AG & SG SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS) VUYYURU-521165

Aided by the Government of A.P, Re-Accredited by NAAC with 'A' Grade

2020-2021
II SEMESTER

PG Department of Chemistry

Minutes of the meeting of Board of Studies

10-06-2021

MINUTES OF BOARD OF STUDIES

Minutes of meeting of Board of studies in PG Department of Chemistry held on 10-06-2021 at 3.00 pm in the PG Department of Chemistry through online (Zoom meeting)

S.No	NAME		Signature
1	**Dr. V.Sreeram** Head, Dept. ofChemistry(P.G) AG & SG S College,Vuyyuru.	Chairman	
2	**Prof.C.Suresh Reddy** Department ofChemistry S.V. University,Tirupati.	University Nominee	
3	**Prof. Koya Prabakar Rao** Department of Chemistry Vignan University, Guntur.	Subject Expert	
4	**Dr.M.Sivanath** Associate prof. Dept. of Chemistry A.N.R.College, Gudivada.	Subject Expert	
5	**Dr.G.Raja** Manager(Q.A) Biophore India pharamaceuticals. Hyderbad.	Representative from Industry	
6	**Abdul Raheem**	One Post Graduate Meritorious Aluminous nominated by the Principal	
7	**N.V.Srinivasa Rao** Department of Mathematics AG & SG S College, Vuyyuru.	Representative Science Faculty Other Dept.	
8	**V.N.V.Kishore** Dept. of Chemistry(P.G) AG & SG S College, Vuyyuru	Member	
9	**Dilshad Begum** Dept. of Chemistry(P.G) AG & SG S College, Vuyyuru	Member	
10	**M.Rekha** Dept. of Chemistry(P.G) AG & SG S College, Vuyyuru	Member	

AGENDA:

1. To prepare syllabus and model question papers, discuss & approve modalities of lab courses.
2. To Suggest methodologies for innovative methods of teaching.
3. Any other matter with the permission of the Chair.

Resolution –I

1. Resolved to recommend the framed Syllabus & Model Question Papers for theory courses and approve the modalities of Lab Courses as prescribed by BOS members.
2. Resolved to conduct assignments etc., for Internal Assessment Tests.
3. To recommend the changed syllabus Radioactivity and isotopes in Unit V of semester I

Resolution –II

1. Resolved to adopt online teaching methods like as ZOOM, Microsoft teams, Google meet etc for ICT (Information and communication technologies) teaching.

Resolution –

1.Resolved to change the II SEM Syllabus

A.G. & S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE(Autonomous)
DEPARTMENT OF CHEMISTRY
M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)
II SEMESTER

Paper Code & Title: CH201: ORGANIC SPECTROSCOPY

No. of hours per week: 04 Total credits: 04
Total marks: 100 (Internal: 30 M & External: 70M)

Course: Organic Spectroscopy (code 20CH2T1)		
S.No	COURSE OUTCOMES	PO`S
	The graduate will be able to	
1	Memorize the basic principles and theory involved in molecular absorption spectroscopy.	2,7
2	Comprehend the advanced concepts of molecular absorption spectroscopy.	1,2,5
3	Apply the knowledge of spectroscopy in establishing the structure of organic molecules.	1,5,7
4	Analyze the spectral data to ascertain the structure of unknown molecules.	1,4,2

UNIT- I

UV- Visible Spectroscopy:
Mechanics of measurement – Energy transitions – Simple chromophores – Auxochrome, Absorption shifts (Bathchromic shifts, Hypsocromic shift, Hyper chromic shift, Hypo chromic shift). UV absorption of Alkenes – polyenes, unsaturated cyclic systems .
UV absorption of Carbonyl compounds α,β-unsaturated carbonyl systems - UV absorption aromatic systems – solvent effects – geometrical isomerism – acid and base effects – typical examples – calculation of λmax values for simple molecules using Woodward -Fieser rules.

UNIT – II

IR Spectroscopy:
Mechanics of measurement – Fundamental modes of vibrations -Stretching and bending vibrations – Factors effecting vibrational frequency-hydrogen bonding.
Finger print region and its importance. Typical group frequencies for – CH,
-OH, -NH, -CC, -CO and aromatic systems - Application in structural determination Examples – simple problems.

UNIT – III

Nuclear Magnetic Resonance Spectroscopy (1HNMR – First Order PMR):
Introduction:Nuclear spin-Basic principle of -NMR - nuclear resonance –saturation-Larmor's frequency-Relaxation- Instrumentation(Cw and FT) shielding and de shielding of magnetic nuclei- chemical shift and its measurements, factors influencing chemical shift, spin–spin

interactions and factors influencing spin -spin coupling- Dynamic NMR- coupling constant J. and factors effecting J value.

UNIT – IV

Mass Spectrometry I

Introduction- ionization methods-EI, CI, ES, MALDI and FAB – advantages and disadvantages-molecular ion peak and its importance, meta stable peak, Nitrogen rule and extension of nitrogen rule. Determination of Molecular weight and determination of molecular formulae- Isotopic Peaks- Identification of single chlorine atom and double chlorine atom single bromine atom and double bromine atoms in organic compounds. Instrumentation.

UNIT – V

Mass Spectrometry II

Fundamental fragmentation process- Stevenson's rule- radical site initiated cleavage-charge site initiated cleavage- two bond cleavage- Retrodielalder cleavage- Mc-Lafferty rearrangement and other cleavages. Mass spectral fragmentation of alkanes, cycloalkanes, alkenes, alkynes, aromatic hydrocarbons, alcohols, phenols, thiols, ethers, carbonyl containing compounds (Aldehydes, ketones, esters and carboxylic acids), nitrogen compounds, alkyl chlorides and alkyl bromides, Examples of mass spectral fragmentation of organic compounds with respect to their structure determination.

