachin Kumar Ghosh. New Age Publishers Pvt Ltd (2008).
3. Text book of organic chemistry by Morrison and Boyd. Person(2009)
4. Text book of organic chemistry by Graham Solomons. Wiley(2015)
5. Text book of organic chemistry by Bruice Yuranis Powla. (2012)
6. Text book of organic chemistry by C N pillai CRC Press (2012)
7. Organic Chemistry by L. G. Wade Jr.
8. Organic Chemistry by M. Jones, Jr
9. Organic Chemistry by John McMurry.

Unit III

1. Principles of physical chemistry by Prutton and Marron. The MacmillanCompany; 4th Edn.(1970)
2. Text Book of Physical Chemistry by Soni and Dharmahara. Sulthan Chand and Sons.(2011)
3. Text Book of Physical Chemistry by Puri and Sharma. S. Nagin chand and Co.(2017)
4. Text Book of Physical Chemistry by K. L. Kapoor. (2012)
5. Colloidal and surface chemistry , M. Satake, Y. Hayashi, Y.Mido, S.A.Iqbal and
6. M.S.sethi, Discovery Publishing Pvt.Ltd (2014)
7. Material science by Kakani & Kakani, New Age International(2016)
8. Physical Chemistry by Ira Levine (Author) McGraw-Hill Education; 6 edition (May 9, 2008)

Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007

34
Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA

Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Nizamabad-503322

Laboratory Course
Paper III (Organic Synthesis)

45 h (3h/week)

Objectives:

- Gain knowledge on different reagents and preparation of different organic compound
- Gain knowledge on handling of chemicals
- Gain knowledge on various instruments such as distillation units, melting point apparatus etc.

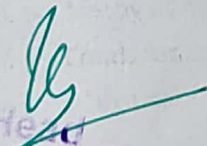
1. Synthesis of Organic compounds:

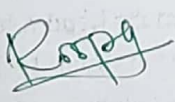
- Acetylation: Acetylation of salicylic acid, Benzoylation of Aniline.
- Aromatic electrophilic substitution: Nitration: Preparation of nitro benzene and m-dinitro benzene.
- Halogenation: Preparation of p-bromo acetanilide, Preparation of 2, 4, 6-tribromo phenol.
- Oxidation: Preparation of benzoic acid from benzyl chloride.
- Esterification: Preparation of n-butyl acetate from acetic acid.
- Methylation: Preparation of β -naphthyl methyl ether.
- Condensation: Preparation of benzilidene aniline from Benzaldehyde and aniline.
- Diazotisation: Azocoupling of β -Naphthol.

Micro wave assisted green synthesis of Aspirin - DEMO (Demonstration only)

Outcomes:

- Will learn and implement the ethics of the laboratory rules while performing the experiments
- Develop the skills of handling various instruments such as distillation units, melting point apparatus etc
- Experimental learning in the preparation of various organic compounds that improves their skills in organic synthesis


Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA - 508254, A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichnally, Nizamabad-503322.

Government Degree College for Women, Begumpet, Hyderabad
Autonomous Accredited with "B+" Grade by NAAC

II B.Sc Chemistry

III Semester

Paper- III (Practicals)

Practical Model Question Paper

Duration : 2 Hours

Total Marks : 50

1. Write brief Procedure with chemical equation and principle for the preparation of an organic compound. (10M)
2. Prepare and submit the crude sample of organic compound (30M)
3. Record (5M)
4. Viva (5M)



Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007



Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254, A.P. INDIA.



Dr. MAVURAPU SATYANARAYA
M.Sc.
Assistant Professor
Department of Pharmaceutical Chem
Telangana University
Dichpally, Nizamabad-503322.

GOVERNMENT DEGREE COLLEGE FOR WOMEN
BEGUMPET, HYDERABAD - 16
B.Sc. II YEAR SEMESTER MODEL QUESTION PAPER
Subject: CHEMISTRY
SEMESTER - III

Time: 2 Hours

Max. Marks: 60
Min. Marks: 24

Section - A

I Short Answer questions

Answer any Five of the following questions

5x4=20marks

1. Define lanthanides and actinides?
2. Explain EAN rule with one example ?
3. Write Arndt-Eistert synthesis?
4. Write preparation of Nitro hydrocarbons?
5. Explain I law of thermodynamics?
6. Derive equation of $Pv^\gamma = \text{constant}$?
7. Define accuracy and precision.
8. Define phase, component and degrees of freedom?

SECTION-B

II Essay questions

Answer all questions choosing any one bit from each question

4X10 = 40 Marks

9. (a) Explain the Valance Bond Theory (VBT) postulates with examples each from tetrahedral complex, square planar complex and octahedral complex
(or)

(b) Write classification of Organo Metallic Compounds (OMC) with examples?

10. (a) Write the preparation of Nitrobenzene with mechanism and reduction of Nitro benzene in different media.

(or)

(b) Write preparation of amines using Gabriel synthesis, Hoffman's bromamide reaction with mechanism?

11. (a) Derive $C_p - C_v = R$.

(or)

(b) Explain Carnot's theorem?

12. (a) Write aldol condensation and bezoin condensation reaction?

(or)

(b) explain water system with phase diagram

Head

Department of Chemistry
UCS, Osmania University
Hyderabad-007

39

Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA.

Dr. MANI RAO SATYANARAYANA
M.Sc. Ph.D.
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpally, Nizamabad-503322.



**B.Sc. Chemistry II Year
Semester III
Skill Enhancement Course- I (SEC-I)**

Objectives:

- To improve the skills of students in the application of theory and practical knowledge.
- To fill the gap between theory and practicals.
- To train the students in understanding laboratory safety rules and to improve the skills in preparation of laboratory reagents

301 SEC: Safety Rules in Chemistry Laboratory and Lab Reagents

Unit I: Laboratory Safety Rules and Regulations.

General rules and regulations for lab safety: Minimizing Risks of Hazards , Personal Protective Equipment (PPE) - Hair, Dressing for the Laboratory, Eye Protection, Eye-wash fountain, Gloves, Laboratory Protocols, Labeling Chemicals, Careful reading of labels Prevention of Inhaling Harmful Chemicals, Guide to Chemical Hazards, Chemical Spills etc., Accidents use of fire extinguisher and first aid kit in the laboratory, safety symbols- Preparation of the charts by the students and display of charts in chemistry labs. Calibration of fractional weights, calibration of glass ware - burette, pipette, standard flask, Normality/Molarity and specific gravity of concentrated acids – Preparation of dilute solutions (Numerical problems). Precautions to be taken in the preparation of dilute acids and bases and bases. Preparation of stock solutions of salts with specific examples. Properties of primary standard salt and preparation of standard solution. Good laboratory practices- maintenance of observation book record.


UNIT 2: Preparation of Lab Reagents: Preparation of indicators and use of indicators in volumetric analysis- acid base titrations, redox titrations, precipitation titrations and complexometric titrations. Role of an indicator in detecting end point (Phenolphthalein, Methyl orange, Methyl-red, Potassium Chromate, Diphenylamine, EBT, Murexide, etc). Preparation of buffers – pH 10 ammonical buffer and acetate buffer solutions. Preparation of commonly used reagents : Ammonium hydroxide solution, Ammonium molybdate reagent, Ammonium hydrogen phosphate solution, Bayer's reagent, Benedict's solution, Bromine water, Dimethyl glyoxime reagent, 2,4-Dinitrophenyl hydrazine reagent, Eriochrome black-T reagent Fehling solution, Ferric chloride solution, Ferrous sulphate solution, Iodine solution, Molisch's reagent, Nessler's reagent, Neutral FeCl_3 , Schiff's reagent, Silver nitrate solution, Sodium carbonate solution , Sodium hydroxide (Caustic soda) solution, Starch solution, Tollen's reagent. (reference work and submission of assignments). Charts preparation depicting course content.

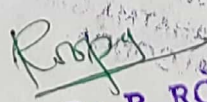
RECOMMENDED BOOKS

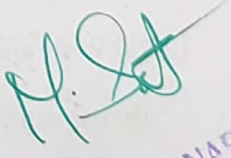
1. Vogel's Text Book of Quantitative Chemical Analysis, 5th edition.
2. Vogel's Text Book of macro and semimicro qualitative inorganic analysis. G. Svehla, 5th edition.
3. Chemistry Reagent Manual Prepared by Chemistry Department, SGTB Khalsa College under DBT's Star College Scheme, University of Delhi (Available: online)
4. American Chemical Society Safety in Academic Chemistry Laboratories 8th edition.

Outcome:

- Gain knowledge on laboratory safety rules
- Gain knowledge on preparation of lab reagents and their uses


Head
Department of Chemistry
UCB, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
Assistant Professor
Department of Pharmaceutical
Bhadrachalam University
Bhadrachalam, Nizamabad.

B.Sc. Chemistry II Year
Semester III
Skill Enhancement Course- II (SEC –II) (2 Credits)

**REMEDIAL METHODS FOR POLLUTION, DRINKING WATER AND SOIL
FERTILITY STANDARDS**

OBJECTIVES:

- To Understand chemistry involved in environment
- To Identify the chemical reactions and changes in contaminants
- Imparts knowledge on essential nutrients, soil fertility, nutrient transformations in soil.
- To assess the water demand of area under consideration
- To plan and design water supply system
- Understand impact of human action on soil and land.
- To learn significance of water quality and its importance for living being including humans.