Text books/ Reference books:

1. Introduction to Spectroscopy – D. L. Pavia, G.M. Lampman, G. S. Kriz, 3rd Ed. (Harcourt college publishers).

2. Spectrometric identification of organic compounds R. M. Silverstein, F. X. Webster, 6th Ed. John Wiley and Sons.

3. Spectroscopic methods in organic chemistry - D. H. Williams and I. FlemmingMc.Graw Hill.

4. Absorption spectroscopy of organic molecules – V. M. Parikh

5. Nuclear Magnetic Resonance – Basic Principles- Atta-Ur-Rehman, Springer-Verlag (1986).

6. One- and Two-dimensional NMR Spectroscopy – Atta-Ur-Rehman, Elsevier (1989).

7.Organic structure Analysis- Phillip Crews, Rodriguez, Jaspars, Oxford University Press (1998).

8. Organic structural Spectroscopy- Joseph B. Lambert, Shurvell, Lightner, Cooks, Prentice-Hall (1998).

9. Organic structures from spectra –Field L.D., Kalman J.R. and Sternhell S. 4th Ed. John Wiley and sons Ltd.

A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE(Autonomous)
DEPARTMENT OF CHEMISTRY
M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)
II SEMESTER

Paper Code & Title: CH102: INORGANIC CHEMISTRY-II

No. of hours per week: 04 Total credits: 04
Total marks: 100 (Internal: 30 M & External: 70M)

Course: Inorganic chemistry (code 20CH2T2)		
S.No	COURSE OUTCOMES	PO`S
	The graduate will be able to	
1	Memorize the fundamental concepts of Metallic & metallic clusters, Inorganic reaction mechanisms, organo metallic chemistry, electronic spectra& magnetic properties of complexes and bioinorganic chemistry.	2,7
2	Comprehend the basic and advanced concepts of metallic &non metallic clusters, Inorganic reaction mechanisms, organo metallic chemistry, electronic & magnetic properties of complexes and bioinorganic chemistry.	1,2,6
3	Applythe conceptual knowledge gained in the concepts of metallic &nonmetallic clusters, inorganic reaction mechanisms, organometallic chemistry, electronic &magnetic properties of complexes and bio inorganic chemistry in other fields of chemistry as well as in research.	1,2,7
4	Analyze the role of metallic &non metallic clusters/cages, inorganic reaction mechanisms, organo metallic chemistry, electronic &magnetic properties of complexes and bio inorganic chemistry in understanding the similarities and differences among the concepts of chemistry.	1,3,2
5	Assess that how far the concepts of metallic&non metallic clusters, Inorganic reaction mechanisms, organos metallic chemistry, electronic & magnetic properties of complexes and bioinorganic chemistry are useful in rendering theoretical explanations for the concepts in chemistry.	1,7,2

Unit-I: Non-metal cages and metal clusters:
Structure and bonding in phosphorous-oxygen, phosphorous-Sulphur cages; structure and bonding in higher boranes with (special reference to B12icosahedra). Carboranes, metalloboranes, metallocarboranes. Classification- LNCs and HNCs,Isoelectronic and Isolobal relationships, electron counting rules: Wade's and Lauher's rules. M-Mmultiple bonding; preparation, structure and bonding in dinuclear [Re2Cl8] 2- ion, trinuclear[Re3Cl9], tetra nuclear W4(OR)16, hexa nuclear [Mo6Cl8]4+ and [Nb6Cl12]2-.

Unit-II: Organometallic chemistry of transition metals:
Classification and electron counting rules, captivity, synthesis, structure and bonding of Olefinic complexes, Acetylene complexes,ferrocene, dibenzene chromium, cyclo heptatriene and tropylium complexes of transition metals.Reactions of organometallic compounds - oxidative addition reductive elimination, insertion and elimination. Applications of organometallic compounds, Catalytic hydrogenation,

Hydroformylation, alkene polymerization.

Unit-III: Reaction mechanism of transition metal complexes:
Kinetics of octahedral substitution, acid hydrolysis, base hydrolysis-conjugate base (CB) mechanism. Direct and indirect evidences in favour of CB mechanism. Anation reactions. Reactions without metal-ligand bond cleavage. Factors affecting the substitution reactions in octahedral complexes. Trans effect on substitution reactions insquare planar complexes. Mechanism of redox reactions, outer sphere mechanism, cross reactions and Marcus –Hush equation, inner sphere mechanism.

Unit-IV: Term symbols and Electronic spectra: Term symbols:
Term symbols and their derivation, Microstates, Hund's rules to predict ground terms and ground states. List of ground energy and higher energy terms from d1 to d9 configurations;
Electronic spectra of transition metal complexes:
Spectroscopic terms. Selection rules, Slator–Condon parameters, Racahparameters, Term separation energies for dn configurations,Orgel diagrams. Tanabe-Sugano diagrams for d1 to d9 configurations. Calculations of Dq, B and β parameters. Charge transfer spectra.

Unit-V: Bio-inorganic chemistry and Magnetic properties of complexes:
Storage and transportof dioxygen by Hemoglobin and Myoglobin,Vitamin B12 and its importance.
Magnetic properties of transition metal complexes:
Types of magnetism, factors affecting Paramagnetism, anomalous magnetic moments - Orbital and spin contribution, spin-orbit coupling and magnetic moments chiro optical properties, cotton effect and Faraday effect.

Text books/ Reference books:
1. Inorganic Chemistry by Huheey. Harper and Row.
2. Concise inorganic chemistry by J. D. Lee, ELBS.
3. Inorganic chemistry, K.F. Purcell and J.C. Kotz, Holt Saunders international
4. Organometallic chemistry by R.C. Mehrotra and A. Singh. New Age International.
5. Advanced Inorganic Chemistry by Cotton and Wilkinson, Wiley Eastern
6. Inorganic reaction mechanism by Basolo and Pearson, Wiley Eastern
7. Bioinorganic Chemistry by K. Hussan Reddy
8. Biological Aspects of inorganic chemistry by A. W.Addiso, W. R. Cullen, D.Dorphin and G. J. James. WelieyInterscience.
9. Photochemistry of coordination compounds by V. BalzaniandV.Carassiti. Academic Press.
10. Text book of Coordination chemistry by K. Soma Sekhara Rao and K.N.K. Vani, Kalyani Publishers.

NOTE: PercentageofChange - 0%

A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE(Autonomous)
DEPARTMENT OF CHEMISTRY
M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)
II SEMESTER

Paper Code & Title: CH203: ORGANIC CHEMISTRY -II

No. of hours per week: 04 **Total credits: 04**
Total marks: 100 **(Internal: 30 M & External: 70M)**

Course: Organic chemistry (code 20CH2T3)		
S. No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Understand the basic and advanced concepts of stereochemistry, conformational analysis, green chemistry, nanochemistry and named reactions.	2,7
2	Apply the concepts related to stereochemistry, conformational analysis, and green and nano chemistry in establishing the mechanism of the reaction.	1,2,3
3	Assess that how far the knowledge gained in stereochemistry, green chemistry and nanochemistry is useful in understanding the nature of product.	1,5,6
4	Evaluate the role of stereochemistry, green principles and nano chemistry in establishing the mechanism of a reaction as well as in other areas of chemistry.	1,4,7

Unit-I: Named reactions:
Aldol condensation, Benzoin condensation, Cannizzaro condensation, claisen condensation, Dieckmann condensation, Perkin condensation, Stobbe condensation,Reformatsky reaction,Mannich reaction, Reimer-Tiemann reaction, Vilsmeier-Haack reaction, Shapiro reaction, McMurray reaction, Michael addition reaction, Wittig reaction, Stork – Enamine reaction,Acyloin condensation, Robinson ringannulation and Simmon-Smith reaction.

Unit-II: Stereo Chemistry-I:
Concept of chirality, Recognitionof Symmetry elements. Definition and classification of Stereoisomers, Enantiomer, Diastereomer, Homomer, Epimer, Anomer, Configuration and Conformation, Configurational nomenclature: D,L and R, S nomenclature. Molecular representation of organic molecules: Fischer, Newman and Sawhorse projections and their inter-conversions.Geometrical Isomerism. Cis-trans, E, Z- and Syn and anti nomenclature, Methods of determining configuration of Geometrical isomers using physical, spectral and chemical methods.

Unit-III: Stereo Chemistry-II:
Definition of Conformation, Conformational analysis of acyclic molecules – alkanes and substituted alkanes. Conformational analysis of monocyclic molecules – cyclohexane – chair,

boat and twist boat - mono and disubstituted cyclo hexanes and conformation around carbon hetero atom bonds having C–O & C–N. Confirmation and intra molecular hydrogen bonding.

Unit-IV: Green chemistry & Phase transfer catalysis:
Introduction to Green chemistry, Principles and concepts of Green chemistry, Green Catalysis, Biocatalysis, renewable resources, Green Reagents, examples of green reactions-synthesis of Ibuprofen, Clean Fischer-Indole synthesis comparison of the above with conventional methods. Introduction to Microwave organic synthesis: introduction, advantages and disadvantages. Applications: solvents (water and organic solvents), solvent free reactions (Solid state reactions).

Unit-V: Chemistry of Nanomaterials:
Introduction, carbon nanotubes: structure of single and multi-walled carbon nanotubes, synthesis-solid and gaseous carbon source-based production techniques, synthesis with controlled orientation. Growth mechanism of carbon nano tubes-catalyst free growth, catalyst activated growth, general properties and applications.

Text books:

1. Advanced organic chemistry –Reaction, mechanism and structure, Jerry March, John Wiley.
2. A guide book to Mechanism in organic chemistry, Peter Sykes, Longman.
3. Organic chemistry, I.L. Finar, Vol. I & II, Fifth ed. ELBS, 1975.
4. Stereo Chemistry of carbon compounds – E.L. Eliel.
5. Nano, The Essentials: T. Pradeep, The Mc. Graw Hill & Co.
6. Principles of organic synthesis, R.O.C. Norman and J.M. Coxon, Blakie Academic & Professional.
7. Reaction Mechanism in organic chemistry, S.M. Mukherji and S.P. Singh, Macmillan.
8. Green chemistry Theory and Practice by Paul T. Anastas and John C. Warner, Oxford University press.
9. Methods and reagents for Green chemistry, PietroTundo, AlvisePerosa, FulvioZecchini, John Willey& sons Inc.

NOTE: Percentage of Change - 0%

A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE(Autonomous)
DEPARTMENT OF CHEMISTRY
M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)
II SEMESTER

Paper Code & Title: CH204: PHYSICAL CHEMISTRY-II
No. of hours per week: 04 Total credits: 04
Total marks: 100 (Internal: 30 M & External: 70M)

Course: Physical chemistry (code 20CH2T4)		
S.No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Remember the concepts of thermodynamics, polymer chemistry, electro chemistry, chemical kinetics, photo chemistry.	1,2,7
2	Understand the concepts of thermodynamics, polymer chemistry, electro chemistry, chemical kinetics, photo chemistry.	1,2,7
3	Apply the concepts of thermodynamics, polymer chemistry, electro chemistry, chemical kinetics, photo chemistryin research and other allied fields.	1,2,4
4	Analyze the role and significance of concepts of thermodynamics, polymer chemistry, electro chemistry, chemical kinetics, photo chemistry.	1,2,7
5	Evaluate the role of concepts of Symmetry and Group theory in chemistry and applications of group theory, construction of character tables.	1,2,7

Unit-I: Third law of Thermodynamics and Statistical thermodynamics:
Nernst Heat theorem -Third law of thermodynamics - Its limitations - Determination of absolute entropy -
Thermodynamic probability and most probable distribution, Entropy and probability - Boltzmann-Plank equation. Ensembles, Maxwell-Boltzmann distribution, Fermi-Dirac statistics, Bose Einstein statistics. Partition function - calculation of thermodynamic properties in terms of partition function- Chemical equilibrium and partition function - Translational, rotational and electronic partition function - Entropy of Monatomic gases (Sackur-Tetrode equation).