UNIT I: Remedial Methods for Pollution Prevention and control of air pollution
15 h (1 hr/week)

Ozone hole-causes and harm due to ozone depletion. The effect of CFC's in Ozone depletion and their replacements. Global Warming and Greenhouse Effect Precautions to control global warming. Deleterious effect of pollutants - Endangered Monuments- acid rain. Precautions to protect monuments. Sources of Radiation pollution - Chernobyl accident and its Consequences. Radiation effect by the usage of cell phones and protection tips. Deleterious effects of cell phone towers and health hazards.

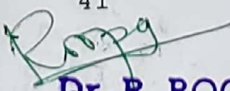
Sources of water pollution-(i). Pollution due to pesticides and inorganic chemicals, (ii). Thermal pollution (iii). Ground water pollution (iv). Eutrophication.


Methods for control of water pollution and water recycling. Dumping of plastics in rivers & oceans and their effect on aquatic life. Determination of (i) Dissolved Oxygen and (ii) Chemical Oxygen Demand in polluted water - Illustration through charts (or) demonstration of experiments. Sources of soil pollution (i). Plastic bags, (ii). Industrial and (iii). Agricultural sources. Control of soil pollution. Environmental laws in India. Environmental benefits of planting trees.

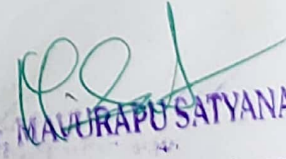
UNIT II: Drinking Water and Soil Fertility Standards and Analysis
15 h (1 hr/week)

Water Quality and Common Treatments for Private Drinking Water Systems: Drinking Water Standards-Primary Drinking Water Standards : Inorganics, Organics and Volatile Organic Chemicals. Secondary Drinking Water Standards-Inorganics and Physical Problems. Water Testing, Mineral Analysis, Microbiological Tests, Pesticide and Other Organic Chemical Tests. Principle involved in Water Treatment Techniques: (i) Reverse osmosis (ii) Disinfection methods such as chlorination, ultraviolet light, ozonation etc (iii) Chemical oxidation and (iv) Ion exchange (water softeners). Visit to nearby drinking water plants and interaction at sites.

41


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254, A.P. INDIA


Head
Department of Chemistry
UCS, Omania University
Hyderabad-607


Dr. NAVURAPU SATYANARAYANA
Assistant Professor
Department of Pharmaceutical
Telangana University
Dichpally, Nizamabad-50


Introduction to Soil Chemistry- Basic Concepts. Effect of pH on nutrient availability. Macronutrients and their effect on plants -Carbon, Hydrogen, Oxygen, Nitrogen and Phosphorus other macronutrients-Calcium, Magnesium and Sulfur. Micronutrients and their effect on plants. Boron ($B_4O_7^{2-}$), Copper (Cu^{2+}), Iron (Fe^{2+} , Fe^{3+}) Manganese (Mn^{2+}) Molybdenum (MoO_4^{2-}) Zinc (Zn^{2+}) Cobalt (Co^{2+}) Chlorine (Cl^-) and Others. Determination of soil nitrogen by Kjeldahl method- Illustration through charts (Or) demonstration of experiment. Visit to nearby agricultural farms and interaction with farmers. Discussion with farmers on the use of Soil Analysis Kits.

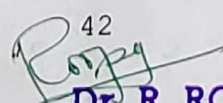
References

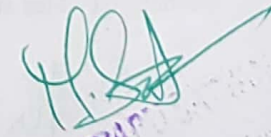
1. A Text book for 'Remedial methods for pollution, drinking water and soil fertility standards', First Edition, Authors: Dr Mudvath Ravi, Gopu Srinivas, Putta Venkat Reddy, Vuradi Ravi Kumar, Battini Ushaiah, ISBN No. 978-93-5311-183-0.
2. Remedial methods for pollution, drinking water and soil fertility standards, Author: Dr G. Vanjatha.
3. Remedial methods for pollution, drinking water and soil fertility standards, Telugu version, Authors: Dr N. Yogi Babu, Dr. G. Vanajatha, M. Srilatha.
4. Environmental Pollution, download.nos.org/333courseE/10.pdf
5. CFC Replacements, butane.chem.uiuc.edu/pshapley/Environmental/L21/3.html
6. Effects of Acid Rain on Buildings www.air-quality.org.uk/12.php
7. Acid Rain Effects - Buildings - Chemistry chemistry.elmhurst.edu/vchembook/196buildings.html
8. How to protect national heritage - ways to protect monuments www.youthkiawaaz.com/2011/03/how-to-protect-national-heritage/.
9. Chernobyl nuclear power plant accident - NRC www.nrc.gov/reading-rm/doc-collections/fact-sheets/chernobyl-bg.pdf
10. Side-effects of harmful radiation from mobile phones and towers pib.nic.in/newsite/printrelease.aspx?relid=116304

OUTCOMES:

- Enhance the ability to apply this knowledge and proficiency to find solutions relating to environmental concerns of varied dimensions of present times.
- Students gain Knowledge of water sources and processes involved and Application of knowledge on water resource technology
- To get acquaint in Understand the Indian constitutional provisions with respect to the environmental protection, division of powers, and fundamental rights
- Students Understand impact of human action on soil and land
- Apply the gained knowledge to practical situations particularly in agriculture.
- Ability to respond flexibly towards restoration of problematic soils of specific areas.
- Able to do sampling and analysis of air pollutant Develop an understanding of working of air pollution control devices
- Students will gain knowledge on concepts and principles of Soil fertilizes.


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007

42

Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254, A.P. INDIA.


Dr. MAVURAN
Assistant Professor
Department of Pharmaceutics
Tetel
Dichally, Nizamabad

GOVERNMENT DEGREE COLLEGE FOR WOMEN BEGUMPET
AUTONOMOUS
NAAC ACCREDITED "B+"

Max marks: 40M

Time: 1 1/2hour

Date:

SEC Model Paper

Invigilator Signature

Name: _____

Roll No. _____

Class: _____

Semester: III

SECTION-A

Answer any 4 questions from the following, each question carries 4 marks

4x4=16M

1. UNIT -1

2. UNIT -1

3. UNIT -1

4. UNIT -2

5. UNIT -2

6. UNIT -2

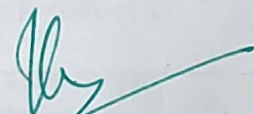
SECTION-B

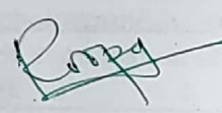
Answer all questions, each question carries 12 marks


12x2=24M

7. UNIT -1

8. UNIT -2


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA.



Dr. MAVURAPU SATYANARAYA
Assistant Professor
Department of Pharmaceutical Chem
Telangana University
Dichpally, Nizamabad-502001

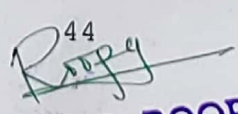
II B.Sc. Chemistry syllabus
IV Semester 60 Hrs (4 H/W)
(Syllabus with effect from 2019-20)


	UNIT-I Inorganic Chemistry	15h
I	Coordination Compounds –II	11
II	Bioinorganic Chemistry	4
III	Metal carbonyls and Organometallic Chemistry	4
	UNIT II Organic Chemistry	15h
I	Carbohydrates	6
II	Amino acids and proteins	5
III	Heterocyclic Compounds	4
	Unit-III Physical Chemistry	15h
I	Chemical Kinetics	11
II	Photochemistry	4
	Unit-IV General Chemistry	15h
I	Theories of bonding in metals	4
II	Carbanions-II	5
III	Colloids & Surface Chemistry	6

Course Objectives

- To understand and learn the Crystal field theory splitting in d-orbitals of octahedral, tetrahedral, square planer coordination compounds.
- Pearson's concept of hardness and softness, application of HSAB principle
- Biological significance of various inorganic elements
- Preparation and properties of carbohydrates, aminoacids, proteins and heterocyclic compounds
- Understand Kinetics of chemical reactions


Head
 Department of Chemistry
 UCS, Osmania University
 Hyderabad-007


Dr. R. ROOPA
 Asst. Professor, Dept. of Chemistry
 MAHATMA GANDHI UNIVERSITY,
 NALGONDA - 508254, A.P. INDIA.


 Assistant Professor
 Department of Chemistry
 Telangana University
 Dichepally, Nalgonda-508254



- Learn laws of photochemical reactions
- Understand various theories of bonding in metals
- Understand the chemistry of colloids and adsorption
- Synthesis of organic compounds

B.Sc. II yr CHEMISTRY
SEMESTER IV Paper-IV
Chemistry - IV

Unit-I (Inorganic Chemistry)

15h (1 h/week)

S4-I-1: Coordination Compounds –II 11 h

Crystal field theory (CFT)- Postulates of CFT, splitting patterns of d-orbitals in octahedral, tetrahedral, square planer with suitable examples. Crystalfield stabilization energies and its calculations for various dn configurations in octahedral complexes. High Spin Low Spin complexes. Colour and Magnetic properties of transition metal complexes. Calculations of magnetic moments spin only formula. Detection of complex formation - basic principles of various methods- change in chemical properties, solubility, colour, pH, conductivity, magnetic susceptibility.

Hard and soft acids bases (HSAB) - Classification, Pearson's concept of hardness and softness, application of HSAB principles – Stability of compounds / complexes, predicting the feasibility of reaction. Thermodynamic and kinetic stability of transition of metal complexes. Stability of metal complexes –stepwise and overall stability constant and their relationship and chelate effect determination of composition of complex by Job's method and mole ratio method.