Unit-II: Polymer chemistry and Raman Spectroscopy:
Classification of polymers - Free radical, ionic and Zeigler -Natta Polymerization - kinetics of free radical polymerization -Techniques of polymerization -Glass transition temperature - Factors influencing the glass transition temperature. Number average and Weight average, Molecular weights –molecular weights determinations –Membrane Osmometry, Light scattering phenomenon. Classical and quantum theories of Raman effects, pure rotational, vibration and Vibration- rotational Raman spectra, selection rules,
Mutual exclusion principle.

Unit-III: Electro Chemistry-II:
Reference electrode - Standard hydrogen electrode. Calomel electrode -Indicator electrodes: Metal-metal ion electrodes - Inert electrodes -Membrane electrodes- theory of glass membrane potential, potentiometric titrations, advantages of potentiometrictitrations, Conductmetric titrations. Electrode potentials - Double layer at the interface - rate ofcharge transfer - Decomposition potential - Over potential - Tafel plots - Derivation of Butler-Volmer equation for one electron transfer - electro chemical potential.

Unit-IV: Chemical kinetics and Photo chemistry:
Branching Chain Reactions – Hydrogen-oxygenreaction - lower and upper explosion limits - Fast reactions - Study of kinetics by flow methods - Relaxation methods - Flash photolysis. Acid base catalysis –protolytic and phototropicmechanism. Enzyme catalysis - Michelis-Menten kinetics.

Photochemistry:
Quantum yield and its determination, Actinometrical, Reactions with low and high quantum yields, Photo sensitization, Exciplexes and Excimers, Photochemical equilibrium, Kinetics of collisional quenching - Stern-Volmer equation.

Unit-V:
Symmetry and Group theory in chemistry: Symmetry elements, symmetry operation, definition of group, sub group, relation between order of a finite group and its sub group. GMT tables Abelian and non-abelian groups. Point group. Schonfiles symbols, Find out Point group of a molecule (yes or no Method). Representation of groups by Matrices (representation for the Cn, Cnv, Cnh, Dn etc. groups to be worked out, explicitly). Character of a representation. The great Orthogonality theorem (without proof) and its importance. Character tables and their use. Construction of Character tables.

Text books/ Reference books:

1. Physical chemistry, G.K. Vemulapalli (Prentice Hall of India).
2. Physical chemistry, P.W. Atkins. ELBS.
3. Chemical kinetics - K.J. Laidler, McGraw Hill Pub.
4. Text book of Physical Chemistry, Samuel Glasstone, Macmillan pub.
5. Statistical Thermodynamics - M.C.Gupta.
6. Polymer Sceince, Gowriker, Viswanadham, Sreedhar.
7. Quantitative Analysis, A.I. Vogel, Addison Wesley Longmann Inc.
8. Physical Chemistry by G.W.Castellan, Narosa Publishing House, Prentice Hall.
9. Physical Chemistry by W.J. Moore, Prentice Hall.
10. Polymer Chemistry by Billmayer.
11. Fundamentals of Physical Chemistry by K K. Rohatgi-Mukherjee. Wiley Eastern Ltd publications.
12. Statistical Thermodynamics by M.Dole.
13. Fundamentals of photochemistry by Rohatgimukherjee, New Age international Publications.

14. Essentials of Nuclear chemistry by H.J. Armikar, New Age international Publications.

NOTE: Percentage of Change – 0%

A.G.&S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

II SEMESTER

Paper Code & Title: 20OECH: (OPEN ELECTIVE-I)

CHEMISTRY IN DAILY LIFE

No. of hours per week: 04 **Total credits: 04**

Total marks: 100 **(Internal: 30 M & External: 70M)**

Course: CHEMISTRY IN DAILY LIFE (code 20OECH)		
S.No	COURSE OUTCOMES	PO`S
	The graduate will be able to	
1	Memorize the basic concepts related to chemistry in daily life like – chemistry Laboratory safety symbols, environmental chemistry, bioinorganic chemistry, vitamins, antibiotics and hormones.	2,7
2	Understand the concepts like chemistry Laboratory safety symbols, environmental chemistry, bioinorganic chemistry, vitamins, antibiotics and hormones.	1,2,6
3	Apply the knowledge gained in the concepts like chemistry Laboratory safety symbols, environmental chemistry, bioinorganic chemistry, vitamins, antibiotics and hormones in future job roles.	1,4,7

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on Chemistry Laboratory safety symbols – Meaning, Environmental Chemistry, Bioinorganic Chemistry, Biological functions of Hormones and Medicinal chemistry.

Unit-I: Chemistry Laboratory safety symbols – Meaning:

Corrosive, carcinogenic, Harmful, toxic, dangerous to environment, Explosive, flammable, Narcotic, Oxidizing, Lachrymatory, Radioactive, irritant, gases under pressure, general laboratory safety precautions.

Unit-II: Environmental Chemistry:

Ambient air quality standards, Acid rain, Smog, Greenhouse effect, Bhopal gas tragedy, Vishakhapatnam polymer industry tragedy, Renewable and Nonrenewable energy resources, DO, COD, BOD, Toxicity of lead, mercury, arsenic and Cadmium.

Unit-III: Bioinorganic Chemistry:

Essential elements, biological significance of Na, K, Mg, Ca, Fe, Metalloporphyrin – Structure and functions of hemoglobin, Myoglobin.

Unit-IV: Biological functions of Hormones:

Introduction,Types of harmones, Role of Anderstrone, Progestrone and thyroxin, action of cortisone, Insulin.

Unit-V: Medicinal Chemistry:

The role of vitamins – K,E,D,C,B – complex, classification of antibiotics, mechanism of antibiotics action - role of ampicillin, chloromycetin and amoxicillin as antibiotics.

Text books/ Reference books:

1. Laboratory safety for Chemistry Students by Robert H. Hill and David Finster

2. A Text book of Environmental chemistry by W. Moore and F.A. Moore

3. Environmental Chemistry by Samir K. Banerji

4. Organic Chemistry by G. Mare Loudan, Purdue University

5. Unified Chemistry by O.P. Agarwal, Paper-III, JPNP Publications.

6. Hormones and Endocrine system – Kleine, Rossemanith.

7. Principles of Biochemistry-Leninger.

8. Essentials of Medical pharmacology- K. D. Tripathi.

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE(Autonomous)
DEPARTMENT OF CHEMISTRY
M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)
II SEMESTER
Paper Code & Title: CH206L1: ORGANIC CHEMISTRY PRACTICAL-II

No. of hours per week: 03 Total credits: 03
Total marks: 100 (Internal: 30 M & External: 70M)

Course Learning Objective(S): The main objective of this paper is to give a practical knowledge
for the students on Organic chemistry practical.

List of experiments:
1. Preparation of organic compounds: Single stage preparations by reactions involving nitration, Halogenations, oxidation, reduction, alkylation, acylation, condensation and rearrangement. (A student is expected to prepare at least 5 different organic compounds by making use of the Reactions given above).
2. Preparation of organic compounds: Two stage preparations by reactions involving nitration, Halogenations, oxidation, reduction, alkylation, acylation, condensation and rearrangement. (A student is expected to prepare at least 5 different organic compounds by making use of the reactions given above).
3. Systematic qualitative analysis of organic compounds with different functional groups (5 Different compounds)

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of
Organic chemistry practical.

Text books/ Reference books:
1. A.I.Vogel, "A Text Book of Practical Organic Chemistry", Longman
2. A.I.Vogel, "Elementary Practical Organic Chemistry", Longman
3. Practical Organic Chemistry, F.G.Mann and B.C.Saunders, Longman.
4. Reaction and Synthesis in Organic Laboratory, B.S.Furniss, A.J.Hannaford, Tatchell, University Science Books Mills valley.
5. Purification of Laboratory chemicals, manual, W.L.F. Armarego EDD Perrin.
6. Reaction and Synthesis in Organic Chemistry Laboratory, Lutz-Friedjan-Tietze, TheophilEicher, University Science Book.

NOTE: Percentageof Change - 0%

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE(Autonomous)
DEPARTMENT OF CHEMISTRY
M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)
II SEMESTER

Paper Code & Title: CH207L2: PHYSICAL CHEMISTRY PRACTIAL

No. of hours per week: 03 Total credits: 03
Total marks: 100 (Internal: 30 M & External: 70M)

Course Learning Objective(S): The main objective of this paper is to give a practical knowledge
for the students on Inorganic and Physical chemistry experiments.

List of experiments:
1. Relative strengths of acids by studying the hydrolysis of ethyl acetate / methyl acetate.
2. Determination of equilibrium constant of KI3 KI + I2 by partition coefficient.
3. Determination of unknown concentration of potassium iodide by partition coefficient method.
4. Distribution coefficient of Benzoic acid between Benzene and water.
5. Determination of critical solution temperature of phenol-water system.
6. Study of the effect of electrolyte on the miscibility of phenol-water system.
7. Determination of Coordination number of cuprammoniumcation.
8. Potentiometric determination of Fe(II) with Cr (VI).
9. Potentiometric determination of Fe(II) with Ce (IV).
10. pH-metric determination of strong acid with strong base.
11. Conduct metric titration of strong acid with strong base.
12. Conductometric titration of strong acid + Weak acid with strong base.
13. Dissociation constant of weak acid (CH3COOH) by conductometric method.
14. Determination of cell constant.
15. Verification of Beers Law using potassium permanganate/Potassium dichromate.

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of
Inorganic and Physical chemistry experiments.

Text books/ Reference books:
1. Experimental Physical chemistry by V.D. Athawale, Parul Mathur, New Age International publishers.
2. Physical chemistry experiments by V. P. Kudesia, Pragati Prakasan publishers.
3. Advanced practical Physical chemistry by J.B. Yadav, Krishna's educational publishers.

NOTE: Percentage ofChange–27% (Increment)

M.Sc. DEGREE EXAMINATION
SECOND SEMESTER

Paper-I: ORGANIC SPECTROSCOPY

Time: 3 hours **Maximum Marks: 70**

SECTION – A

Answer all the questions. Each question carries 2 marks. (10x2=20M)

1. Discuss Auxochromes in UV visible spectroscopy in short. (CO-2)
2. Explain Wood ward fieser rules. (CO-2)
3. What is finger print region in IR Spectroscopy and discuss its importance (CO-3)
4. Discuss the mechanics of measurements in IR Spectroscopy in short. (CO-2)
5. Illustrate the basic principle of NMR spectroscopy. (CO-1)
6. What is chemical shift? Explain the significance of δ – scale. (CO-2)
7. Elaborate the importance of nitrogen rule in Mass Spectrometry. (CO-2)
8. Explain the role EI technique in ionization of molecules. (CO-2)
9. What is Stevenson's rule? (CO-1)
10. Write the list out the general modes of fragmentation. (CO-1)

SECTION – B (10x5=50M)

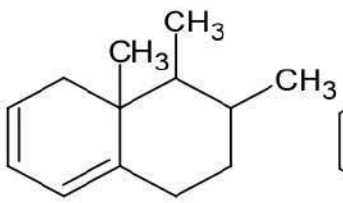
UNIT - I

11.a)Write a detaild note on i)Types of shifts in UV ii) Electronic transitions in UV.(CO-2,L-2)

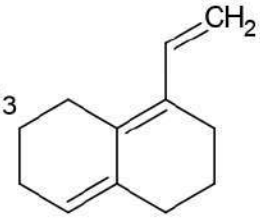
(Or)

b) Calculate the λ max of the following compounds (CO-4, L-4)

(i)



(ii)



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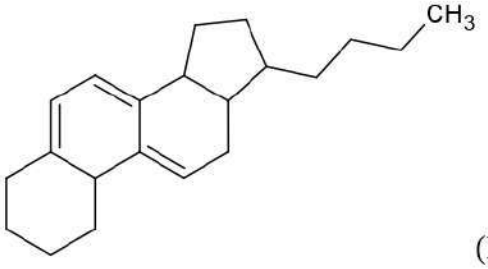
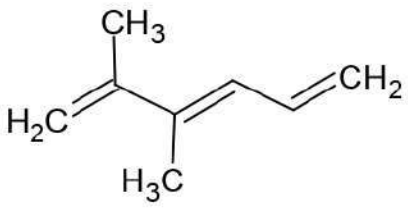