Applications of coordination compounds: Applications of coordination compounds a) in quantitative and qualitative analysis with suitable examples b) in medicine for removal of toxic metal ions and cancer therapy c) in industry as catalysts polymerization – Ziegler Natta catalyst d) water softening.

Additional Input: Spectrochemical Series

S4-I-2: Bioinorganic Chemistry 4 h

Essential elements, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn and chloride (Cl⁻). Toxic metal ions As, Hg & Pb Oxygen transport and storage – structure of hemoglobin, binding and transport of oxygen. Fixation of CO₂ in photosynthesis- overview of light and dark reactions in photosynthesis. Structure of chlorophyll and coordination of magnesium. Electron transport in light reactions from water to NADP⁺ (Z – scheme).

Additional Input: Toxicity of Sn


Unit - II (Organic Chemistry)

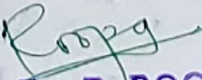
15h(1 hr/week)

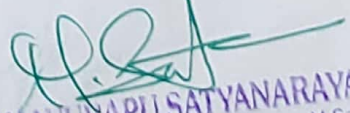
S4-O-1: Carbohydrates 6 h

Introduction: Classification and nomenclature. Monosaccharides: All discussion to be confined to (+) glucose as an example of aldo hexoses and (-) fructose as example of ketohexoses. Chemical properties and structural elucidation: Evidences for straight chain pentahydroxy aldehyde structure. Number of optically active, isomers possible for the structure, configuration of glucose based on D-glyceraldehyde as primary standard (No proof for configuration is required). Evidence for cyclic structure of glucose (Pyranose structure, anomeric Carbon and anomers). Proof for the ring size

45


Head
 Department of Chemistry
 UCS, Oemania University
 Hyderabad-007


DR. R. ROOPA
 Asst. Professor, Dept. of Chemistry
 MAHATMA GANDHI UNIVERSITY
 NALGONDA 508254, A.P. (INDIA)


Dr. MAVURAPU SATYANARAYANA
 M.Sc. Ph.D.
 Assistant Professor
 Department of Pharmaceutical Chemistry
 Oemania University
 Nizamabad-503322

(methylation, hydrolysis and oxidation reactions). (Haworth formula and chair conformational formula). Structure of fructose: Evidence of 2 – ketohexose structure. Same osazone formation from glucose and fructose, Hydrogen bonding in osazones, cyclic structure for fructose (Furanose structure, Haworth formula).

Inter Conversion of Monosaccharides: : Arabinose to D-glucose, D- mannose (kiliani – Fischer method). Epimers, Epimerisation- Lobry de bruyn van Ekenstein rearrangement. D-glucose to D-arabinose by Ruff's degradation. Aldohexose(+) (glucose) to ketohexose (-) (fructose) and Ketohexose(Fructose) to aldohexose (Glucose).

Additional Input: Difference between glucose and fructose

S4-O-2: Amino acids and proteins 5 h

Classification. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples – Glycine, Alanine, Valine and Leucine) by following methods: a) From halogenated Carboxylic acid b) Malonic ester synthesis c) strecker's synthesis. Physical properties: Optical activity of naturally occurring amino acids. Zwitter ion structure – salt like character, definition of isoelectric point. Chemical properties: General reactions due to amino and carboxyl groups – Lactams from gamma and delta amino acids by heating peptide bond (amide linkage). Structure and nomenclature of peptides. Primary structure of proteins, di peptide synthesis

Additional Input: strecker's synthesis mechanism

S4-O-3: Heterocyclic Compounds 4 h

Introduction and definition: 5 membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole. Importance of ring systems –Numbering. Aromatic character
Resonance structures: Explanation of feebly acidic character of pyrrole, electrophilic substitution, Halogenation, Nitration and Sulphonation. Reactivity of furan as 1,3-diene, Diels Alder reactions (one example). Sulphonation of thiophene purification of Benzene obtained from coal tar). Preparation of furan, Pyrrole and thiophene Paul-Knorr synthesis. Structure of pyridine, Basicity – Aromaticity – Comparison with pyrrole – preparation by Hantzsch method and properties – Reactivity towards Nucleophilic substitution reaction – chichibabin reaction.

Additional Input: Nomenclature of heterocyclic compounds

Unit III (Physical Chemistry)

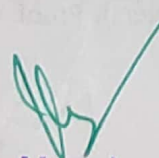
15h (1 hr/week)

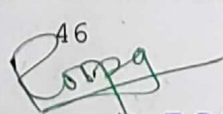
S4-P-1: Chemical Kinetics 11 h

Introduction to chemical kinetics, rate of reaction, variation of concentration with time, rate laws and rate constant. Specific reaction rate. Factors influencing reaction rates: effect of concentration of reactants, effect of temperature, effect of pressure, effect of reaction medium, effect of radiation, effect of catalyst with simple examples. Order of a reaction.

First order reaction, derivation of equation for rate constant. Characteristics of first order reaction. Units for rate constant. Half- life period, graph of first order reaction, Examples- Decomposition of H₂O₂ and decomposition of oxalic acid, Problems.

Pseudo first order reaction, Hydrolysis of methyl acetate, inversion of cane sugar, problems. Second order reaction, derivation of expression for second order rate constant, examples-16. Saponification


Head
Department of Chemistry
UCS, Omerla University
Hyderabad-007

⁴⁶

Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254, A.P. INDIA.


Dr. MAVURA
Department
Telangana
Hyderabad, Nizamabad



of ester, $2O_3 \rightarrow 3O_2$, $C_2H_4 + H_2 \rightarrow C_2H_6$. Characteristics of second order reaction, units for rate constants, half-life period and second order plots. Problems

Additional Input: Zero order reaction

S4-P-2: Photochemistry 4 h

Introduction to photochemical reactions, Difference between thermal and photochemical reactions, Laws of photo chemistry- Grotthus Draper law, Stark-Einstein's Law of photochemical equivalence. Quantum yield. Examples of photo chemical reactions with different quantum yields. Photo chemical combinations of H_2-Cl_2 and H_2-Br_2 reactions, reasons for the high and low quantum yield. Problems based on quantum efficiency. Consequences of light absorption. Singlet and triplet states. Jablonski diagram. Explanation of internal conversion, inter-system crossing, phosphorescence, fluorescence.

Additional Input: Chemiluminescence

Unit IV (General Chemistry)

15h (1 hr/week)

S4-G-1: Theories of bonding in metals 4 h

Valence bond theory, Explanation of metallic properties and its limitations, Free electron theory, thermal and electrical conductivity of metals, limitations, Band theory, formation of bands, explanation of conductors, semiconductors n-type and p-type, extrinsic & intrinsic semiconductors, and insulators.

S4-G-2: Carbanions-II 5 h

Mannich reaction, Michael addition and Knoevenagel condensation Synthetic applications of Aceto acetic ester. Acid hydrolysis and ketonic hydrolysis: Preparation of ketones, monocarboxylic acids and dicarboxylic acids Malonic ester- synthetic applications. Preparation of (i) substituted mono carboxylic acids and (ii) substituted dicarboxylic acids.

Additional Input: Michael addition mechanism

S4-G-3: Colloids & Surface Chemistry 6 h

Definition of colloids. Classification of colloids. Solids in liquids (sols): preparations and properties - Kinetic, Optical and Electrical stability of colloids. Protective action. Hardy-Schultz law, Gold number. Liquids in liquids (emulsions): Types of emulsions, preparation and emulsifier. Liquids in solids (gels): Classification, preparations and properties, General applications of colloids.

Adsorption: Types of adsorption. Factors influencing adsorption. Freundlich adsorption isotherm. Langmuir theory of unilayer adsorption isotherm. Applications.

References


1. A text book of Chemistry for B.Sc II year, Semester-IV, Pper-IV, Divya Lakshmi Publishers & Distributors

General reference: B.Sc II Year Chemistry : Semester IV, Telugu Academy publication, Hyd

Unit- I

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications (1996).
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn. Van Nostrand Reinhold Company (1977)
3. Basic Inorganic Chemistry by F.A. Cotton, G. Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers (2001).
4. Inorganic Chemistry Principles of structure and reactivity by James E. Huhey,

47


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007


DR. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA - 508254, A.P. INDIA


DR. MAVURAPU SATYANARAYANA
M. Sc. Ph.D.
Assistant Professor
Department of Physical Chemistry
Telangana University
Nizamabad-503322



E.A. Keiter and R.L. Keiter 4th edn. (2006)

5. Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press(1989).
6. Inorganic Chemistry by Shriver and Atkins 3rd edn Oxford Press (1999).
7. Textbook of Inorganic Chemistry by R Gopalan, Universities Press,(2012)

Unit- II

1. Text book of organic chemistry by Soni. Sultan Chand & Sons; Twenty Ninth edition (2012)
2. General Organic chemistry by Sachin Kumar Ghosh. New Age Publishers Pvt Ltd (2008)
3. Text book of organic chemistry by Morrison and Boyd. Person(2009)
4. Text book of organic chemistry by Graham Solomons. Wiley(2015)
5. Text book of organic chemistry by Bruce Yuranis Powla. (2012)
6. Text book of organic chemistry by C N pillai CRC Press (2012)
8. Organic Chemistry by L. G. Wade Jr.
9. Organic Chemistry by M. Jones, Jr
10. Organic Chemistry by John McMurry.