(IV)



UNIT – II

12.a) Write a note on i) fundamental modes of vibrations ii) Factors effecting IR stretching Frequency of organic compounds. (CO-3,L-3)

(Or)

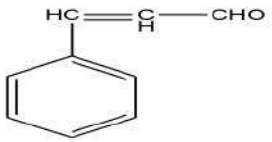
b) How will you distinguish o-hydroxybenzaldehyde and p-hydroxybenzaldehyde on the basis of IR spectroscopy ii) How will you distinguish the following pairs by the use of Their IR spectra (i) CH_3CH_2CHO and CH_3COCH_3 (ii) CH_3CH2NH_2 and CH_3NHCH_3 (CO-3,L-3)

UNIT – III

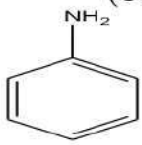
13. a) Define Chemical shift. Give an account on Chemical exchange in NMR. (CO- 2)

b) Predict the number of signals and their chemical shift in each of the following Compounds (CO-3)

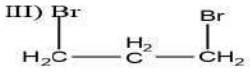
I)



II)



III)



(Or)

c) A compound of Molecular weight 122, in its PMR Spectrum shows 1.4(T,3H) .0(Q, 2H), 6.8-7.2(M, 5H). Write structure of compound using above data. (CO-3)

d) Explain the coupling constant in NMR and describe about various types of Coupling constants (CO-2)

UNIT - IV

14 a) The mass spectrum of an unknown compound shows a molecular ion peak at m/z =78 with a relative intensity of 23.6 and the relative intensities of the Isotopic peaks are as follows m/z 79(1.00), 80(7.55), 81(.25) .what is the Molecular formula of this unknown? (CO- 3)

(Or)

b) what is the principle of mass spectrometry?. Discuss some quantitative and qualitative applications of mass spectrometry. (CO-2)

UNIT - V

15 a) In the mass spectrum of 1-hexanol , a very weak molecular ion peak appears at m/z = 102 . Some other prominent peaks appear at m/z values of 100,99,84 56(base peak) and 31 . What are the most probable species responsible for the above mentioned peak positions. (CO-3)

(Or)

b) How mass spectrum is useful to distinguish between $1^0,2^0,3^0$ aliphatic amines? (CO- 4)

c) Illustrate Mc Lafferty rearrangement with suitable examples (CO-2)

***

M.Sc. DEGREE EXAMINATION
SECOND SEMESTER

Paper-II :: Inorganic Chemistry - II

Time: 3 hours **Maximum Marks: 70**

SECTION – A

Answer all the questions. Each question carries 2 marks. (10x2=20M)

1. Write a short note on Phosphorous-Sulphur cages. (CO-2)
2. Explain the bonding aspects of $[Nb_6Cl_{12}]^{-2}$. (CO-2)
3. Define hapticity. (CO-1)
4. Elaborate the classification of organometallic compounds. (CO-1)
5. Derive rate law ofAnation reaction. (CO-2)
6. Write note on complementary and non-complementary reactions. (CO-2)
7. Discuss how Hund's rules can be used to predict ground terms. (CO-2)
8. Derive the ground term of d^3 and d^9 metal ions. (CO-3)
9. Give a short account on Faraday Effect. (CO-2)
10. Deliberate the effect of spin orbital coupling on magnetic moments.(CO-3)

SECTION – B **(10x5=50M)**

UNIT - I

11.a) Describe the bonding and structure in higher boranes and Metalloboranes. (CO-2)

(Or)

b) Discuss the structure and bonding in $[Re_2Cl_8]^{2-}$ ion. (CO-2)

UNIT – II

12. a) Elucidate the applications of organometallic compounds in catalytic hydrogenation and hydro formylation. (CO-3)

(Or)

b) Explain oxidative addition, reductive elimination reactions of organometallic compounds. (CO-2)

UNIT – III

13. a) Explain the outer sphere mechanism of redox reactions. (CO-2)

(Or)

b) Discuss the direct and indirect evidences in favour of conjugate base mechanism. (CO-3)

UNIT - IV

14. a) Discuss the calculation of D_q and β parameters. (CO-3)

(Or)

b) Draw the orgel diagram and Tanabe Sugano diagram for d^2 and d^9 Configuration and explain. (CO-2)

UNIT - V

15. a) Discuss the storage of dioxygen by myoglobin and write its importance. (CO-2)

(Or)

b) Describe the factors affecting para magnetism. (CO-2)

M.Sc. DEGREE EXAMINATION
SECOND SEMESTER

Paper-III :: Organic Chemistry - II

Time: 3 hours **Maximum Marks: 70**

SECTION – A

Answer all the questions. Each question carries 2 marks. (10x2=20M)

1. Explain Shaciro reaction. (CO - 2)
2. Explain stobbe condensation. (CO - 2)
3. Write notes on configuration and conformation. (CO - 1)
4. Explain enantiomers with suitable examples. (CO - 1)
5. Draw the structures of the cyclohexane boat and twist boat structures. (CO - 1)
6. Discuss conformation and intramolecular hydrogen bonding. (CO - 2)
7. Discuss Clean Fischer Indole synthesis (CO - 3)
8. Write notes on Biocatalysis. (CO - 1)
9. Define nano explain. (CO - 1)
10. Writegeneral properties of carbon nano tubes. (CO - 1)

SECTION – B **(10x5=50M)**

UNIT - I

11. a) Discuss the mechanism of the following
(i) Benzoin condensation. (ii) Reformatsky reaction. (CO - 2)

(Or)

b) Discuss the definition and mechanism of
(i) Wittig reaction (ii) Acyloin condensation. (CO - 2)