Unit III

1. Principles of physical chemistry by Prutton and Marron. The Macmillan Company; 4th edn. (1970)
2. Text Book of Physical Chemistry by Soni and Dharmahara. Sulthan Chand & sons.(2011)
3. Text Book of Physical Chemistry by Puri and Sharma. S. Nagin chand and Co.(2017)
4. Text Book of Physical Chemistry by K. L. Kapoor. (2012)
5. Physical Chemistry through problems by S.K. Dogra. (2015)
6. Text Book of Physical Chemistry by R.P. Verma.
7. Elements of Physical Chemistry by Lewis Glasstone. Macmillan (1966)
8. Industrial Electrochemistry, D. Pletcher, Chapman & Hall, London, 1990


Unit IV

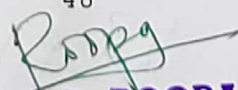
1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications(1996).
2. Concise Inorganic Chemistry by J.D. Lee 3rd edn. Van Nostrand Reinhold Company (1977)
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3rd edn Wiley Publishers (2001).
4. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4th edn. (2006)
5. Text book of organic chemistry by Morrison and Boyd, Person (2009)
6. Text book of organic chemistry by Graham solomons, Wiley (2015)
7. Fundamentals of organic synthesis and retrosynthetic analysis by Ratna Kumar Kar, CBA,(2014)
8. Organic synthesis by Dr. Jagadamba Singh and Dr. L.D.S. Yadav, Pragati Prakashan, 2010
7. Stereochemistry of organic compounds by D. Nasipuri, New Academic Science Limited, 2012
8. Organic chemistry by Clayden, Greeves, Warren and Wothers, Oxford University Press, 2001
9. Fundamentals of Asymmetric Synthesis by G. L. David Krupadanam, Universities, Press 2014


COURSE OUTCOME

Inorganic Chemistry

- Identify the geometries associated with various d-orbital splitting patterns, predict and analyse the stability, magnetic properties and spectra of coordination compounds


Head
Department of Chemistry
UCB, Osmania University
Hyderabad-007

48

Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
M.Sc., Ph.D.
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpaty, Nizampatnam-503322.

- Determine the stability of compounds / complexes and predicting the feasibility of reaction using HSAB rule
- Determine the complex composition using jobs method and mole fraction method, using this knowledge students can synthesis and analyse the new coordination compounds
- Importance of micro and macro inorganic compounds for the human body.

Organic Chemistry


- Elaborate study of classification, structural elucidation, properties, and interconversions of carbohydrates and various tests for the identification of carbohydrates
- Understand the importance of amino acids and proteins in living organisms, their preparation, and properties.
- Students will be able write the various reactions of heterocyclic compound. As heterocyclic compounds play a crucial role in improving the medicinal values of the drugs, having this knowledge will enhance their creative skill in designing the new drugs, especially while working in the research and development laboratories


Physical chemistry

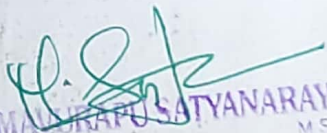
- Understanding chemical kinetics will help students in determining the rates of reactions and under given conditions, Therefore can predict and implement various ways of improving the reaction that is increasing the speed of the reaction
- With the laws of photochemistry, students can understand the photochemical and photophysical processes like fluorescence, phosphorescence, chemiluminescence and photosensitization etc.

General Chemistry

- Students will be able to synthesize new compounds using active methylene compounds from carbon-carbon new bond formation methods learned in carbanions
- Predict the nature of bonding between metal atoms in metals through various theories and predicting the various properties of metals.
- Understand the chemistry behind the working of batteries through their knowledge of conductors, insulators and semi conductors and Knowledge gained in colloids and adsorption.


Head
 Department of Chemistry
 UO8, Osmania University
 Hyderabad-007


Dr. R. ROOPA
 Asst. Professor, Dept. of Chemistry
 MAHATMA GANDHI UNIVERSITY
 NALGONDA-508254. A.P. INDIA.


Dr. MANJARA SATYANARAYAN
 M.Sc. Ph.D.
 Assistant Professor
 Department of Pharmaceutical Chemis
 Telangana University
 Dichpally, Nizamabad-503322.

Laboratory Course
Paper IV Semester-IV


Qualitative Analysis of Organic Compounds:


45hrs (3 h/week)

Qualitative analysis: Identification of organic compounds through the functional group analysis - ignition test, determination of melting points/boiling points, solubility test, functional group tests and preparation of suitable derivatives of the following: Carboxylic acids, phenols, amines, urea, carbohydrates, aldehydes, ketones, amides, Thio urea, Nitro hydrocarbons, Napthalene and ester.

Outcomes of Practicals

- > Will learn and implement the ethics of the laboratory rules while performing the experiments
- > Develop the skills of handling various instruments such as Bunsen burner,
- > Experimental learning in the Qualitative analysis: Identification of organic compounds through the functional group analysis
- > Can identify any unknown compound after performing experiment, this improves and builds their confidence in the synthesis of new compounds and identifying them qualitatively


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpally, Nizamabad-503322.

Government Degree College for Women, Begumpet, Hyderabad

Autonomous Accredited with "B+" Grade by NAAC

II B.Sc Chemistry

IV Semester

Paper- IV (Practicals)

Practical Model Question Paper

Date


BATCH

Duration: 2 Hours


Total Marks: 50

1. Write functional group tests for the following compound (10M)
2. Identify the functional group present in the given Organic compound and report its nature, Physical constant, and solubility and functional group tests. Prepare a solid derivative and submit. (30M)

- a) Flame test (3M)
 - b) Physical constant (3M)
 - c) Solubility (5M)
 - d) Functional group tests (15M)
 - e) Derivative (4M)
3. Record -5M
 4. Viva -5M


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpally, Nizamabad-503322.

GOVERNMENT DEGREE COLLEGE FOR WOMEN, BEGUMPET
AUTONOMOUS

Max marks: 20M

Time: 1hour

Date: _____

NAAC ACCREDITED "B+"
II Year Internal Question Paper
Internal assessment Test No.1
CHEMISTRY
Paper-IV

Invigilator Signature

Name: _____

Class: _____

Roll No. _____

Semester: IV _____

SECTION - A

Answer any 2 questions of the following, each question carries 5 marks

2x5=10M

1. Write Pearson's concept of hardness and softness, application of HSAB principles?
2. Write biological significance of Na, K and Mg?
3. Write chichibabin reaction?
4. Write paul-knorr synthesis?

SECTION - B


Answer any one question from the following, each question carries 10 marks


1X10=10M

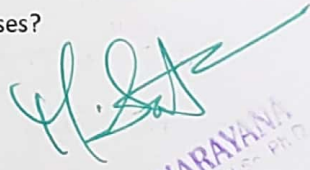
- II. 1. Write Crystal field theory (CFT)- Postulates of CFT, splitting patterns of d-orbitals in octahedral, tetrahedral with suitable examples

(OR)

2. Write all discussion to be confined to (+) glucose as an example of aldo hexoses?


Head
Department of Chemistry
UCB, Omeria University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
Assistant Professor
Department of Pharmacy
Telangana University
Dichpally, Nalgonda District

GOVERNMENT DEGREE COLLEGE FOR WOMEN
BEGUMPET, HYDERABAD - 16
B.Sc. II YEAR SEMESTER MODEL QUESTION PAPER
Subject: CHEMISTRY
SEMESTER - IV

Time: 2 Hours

Max. Marks: 60
Min. Marks: 24

Section - A

I Short Answer questions

Answer any Five of the following questions

(5x4=20marks)

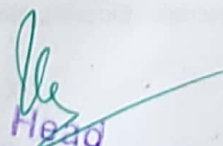
1. Write Pearson's concept of hardness and softness, application of HSAB principles?
2. Write applications of coordination compounds ?
3. Define anomers and epimers with example?
4. Write chichibabin reaction?
5. Explain briefly Factors influencing on reaction rate?
6. Explain Stark-Einstein's Law of photochemical equivalence?
7. Explain conductors, semiconductors and insulators.
8. Write Mannich reaction?

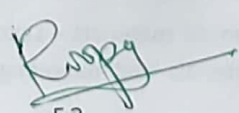
SECTION-B

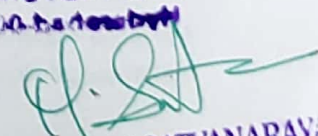
II Essay questions

Answer all questions choosing any one bit from each question (4X10 = 40 Marks)

9. (a) Write Crystal field theory (CFT)- Postulates of CFT, splitting patterns of d-orbitals in octahedral, tetrahedral with suitable examples
(or)
(b) Write biological significance of Na, K, Mg, Ca and Fe?
10. (a) Write all discussion to be confined to (+) glucose as an example of aldo hexoses?
(or)
(b) Write preparation of glycine and alanine using Strecker synthesis and Gabriel phthalimide synthesis.
11. (a) Define First order reaction, derivation of equation for rate constant.
(or)
(b) Explain Jablonski diagram with internal conversion, inter- system crossing, phosphorescence, fluorescence?
12. (a) Explain Freundlich adsorption isotherm. Langmuir theory of unilayer adsorption isotherm and its Applications?
(or)
(b) Write Michael addition and Knoevenagel condensation reaction.


Head
Department of Chemistry
UC8, Osmania University
Hyderabad-007


53
Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA - 508254, A.P. INDIA


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D.
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpally, Nizamabad - 508322.

B.Sc. Chemistry II Year
Semester - IV
Skill Enhancement Course- III (SEC - III) (2 Credits)
Materials and their Applications

Objectives:

- Basic knowledge of materials science, so that they would be able to understand and distinguish between variety of materials based on their structure and properties.
- Concept of Alloys - its classification and applications.
- To understand the fundamentals (structure, properties and processing) of ceramic materials to appreciate its advantages and limitations and to apply those fundamentals for selecting and developing ceramic materials for different engineering applications.
- Understand the basics of polymers and composites- classifications and their properties and applications.

Unit – I: Types of Materials

15 h (1 hr/week)

Introduction: Materials and their importance. Classification of Materials, Advanced materials and their need. Types of Materials: Metals, ceramics, polymers and composites; Nature of bonding (Type of bond present). Types and applications of metal alloys: Classification- ferrous and non-ferrous alloys. Ferrous alloys -types and their applications. Non-ferrous alloys – Cu, Al, Ti alloys, their applications and super alloys.

Field Work- Collection of Metal Alloy Samples.

Types and Applications of Ceramics: Classification of Ceramics based on their application- glasses, clay products, refractories, abrasives, cements, and advanced ceramics. Glasses: Compositions and Characteristics of Some of the Common Commercial Glasses; Properties and applications of glass ceramics - preparation of charts depicting various types of glass and their use. Clay products: Structural clay products and the white wares. Refractories: Compositions of four Common Ceramic Refractory Materials, fireclay, silica, basic refractories ex. MgO and special refractories ex. Alumina and Zirconia Cements: Classification, preparation of cement and the setting process; quick setting cements; applications.


Field Work-Visit to industries and collection of samples of materials


Unit – II: Types of Polymers and Applications

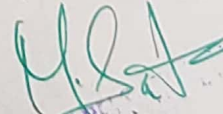
15 h (1 hr/week)

Classification of Polymeric materials based on application: Coatings, adhesives, films, foams with examples Polymer Additives: Fillers, Plasticizers, Stabilizers, Colorants, Flame Retardants with examples.

Advanced Materials: Types of advanced materials - semiconductors, bio-compatible materials, smart materials, advanced polymeric materials and nano-engineered materials. Biocompatible materials:


Head
Department of Chemistry
UO, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254, A.P, INDIA.


Dr. MAVURAM
Asst. Professor
Department of Ph
Telangana
Nizami



Definition. Materials used as biomaterials and their properties. Metals and alloys used in bone and joint replacement. Filling and restoration materials – dental cements, dental amalgams, dental adhesives.

Field Work- Visit to Dental Clinics and interaction with Doctors regarding materials used in Dental treatments.

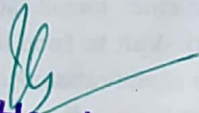
Smart materials: Shape memory alloys- definition and examples (Ni-Ti alloys, Cu based alloys), applications. Conducting polymers: - Introduction, Electrically conducting polymers and their uses (polyaniline, polypyrrole, polyacetylene and polythiophene).


References

1. William D. Callister Materials Science and Engineering An Introduction, John Wiley & Sons, Inc, 2006.
2. Material science by Kakani and Kakani.
3. Sujata V., Bhat., –Biomaterials]], Narosa Publication House, New Delhi, 2002.
4. M. V. Gandhi and B. S. Thompson, –Smart Materials and Structures]], Chapman and Hall, London, First Edition, 1992.
5. Duerig, T. W., Melton, K. N, Stockel, D. and Wayman, C.M., –Engineering aspects of Shapememory Alloys]], Butterworth – Heinemann, 1990.
6. Conducting Polymers, Fundamentals and Applications A Practical Approach Authors: Chandrasekhar, Prasanna Ashwin-Ushas Corp., Inc. Kluwer Academic Publishers. Boston

Course Outcome:

- Understand and distinguish between variety of materials based on their structure and properties.
- Know the structure and properties of different ceramic materials.
- Understand the structure and properties of nonferrous metals and alloys.
- Classify different types of polymers and composites and their structure –property relationships
- Students will get to know the different classes of materials used in engineering applications and would be able to choose the right materials for specific applications.


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA - 508254. A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpally, Nizamabad-502322

B.Sc. Chemistry II Year Semester IV
Skill Enhancement Course- IV (SEC - IV) (2 Credits)
Chemistry of Cosmetics and Food Processing

Course Objectives:

- Provide knowledge on cosmetics, and related sciences, cosmeceuticals (cosmetics with skin, hair and oral care benefits) and personal care and hygiene products.
- Provide multidisciplinary scientific knowledge to gain expertise in the field and to respond the industry challenges effectively.
- Provide with knowledge on marketing approaches on studying consumer need, need gaps, managing competition and global markets.
- Develop your potential to have a career in this fast growing industry in the area of product development & research, regulatory, quality assurance and manufacturing or pursue academic research in the area or to become an entrepreneur in the field.
- To learn about food preservatives and utility.
- To learn about the nutrition and its importance.

Unit-I: Chemistry of Cosmetics and Perfumes


A general study including preparation and uses of the following: Hair dye, hair spray, shampoo, sunscreen lotions, lipsticks, talcum powder, nail enamel, creams (cold, vanishing and shaving creams), antiperspirants and artificial flavours. Essential oils and their importance in cosmetic industries with reference to eugenol, geraniol, sandalwood oil, eucalyptus, 2-phenyl ethyl alcohol. Demonstration experiments or illustration of experimental procedures through charts for the preparation of talcum powder, shampoo and vanishing cream. Analysis of deodorants and antiperspirant - Aluminum, Zinc, Boric acid, Chloride and Sulphide.


Unit-II: Food Processing and Food Adulteration

Food processing: Introduction, methods for food processing, additives and preservatives. Food processing- impact on nutrition, analysis of calcium in milk by complexometric titration, spectrophotometric analysis of iron in foods, Spectrophotometric identification and determination of caffeine and benzoic acid in soft drinks. Field Work -Visit to Food Industries. Food adulteration: Adulterants in some common food items and their identification: Pulses, chilli powder, turmeric powder, milk, honey, spices, food grains and wheat flour, coffee powder, tea leaves, vegetable oil, ghee, ice creams, tomato sauce. Field Work-Collection of adulterated food samples, demonstration of a minimum of five experiments for testing adulterants in food items.

References

1. E. Stocchi: Industrial Chemistry, Vol -I, Ellis Horwood Ltd. UK.


Head
Department of Chemistry
JCS, Osmania University
Hyderabad-007



Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA.



Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D.
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Bichhalpally, Nizamabad-502222.

2. P.C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi
3. Sharma, B.K. & Gaur, H. Industrial Chemistry, Goel Publishing House, Meerut (1996).
4. Rameen Devi, Food Processing and Impact on Nutrition, Sc J Agric Vet Sci., AugSep 2015; 2(4A):304-311.
5. W.A. Poucher, Perfumes, Cosmetics and Soaps (1993).
6. Srilakshmi, Food Science. Edition: 3rd (2004). 7. Lillian Hoagland Meyer, Food chemistry (2008).
8. Handbook of Analysis and Quality Control for Fruit and Vegetable Products, S. Ranganna, Tata McGraw-Hill Education, 1986 – Food.
9. Fundamental concepts of applied chemistry J.C Ghosh, S. Chand and Co, Ltd, New Delhi.
10. Applied Chemistry K .Bhagavathi Sundhar, MJP publishers.

Course Outcome:

- To create a workforce in application of principles of cosmetic science for the rapidly growing FMCG
- Provide in depth learning in cosmetic science, which will serve as a focus for research into the field of cosmetic science
- This course is designed to provide foundation knowledge of cosmetic principles to address the needs of cosmetic industry.
- Provide practical skills in the area of biology, formulation science and analytical techniques required to scientifically design and develop products.
- Students understand the terms food adulteration and adulterant.
- Students understand the different types of adulterants used in food.
- Students acquire the skill to detect the presence of adulterants in different food samples after having observed the animation and simulation.


Head
 Department of Chemistry
 UOB, Osmania University
 Hyderabad-007


Dr. R. ROOPA
 Asst. Professor, Dept. of Chemistry
 MAHATMA GANDHI UNIVERSITY
 NALGONDA -508254, A.P. INDIA


Dr. MAVURAPU SATYANAR
 Assistant Professor
 Department of Pharmaceutical
 Telangana University
 Dichpally, Nizamabad-50

GOVERNMENT DEGREE COLLEGE FOR WOMEN, BEGUMPET
AUTONOMOUS
NAAC ACCREDITED "B"

Max marks: 40M

Time: 1 1/2hour

Date:

SEC - Model Paper

Invigilator Signature

Name: _____

Roll No. _____

Class: _____

Semester: IV _____

SECTION-A

Answer any 4 questions from the following, each question carries 4 marks 4x4=16M


1. UNIT -1
2. UNIT -1
3. UNIT -1
4. UNIT -2
5. UNIT -2
6. UNIT -2


SECTION-B


Answer all questions, each question carries 12 marks

12x2=24M

7. UNIT -1
8. UNIT -2


Head
Department of Chemistry
UCB, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA - 508254. A.P. INDIA.