UNIT - II

12. a) Explain the various elements of symmetry with suitable examples. (CO - 1)

(Or)

b) Discuss the various methods for determination of configuration of geometrical isomers with suitable examples. (CO - 1)

UNIT - III

13. a) Discuss the conformational analysis of cyclohexane and explain the stabilites.(CO - 1)

(Or)

b) Write an account of comformation around C – N and C – O hetero atom bonds.(CO -1)

UNIT – IV

14. a) Discuss the principles of green chemistry. (CO - 2)

(Or)

AG & SG SIDDHARTHA DEGREE COLLEGE OF ARTS &SCIENCE
(AUTONOMOUS) VUYYURU- 521165

Re-Accredited by NAAC with 'A' Grade

2020-2021

PG Department of Chemistry

Minutes of the meeting of Board of Studies

24-11-2020

MINUTES OF BOARD OF STUDIES

Minutes of meeting of Board of studies in PG Department of Chemistry held on 24-11-2020 at10.30 am in the PG Department of Chemistry through online(Zoom meeting)

Members Present

S.No	NAME		Signature
1	**Dr. V.Sreeram** Head, Dept. ofChemistry(P.G) AG & SG S College,Vuyyuru.	Chairman	
2	**Prof.C.Suresh Reddy** Department ofChemistry S.V. University,Tirupati.	University Nominee	
3	**Prof. Koya Prabakar Rao** Department of Chemistry Vignan University, Guntur.	Subject Expert	
4	**Dr.M.Sivanath**Associate prof. Dept. of Chemistry A.N.R.College, Gudivada.	Subject Expert	
5	**Dr.G.Raja** Manager(Q.A) Biophore India pharamaceuticals. Hyderbad.	Representative from Industry	
6	**Abdul Raheem**	One Post Graduate Meritorious Aluminous nominated by the Principal	
7	**N.V.Srinivasa Rao** Department of Mathematics AG & SG S College, Vuyyuru.	Representative Science Faculty Other Dept.	
8	**V.N.V.Kishore** Dept. of Chemistry(P.G) AG & SG S College, Vuyyuru	Member	
9	**Dilshad Begum** Dept. of Chemistry(P.G) AG & SG S College, Vuyyuru	Member	
10	**M.Rekha** Dept. of Chemistry(P.G) AG & SG S College, Vuyyuru	Member	

AGENDA:

1. To Review and modified syllabus and model question papers, discuss & approve modalities of lab courses.
2. To suggest methodologies for innovative methods of teaching
3. Any other matter with the permission of the Chair
4. Molecular Spectroscopy, Rotational Vibrational Spectroscopy, Symmetry and Group theory in chemistry in paper I semester I
5. To recommend the changed syllabus potentiometry V in semester I

Resolutions

Resolution –I

1. Resolved to recommend the framed Syllabus & Model Question Papers for theory courses of SEM III and approve the modalities of Lab Courses as prescribed by BOS members.
2. Resolved to conduct assignments etc., for Internal Assessment Tests.
3. It is resolved to change the syllabus in III, I units namely Introduction to Molecular Spectroscopy, Rotational Vibrational Spectroscopy, Symmetry and Group theory in chemistry in paper I semester I
4. It is resolved to add potentiometry in paper IV of semester I

4 Resolution –II

Resolved to adopt online teaching methods like as ZOOM, Microsoft teams, Google meet etc for ICT (Information and communication technologies) teaching

Resolution –III

5. Nil

M.Sc. CHEMISTRY - I - SEMESTER

CH1T1: GENERAL CHEMISTRY

Subject Code	CH1T1	I A Marks	30
No. of Lecture Hours / Week	4	End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Seminar	---	Exam Hours	03

Objectives : 1. To generalize the analytical and quantitative skills gained in this course and to Apply them in more advanced course.
2. To specify the principles and applications of stoichiometry, titrimetry etc.
3. To learn problem solving and learning skills to interpret the data to employ Valid and efficient methods of analysis and to assess whether or not the Results and calculations are reasonable.

Course: General Chemistry (code CH1T1)			
S.No	COURSE OUTCOMES	PO`S	PSO's
	The student will be able to		
1	Understand the significance of statistical rules and principles in quantitative analysis.	1,2,5	2,3
2	Assimilate the knowledge of various kinds of reactions, titrations and their applications.	1,2,6	3
3	Get equipped with the basic knowledge of Methods of purification, Drying techniques and Solvent extraction.	1,2,7	1
4	Get equipped with the knowledge of Chromatography techniques like as Adsorption, Column, Paper and Thin Layer chromatography	1,2,7	3
5	Test the conceptual knowledge gained in Gas Chromatography and High-Performance Liquid Chromatography	1,2,7	3

UNIT I

Treatment of analytical data : Classification of errors - Determinate and indeterminate errors - Minimisation of errors - Accuracy and precision - Distribution of random errors - Gaussian distribution - Measures of central tendency - Measures of precision - Standard deviation - student's t test - Confidence interval of mean - Testing for significance - Comparison of two means – F - test - Criteria of rejection of an observation - propagation of errors - Significant figures and computation rules.

UNIT-II

Titrimetric Analysis: Classification of reactions in titrimetric analysis- Primary and secondary standards-Neutralisation titrations-Theory of neutralisation indicators-Mixed indicators-Neutralisation curves-Displacement titrations-Precipitation titrations-Indicators for precipitation titrations-Volhard method-Mohr method- Theory of adsorption indicators-Oxidation reduction Titrations-Change of electrode potentials during titration of Fe (II) with Ce (IV)- Detection of end point in redox titrations.

UNIT -III

Methods of purification:

Distillation: Basic principles. Distillation types, continuous distillation, batch distillation, fractional distillation, vacuum distillation and steam distillation.

Drying Techniques: Drying of Hexane, Benzene, Toluene, Xylene, Tetrahydrofuran, DMF, DMSO, Methanol, Ethanol, Diethylether and Dioxane. **Solvent extraction**: Basic principles. Different types of extraction. Selection of solvents. Avoiding emulsion formation. Basic concepts on Soxhlet extraction.