Dr. MAURAPU SATYANARAYANA
M.Sc. PH.D.
Assistant Professor
Department of Pharmaceutical Chemistry
Tatyngalva University
Dichmally, Nizamabad-503222.

**B.Sc III yr CHEMISTRY
SEMESTER WISE SYLLABUS
SEMESTER V
Paper-V
Discipline Specific Elective- A (4 credits)**

Spectroscopy and Chromatography 60Hrs

Objective:

- To understand the concept of interaction of electromagnetic radiations with the molecules.
- To gain knowledge on different types of energy levels, electronic transitions and Classification of spectroscopy.
- To understand the terminology, principle, instrumentation and applications of various spectroscopy.
- To gain knowledge on the solvent extraction techniques and chromatography methods.

Unit I Molecular spectroscopy

15Hrs

Introduction to electromagnetic radiation, interaction of electromagnetic radiations with molecules, various types of molecular spectra.

Rotational spectroscopy (Microwave spectroscopy)

Rotational axis, moment of inertia, classification of molecules (based on moment of inertia), rotational energies, selection rules, determination of bond length of rigid diatomic molecules eg. HCl.

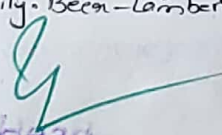
Infra red spectroscopy

Energy levels of simple harmonic oscillator, molecular vibration spectrum, selection rules. Determination of force constant. Qualitative relation of force constant to bond energies. Anharmonic motion of real molecules and energy levels. Modes of vibrations in polyatomic molecules. Characteristic absorption bands of various functional groups. Finger print nature of infrared spectrum.

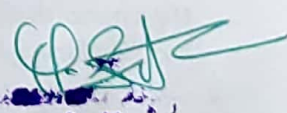
Electronic spectroscopy:

Bonding and antibonding molecular orbitals, electronic energy levels of molecules (σ , π , n), types of electronic transitions: σ - σ^* , n - σ^* , n - π^* , π - π^* with suitable examples. Selection rules, Terminology of chromophore, auxochrome, bathochromic and hypsochromic shifts. Absorption of characteristics of chromophones: diene, enone and aromatic chromophores. Representation of UV-visible spectra.

General features of absorption - Spectroscopy, transmittance, absorbance, and molar absorptivity. Beer-Lamberts law & its limitations.


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007

Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-598254. A.P. INDIA


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D.
Assistant Professor
Department of Pharmaceutical Chemistry
Tea and University
Dichpally, Nizampet-503322

Unit II: NMR and Mass Spectrometry

15 Hrs

SS-E-A-II: Proton Magnetic Resonance Spectroscopy

Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, factors affecting chemical shifts, NMR splitting of signals – spin-spin coupling, representation of proton NMR spectrum – Integrations. ¹H NMR spectrum of— ethyl bromide, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate and acetophenone.

Mass Spectrometry

Electron Impact Mass: Basic principles, Nitrogen rule, types of ions: Molecular ion and fragment ions. Representation of mass spectrum, types of peaks (molecular ion peak, base peak and isotopic ion peaks). Determination of molecular formula. Mass spectrum of ethyl chloride, ethyl bromide and acetophenone.

Unit III: Separation techniques – I

15Hrs

SS-E-A-III Solvent Extraction - Principle, Methods of extraction: Balch extraction, continuous extraction and counter current extraction. Application – Determination of Iron(III). **Chromatography:** Classification of chromatographic methods, principles of differential migration, adsorption phenomenon, nature of adsorbents, solvent systems.

Thin layer Chromatography (TLC): Advantages, preparation of plates, Solid phase and mobile phase used in TLC, eluotropic series, development of the chromatogram, Detection of the spots, visualizing agents, factors effecting R_f values and applications of TLC.

Paper Chromatography: Principle, choice of paper and solvent systems, development of chromatogram – ascending, descending, radial and two dimensional chromatography and applications.

Unit IV: Chromatography- II

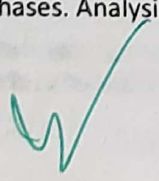
15Hrs

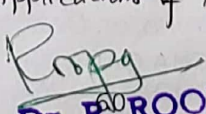
SS-E-A-I: Column Chromatography- Principle, Types of stationary phases, Column packing – Wet packing technique, Dry packing technique. Selection criteria of mobile phase solvents for eluting polar, non-polar compounds and its applications.

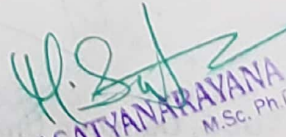
ion exchange chromatography: Principle, cation and anion exchange resins, its application in separation of ions, *Deionized water*

Gas Chromatography: Theory and instrumentation (Block Diagram), Types of stationary phases and carrier gases (mobile phase). *Applications of GC.*

High performance liquid chromatography: Theory and instrumentation, stationary phases and mobile phases. Analysis of paracetamol. *Applications of HPLC.*


Head
Department of Chemistry
UCA, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D.
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpally, Nizamabad-503322



Recommended Text Books and Reference Books

1. Fundamentals of Molecular Spectroscopy, Banwell & McCash
2. Organic spectroscopy, William Kemp, Palgrave Macmillan; 2nd Revised edition
3. Spectroscopy, B K Sharma Krishna Prakashan Media, 1981
4. Elements of Organic Spectroscopy, Y R Sharma.
5. Applications of Absorption Spectroscopy of Organic Compounds (English, Paperback, Dyer R. John)
6. Organic Chemistry, Morrison and Boyd, Pearson Publications.
7. Introduction to Spectroscopy by Donald Pavia, Gary Lampman and George Kriz. Saunders College Division, 2001
8. Chemistry text book for B.Sc., published by Telugu Academy, Govt. of Telangana.
9. Analytical Chemistry by David Krupadanam, Universities Press (India) Limited.
10. Principles of Instrumental Analysis, D.A. Skoog, F.J. Holler, T.A. Nieman, Engage earning India Ed.
11. Fundamentals of Analytical Chemistry 6th Ed., D. A. Skoog, D.M. West, F.J. Holler, Saunders College Publishing, Fort worth (1992).
12. Instrumental Methods of Analysis. 7th Ed. Willard, H.H., Merritt, L.L., Dean, J, & Settle, F.A. Wordsworth Publishing Co. Ltd., Belmont, California, USA, i sg8.
13. A Textbook of Quantitative Inorganic Analysis 7th Ed., Vogel, A. I. Prentice Hall.
14. Analytical Chemistry 7th edition by Gary D. Christian (2004).
15. Separation Methods, M.N Sastry, Himalaya Publication (2004).

Outcome:

At the end of the course the student shall be able to:


Identify the unsaturation, chromophores and auxochromes present in the given unknown compounds using UV data

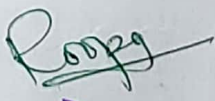
Identify the functional groups present in the given unknown compounds using IR data

Calculate the molecular formula and mass of the unknown compounds using mass spectral data

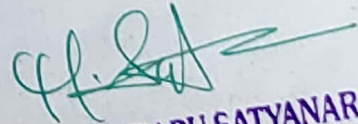
Able to elucidate the structure of unknown compounds by spectral data.

Could able to separate the components from a given mixture by solvent extraction and chromatographic techniques.


Head
Department of Chemistry
JCS, Omania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA - 508254. A.P. INDIA.

61


Dr. MAVURAPU SATYANARAYAN
M.Sc.
Assistant Professor
Department of Pharmaceutical Chem
Telangana University
Dichpally, Nizamabad-503322


Semester - V
Laboratory Course
Paper V. Experiments in Physical Chemistry-I


45 h (3 h / w)

1. Distribution law
 - a) Determination of molecular status and partition coefficient of benzoic acid in Toluene and water.
 - b) Determination of distribution coefficient of ~~acetic acid between~~ n-butanol and water.
2. Electrochemistry
 - a) Determination of cell constant of a conductivity cell
 - b) Verification of Ostwald's dilution law- Determination of dissociation constant (K_a) of acetic acid by conductivity measurements.
3. Colorimetry
 - a) Verification of Beer's law using $KMnO_4$
 - b) Determination of the concentration of the given $KMnO_4$ solution.
4. Adsorption
 - b) Adsorption of acetic acid on animal charcoal - Verification of Freundlich adsorption isotherm.
5. Physical constants
 - a) Surface tension and
 - b) viscosity of liquids. (Demonstration Experiment)

Reference books:

1. Senior practical physical chemistry. B. D. Khosla, V.C. Garg, Adarsh Gulati Published by R. Chand & Co.
2. Practical Physical Chemistry: B. Vishwanathan and P.S. Raghavan. Viva Books
3. Practicals in Physical Chemistry by P.S. Sindhu ISBN-10: 1-4039-2916-5 / 1403929165
ISBN-13: 978-1-4039-2916-7 / 9781403929167


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA - 508254. A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpally, Nizamabad-503322.

**GOVERNMENT DEGREE COLLEGE FOR WOMEN
BEGUMPET, HYDERABAD**


III YEAR PRACTICAL MODEL QUESTION PAPER


Semester-V

Duration : 2hrs.

Total marks 50

1. Write the principle and procedure of an experiment. (5M)
2. Experiment along with calculation and graph 35m
3. Viva (5M)
4. Record (5M)


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254, A.P. INDIA


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpally, Nizamabad-503322.

GOVERNMENT DEGREE COLLEGE FOR WOMEN
BEGUMPET, HYDERABAD - 16
B.Sc. III YEAR Model question paper
Subject: CHEMISTRY
SEMESTER - V
PAPER - V

Time: 2 Hours

Max. Marks: 60

Section-A

I. Answer any five of the following questions.

5 x 4 = 20M

1. Unit-1
2. Unit-1
3. Unit-2
4. Unit-2
5. Unit-3
6. Unit-3
7. Unit-4
8. Unit-4

SECTION -B

II. Answer all questions choosing any one bit from each question

(4X10 = 40 Marks)

9. a) Unit-1
(or)
b) Unit-1

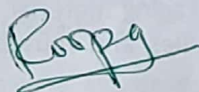
10. a) Unit-2
(or)
b) Unit-2

11. a) Unit-3
(or)
b) Unit-3

12. a) Unit-4
(or)
b) Unit-4



Head
Department of Chemistry
JCS, Osmania University
Hyderabad-007



Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA



Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpally, Nizamabad-503322

Semester V

Generic Elective (GE) Course - I (4Credits) (for B.Sc. Non Chemistry/B.A/B.Com Students)

Chemistry of Cosmetics, Food Processing, Pollution & Water Treatment Methods 60Hrs

Objectives:

- Provide knowledge on cosmetics, and related sciences, cosmeceuticals (cosmetics with skin, hair and oral care benefits) and personal care and hygiene products.
- Provide multidisciplinary scientific knowledge to gain expertise in the field and to respond to the industry challenges effectively.
- To provide knowledge on various methods of food processing, food preservatives and additives.
- To gain knowledge on food adulteration and methods to identify it.
- To gain knowledge on the materials used in food packing, food labeling etc.
- To gain knowledge on the types of pollution and measures to be taken to minimize it.
- To have thorough knowledge on the drinking water standards and various methods to treat water systems.

Unit-I: Chemistry of Cosmetics and Perfumes

15 Hrs

A general study including preparation and uses of the following: Hair dye, hair spray, shampoo, sunscreen lotions, lipsticks, talc powder, nail enamel, creams (cold, vanishing and shaving creams), antiperspirants and artificial flavours. Essential oils and their importance in cosmetic industries with reference to eugenol, geraniol, sandalwood oil, eucalyptus, 2-phenyl ethyl alcohol.

Demonstration experiments or illustration of experimental procedures through charts for the preparation of talcum powder, shampoo and vanishing cream. Chemistry and Applications of deodorants and antiperspirant - Aluminum, Zinc, Boric acid, Chloride and Sulphide.

Unit-II: Food Processing and Food Adulteration

15 Hrs

Food processing: Introduction, methods for food processing, additives and preservatives. Food processing- impact on nutrition,

Food adulteration: Adulterants in some common food items and their identification: Pulses, chilli powder, turmeric powder, milk, honey, spices, food grains and wheat flour, coffee powder, tea leaves, vegetable oil, ghee, ice creams, tomato sauce.

Food Packaging: Definition and function of packaging-Classification of packaging materials-different types of packaging materials such as glass, wood, metal, paper, wood, plastic etc., advantages and disadvantages of each packaging material. Packaging materials and systems: corrugated fibre board boxes, shrink bundles and reusable packages. Effect of packaging materials on nutritive values of food.

Food labelling: Introduction, need and importance.

UNIT III: Remedial Methods for Pollution Prevention and control of air pollution 15 Hrs

Ozone hole-causes and harm due to ozone depletion. The effect of CFC's in Ozone depletion and their replacements. Global Warming and Greenhouse Effect Precautions to control global warming. Deleterious effect of pollutants - Endangered Monuments- acid rain. Precautions to protect monuments. Sources of Radiation pollution - Chernobyl accident and its Consequences. Radiation effect by the usage of cell phones and protection tips. Deleterious effects of cell phone towers and health hazards.

Sources of water pollution-(i). Pollution due to pesticides and inorganic chemicals, (ii) Thermal

Head
Department of Chemistry
UCS, Osmania University
Hyderabad-507

Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA.

Dr. MAVURAPU SATYANAR
Assistant Professor
Dept. of Pharmaceutical Chemistry
Osmania University
Hyderabad-500032

pollution (iii). Ground water pollution (iv). Eutrophication.

Methods for control of water pollution and water recycling. Dumping of plastics in rivers & oceans and their effect on aquatic life. Determination of (i) Dissolved Oxygen and (ii) Chemical Oxygen Demand in polluted water - Illustration through charts (or) demonstration of experiments. Sources of soil pollution (i). Plastic bags, (ii). Industrial and (iii). Agricultural sources. Control of soil pollution. Environmental laws in India. Environmental benefits of planting trees.

Unit — IV: Water Quality and Common Treatments for Private Drinking Water Systems 15 Hrs

Water Quality and Common Treatments for Private Drinking Water Systems: Drinking Water Standards-Primary Drinking Water Standards : Inorganics, Organics and Volatile Organic Chemicals. Secondary Drinking Water Standards-Inorganics and Physical Problems. Water Testing, Mineral Analysis, Microbiological Tests, Pesticide and Other Organic Chemical Tests. Principle involved in Water Treatment Techniques. (i) Reverse osmosis (ii) Disinfection methods such as chlorination, ultraviolet light, ozonation etc (iii) Chemical oxidation and (iv) Ion exchange (water softeners). Visit to nearby drinking water plants and interaction at sites.

Recommended Text Books and Reference Books

1. Industrial Chemistry, Vol -1, E. Stocchi, Ellis Horwood Ltd. UK.
2. Engineering Chemistry, P.C. Jain, M. Jain, Dhanpat Rai & Sons, Delhi.
3. Industrial Chemistry, Sharma, B.K. & Gaur, H. , Goel Publishing House, Meerut (1996).
4. Food Processing and Impact on Nutrition, Rameen Devi, Sc J Agric Vet Sci., Aug-Sep 2015; 2(4A):304-311.
5. A Text book for 'Remedial methods for pollution, drinking water and soil fertility standards', First Edition, Authors: Dr Mudvath Ravi, Gopu Srinivas, Putta Venkat Reddy, Vuradi Ravi Kumar, Battini Ushaiah, ISBN No. 978-93-5311-183-0.
6. Remedial methods for pollution, drinking water and soil fertility standards, Author: Dr G. Vanjatha.
7. Environmental Pollution, download.nos.org/333courseE/10.pdf
8. Effects of Acid Rain on Buildings www.air-quality.org.uk/12.php
9. Acid Rain Effects - Buildings - Chemistry chemistry.elmhurst.edu/vchembook/196buildings.html
8. How to protect national heritage - ways to protect monuments
10. Determination of dissolved oxygen (DO) www.cutm.ac.in/pdf/env%20engg%20lab%20manual.pdf
18. Determination of chemical oxygen demand of wastewater www.pharmaguideline.com > quality control >

Outcome: After the successful completion of the course, students will be able to:

- > Identify the various ingredients present in cosmetics and perfumes.
- > They could understand the terms food adulteration and adulterant.
- > Understand the different types of adulterants used in food.
- > Acquire the skill to detect the presence of adulterants in different food samples after having observed the animation and simulation.
- > They could assess the drinking water standards and implement the water treatment techniques.

Justification

- > The new units were introduced in Generic Elective course(GE), the students who opted this course are from B.A & B.Com courses, so that these units are easy to understand and are involved in day to day practices.
- > These two new units were introduced to create awareness to the students by encouraging them towards a better use and management of water so that the student can be socially responsible and environmentally conscious.
- > To develop scientific knowledge by conducting industrial tours and seminars to the students.

Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007

67
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NARAYANA, 508254. A.P. INDIA

Dr. MAHARAJU SANKARANARAYANAN
Assistant Professor
Department of Pharmaceutical
Telangana University
Nizamnally, Nizamabad-503



B.Sc. Chemistry III Year

Semester-VI, Paper-VI

Discipline specific elective-A(4 Credits)

Medicinal Chemistry

60Hrs

Objective:

- Basic knowledge in pharmaceuticals in addition to understand the types of diseases, drugs used to cure specific diseases, concept of ADME, mode of action etc.
- Differentiate the diseases according to the symptoms.
- Classify the drugs based upon chemotherapy, Pharmacodynamics properties.
- Understanding of basic biological and pharmacological interactions
- Use of corresponding knowledge for the development of clinically active drugs.
- Drug design and analytical methods
- Relate the structure and physical properties of drugs to pharmacological activity
- Correlating the pharmacology of disease and its cure.
- Drug metabolic pathways, adverse effect and therapeutic value of drug.
- Chemical synthesis of some drugs.
- To gain Knowledge on the importance of vitamins, hormones in the growth and development of human body.

Unit- I:Introduction and Terminology

15Hrs

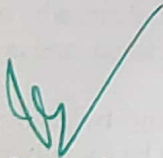
S6-E-A-I: Diseases: Common diseases, infective diseases–insect borne, air-borne, water-borne and hereditary diseases.

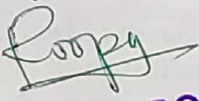
Terminology in Medicinal Chemistry: Drug, Active pharmaceutical ingredients(API),Pharmaceuticals,Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetics, metabolites, anti metabolites and therapeutic index.


Drugs: Nomenclature: Chemical name, Generic name and Trade names with examples;

Classification: Classification based on structures and therapeutic activity with examples.

ADMET: a) Absorption: Definition, absorption of drugs across the membrane – active and passive absorption, routes of administration of drugs. b) Distribution: definition and effect of plasma protein binding. c) Metabolism: definition, phase I and phase II reactions.d) Elimination: definition and renal elimination. e) Toxicity


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D
Assistant Professor
Department of Pharm. Biotech Chemistry
Telangana University
Dichpally, Nizamabad-503329.



Unit-II: Enzymes and Receptors

15Hrs

S6-E-A-II: Enzymes: Introduction. Mechanism and factors affecting enzyme action, Specificity of enzyme action (Including stereo specificity), Enzyme inhibitors and their importance. Types of inhibition - reversible, irreversible and their subtypes with examples.

Receptors: Introduction, Drug action-receptor theory, Mechanism of drug action, concept of agonists and antagonists with examples. Drug receptor interactions involved in drug receptor complex. binding role of -OH group, -NH₂ group, quaternary ammonium salts and double bond. Structure - activity relationships of drug molecules, explanation with sulfonamides.

Unit- III: Synthesis and Therapeutic Activity of Drugs

15Hrs

S6-E-A-III: Introduction, synthesis and therapeutic activity of :

Chemotherapeutics: Sulphanilamide, dapsone, Pencillin-G (semi synthesis), Chloroquin, Isoniazid, Cisplatin and AZT.

Drugs to treat metabolic disorders: Anti diabetic - Tolbutamide; Antiinflammatory - Ibuprofen; Cardiovascular- Glyceryl trinitrate; Antipyretic (paracetamol, aspirin) and Antacid-Omeprazole.

Drugs acting on nervous system: Anesthetics-definition, Classification-local and general. Volatile- Nitrous oxide, chloroform uses and disadvantages. Local anesthetics - benzocaine.

Unit- IV: Molecular Messengers and Health Promoting Drugs


15Hrs


S6-E-A-IV: Molecular Messengers: Introduction to hormones and neurotransmitters, Thyroid hormones, Antithyroid drug-Carbimazol. Adrenaline: Adrenergic drugs- salbutamol, atenelol. Serotonin: SSRIs- fluoxetine. Dopamine: Antiparkinson drug- Levodopa .

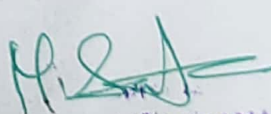
Health promoting drugs: Introduction, sources, Deficiency disorders and remedy of Vitamins A,B, C, D, E K and micronutrients - Na, K, Ca, Cu, Zn and I .

Reference books

1. G.L. Patrick: Introduction to Medicinal Chemistry, Oxford University Press, New York. 2013.
2. Thomas Nogrady, Medicinal Chemistry, Oxford Univ. Press, New York.2005.
3. David William and Thomas Lemke, Foye's Principles of Medicinal Chemistry, Lippincott Williams & Wilkins, 2008.
4. Ashutosh Kar Medicinal Chemistry, New Age International, 2005.
5. O.D.Tyagi & M.Yadav Synthetic Drugs by, Anmol Publications,1998.
6. Medicinal Chemistry by Alka L. Gupta, Pragati Prakashan.
- 7.G. L. David Krupadanam, D.Vijaya Prasad, K.Varaprasad Rao, K. L. N. Reddy, C. Sudhakar, Drugs, Universities Press (India) Ltd. 2012.

69

Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIV
NALGONDA-508254, A.P. INDIA


Dr. MAVURAPU SATYANA
Assistant Professor
Department of Pharmaceutics
Telangana Unive
Dichpally, Nizamabad-

Semester - VI
Laboratory course
Paper VI Experiments in Physical Chemistry-II

45h (3 h/w)

1. Kinetics

- Determination of specific reaction rate of the **hydrolysis** of methyl acetate catalyzed by hydrogen ion at room temperature.
- Determination of rate of decomposition of hydrogen peroxide catalyzed by FeCl_3 .

2. Electrochemistry

A. Potentiometry:

- Determination of redox potential of $\text{Fe}^{2+}/\text{Fe}^{3+}$ by potentiometric titration of ferrous ammonium sulphate vs. potassium dichromate.
- Precipitation titration of KCl vs. AgNO_3 - Determination of given concentration of silver nitrate.

B. pH metry:


- pH metric titration of strong acid (HCl) vs. strong base- Determination of the concentration of the given acid.
- pH metric titration of weak acid (acetic acid) **with strong base (NaOH)** - Determination of acid dissociation constant (K_a) of weak acid.


3. Conductometry:

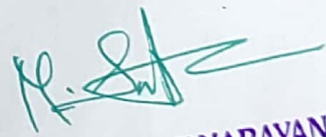
- Determination of overall order: **Saponification of ethyl acetate** with NaOH by conductance measurements.

Reference books:

- Senior practical physical chemistry. B. D. Khosla, V.C. Garg, Adarsh Gulati
- Advanced Practical Physical chemistry: J.B. Yadav
- Practical Physical Chemistry: B. Vishwanathan and P.S. Raghavan.
- Practical in Physical Chemistry: P.S. Sindhu


Head
Department of Chemistry
OS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D.
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpally, Nizamabad-503328

**GOVERNMENT DEGREE COLLEGE FOR WOMEN
BEGUMPET, HYDERABAD**


III YEAR PRACTICAL MODEL QUESTION PAPER


Semester-VI


Duration : 2hrs.

Total marks 50

1. Write the principle of kinetics . (5M)
2. Experiment with calculations and graph. (35 M)
3. Viva (5M)
4. Record (5M)


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA - 508254. A.P, INDIA.


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpally, Nizamabad-503322.

Govt. Degree College for Women (A), Begumpet, Hyderabad
Department of Chemistry
B.Sc –III yr, Semester-VI,
Project in Chemistry/Advanced Chemistry - Credits-4

Project work is considered as a special course involving application of knowledge in solving /analyzing /exploring a real life situation /difficult problem. Project work will be of 4 credits. Studied subject specific project work can be handled, with a view to develop creative thinking, team spirit & skill. The project work at preliminary level should be assigned to students in groups.

Project report in the form of a dissertation is prepared and submitted by the students. It will be evaluated by the external and internal examiners. Head of the department will chair the evaluation panel and proceedings of viva-voce. It carries a maximum of 100 marks.


Project Guidelines


- Understand the subject broadly.
- Choose a topic of interest.
- Refer to the books and interact with subject specific experts.
- Try to understand the basic principles of chemistry involved in the project work.
- Laboratory facilities, books to refer and faculty with research experience are essential to handle projects.
- Analyse the data and draw a conclusion
- Communicate the results
- Work division among the group members should be followed.
- Maximum number of students in a group should not exceed five.


Project Examination- Max. marks-100

Project Report- 50 marks

Research methodology -50 marks


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIV^{TY}
NALGONDA - 508254. A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
M.Sc, Ph.D
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpally, Nizamabad-503322.

Department of Chemistry

Certificate Course

Hands on Training on ChemDraw and ChemSketch Softwares 30Hrs

Objectives:

1. The students will be able to write chemical structures using softwares.
2. Able to predict physical properties using chemistry softwares.
3. Able to predict spectral data using chemistry softwares.
4. Students can write the chemical equations

ChemDraw(10Hrs)

Introduction to basic features of ChemDraw, download and installation process, Chemical structure to name conversion, Chemical name to structure conversion, NMR spectrum simulation (both ^1H NMR & ^{13}C NMR), Mass spectrum simulation, structure clean up, export to SVG, PDF. Introduction to Chemsketch-Molecular modelling, create and modifying images of chemical structures, write and perform chemical equations and diagrams.

Chemsketch (10 hrs)


Introduction to basic features of Chemsketch, Drawing of heterocyclic compounds and predicting physical properties such as molecular weight, molecular formula, density, refractive index and spectral data (^1H NMR & ^{13}C NMR)

Analysis of Data (5 hrs)

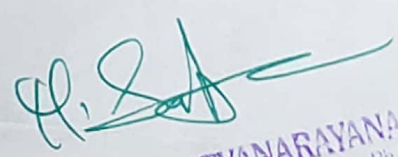
Analysis of data by using pie charts, bar diagrams and plotting of various 2D & 3D graphs. Calculation of statistical data using formulas. Conversion of graph to various file format like JPEG, GIF, EPS.

Practicals: (5Hrs)

Drawing of chemical structures, prediction of spectral data and physical properties of the following compounds 2,4,6- Tribromophenol, Nerolin, Acetophenone, Sulphinilamides, Paracetamol, Chloroquin, Omeprazole and Penicillin G.


Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007


Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA.


Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpally, Nizamabad-503322.

Outcomes:


1. After completing the course students can use chemdraw and chemsketchsoftwares for molecular modeling, writing structures and chemical equations.
2. Students can interpret the physical properties and spectral data through chemdraw and chemsketch.
3. To understand scientific graphing and data analysis.

Evaluation:


Assessment of the course will be done by based on assignments and practicals.

Assignments - 20 marks

Practicals - 30 marks



Head
Department of Chemistry
UCS, Osmania University
Hyderabad-007



Dr. R. ROOPA
Asst. Professor, Dept. of Chemistry
MAHATMA GANDHI UNIVERSITY
NALGONDA-508254. A.P. INDIA



Dr. MAVURAPU SATYANARAYANA
M.Sc. Ph.D
Assistant Professor
Department of Pharmaceutical Chemistry
Telangana University
Dichpally, Nizamabad-503322.