UNIT – IV

Adsorption and Partition Chromatography: Introduction to chromatography, Different types of Chromatography: **Adsorption chromatograph**: adsorbents, solvents, solutes, apparatus; **Column Chromatography:** stationary phase, Mobile phase, packing of column, advantages and disadvantages. **Paper chromatography:** Basic Principles. Ascending and descending types. Selection of mobile phase, Development of chromatograms, Visualization methods. Application of paper chromatography in the identification of sugars and amino acids. One- and two-dimensional paper chromatography; **Thin Layer chromatography:** Basic Principles. Common stationary phases, Methods of preparing TLC plates, Development of TLC plates, Visualization methods, Rf value. Application of TLC in monitoring organic reactions. identification and quantitative analysis.

UNIT V

Gas Chromatography and High-Performance Liquid Chromatography: **Gas chromatography:** Basic Principles. Different types of GC techniques. Selection of columns and carrier gases. Instrumentation. detectors; RT values. Applications in the separation, identification and quantitative analysis of organic compounds; **High Performance liquid chromatography (HPLC):** Basic Principles. Normal and reversed Phases. Selection of column and mobile phase. Instrumentation. detectors; RT values. Applications in the separation, identification and quantitative estimation of organic compounds. Concepts on HPLC method development.

REFERENCES:

1. Vogel's text book of quantitative analysis. (3rd edition)Addition Wesley Longmann Inc.
2. Quantitative analysis R.A Day and A.L.Underwood. Prentice Hall Pvt.Ltd.
3. Principles of computer programming (Fortran 77 IBM PC)V.Rajaraman, Prentice Hall.
4. An introduction to Digital computers.V.Rajaraman and T.Radhakrishnan
5. Fundamentals of Analytical Chemistry – Skoog and West
6. Instrumental Methods of analysis – B K Sharma
7.Basics of computers for Chemists, P.C. Jurs.

CH1T2: INORGANIC CHEMISTRY – I

Subject Code	CH1T2	I A Marks	30
No. of Lecture Hours / Week	4	End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Seminar	----	Exam Hours	03

Objectives:

1. To impart knowledge on basic & advanced aspects of Inorganic Chemistry.
2. To specify the need of modern theories of atomic structure and chemical bonding and their applications to molecular and metallic structures and coordination chemistry.
3. To equip the students with the fundamental principles and advanced aspects of Quantum chemistry.

Course: Inorganic chemistry (code CH1T2)			
S.No	COURSE OUTCOMES	PO`S	PSO's
	The post graduate will be able to		
1	Understand the postulates, basic theory and advanced theory of Quantum chemistry.	1,2	1
2	Take up the knowledge of preparation, structure, bonding aspects and chemical properties of metal pi complexes, compounds of non – transitional elements and also spectral properties, magnetic properties and applications of Lanthanides and actinide complexes.	1,2,4	3
3	Assimilate the knowledge of non-valence cohesive forces, VSEPR theory, MO theory, MO diagrams and implications of MO theory.	1,2,7	3
4	Comprehend the bonding, structural aspects, properties and applications of complexes basing on CFT & MO theory and evidences in support of M-L bond.	1,2,3	1,3
5	Identify the significance of the thermodynamic stability of complexes, factors effecting, theories to explain stability and methods of determining the stability constant of complexes.	1,2,5	3

UNIT-I

Introduction to Exact Quantum Mechanical Results: Schrodinger equation importance of wave function, Operators, derivation of wave equation using operator concept. Discussion of solutions of Schrodinger's equation to some model systems viz. particle in one dimensional box (applications), three dimensional box, Rigid rotator system and the Hydrogen atom.

UNIT-II

Chemistry of non- transition elements - Inter halogen compounds, Halogen oxides and oxyfluorides. Noble gas compounds with special reference to clathrates. Spectral and Magnetic properties of Lanthanides and Actinides. Analytical applications of Lanthanides and Actinides.

Synthesis, properties and structure of B-N, S-N, P-N cyclic compounds and intercalation compounds.

UNIT-III

Structure and Bonding - pπ - dπ bonding - Evidences (in non-transition metal compounds). Non-valence cohesive forces, Hydrogen bonding. VSEPR theory, Walsh diagrams for linear (BeH_2) and bent (H_2O) molecules. Molecular Orbital theory, Molecular orbitals in triatomic (BeH_2) molecules and ions (NO_2^-) and energy level diagrams.

UNIT-IV

Metal –ligand bonding - Crystal Field Theory of bonding in transition metal complexes – Splitting of d-orbitals in octahedral, tetrahedral, square plannar, Trigonalbipyramidal and Square pyramidal fields.Tetragonal distortions - Jahn Teller effect . Experimental evidences for covalence in complexes.

Molecular Orbital Theory of bonding for Octahedral, tetrahedral and square planar complexes. π-bonding and MOT -

UNIT-V

Metal – ligand Equilibria in solutions - Step wise and over all formation constants. Trends in stepwise constants (statistical effect and statistical ratio). Determination of formation constants by Spectrophotometric method (Job's method) and pH metric method (Bjerrum's). Stability correlations - Irwing – William's series.Hard and soft acids and bases – Hard and soft acids and bases (HSAB).

Reference Books

1. Inorganic Chemistry Huheey, Harper and Row.
2. Physical methods in inorganic chemistry, R.S. Drago. Affliated East-West Pvt. Ltd.
3. Concise inorganic chemistry, J. D. Lee, ELBS.
4. Modern Inorganic Chemistry, W. L. Jolly, McGrawHill.
5. Inorganic Chemistry, K. F. Purcell and J. C. Kotz Holt Saunders international.
6. Concepts and methods of inorganic Chemistry, B. E. Douglas and D.H.M.C. Daniel, oxford Press.
7. Introductory quantum mechanics, A. K. Chandra
8. Quantum Chemistry, R. K. Prasad.
9. Inorganic Chemistry, Atkins, ELBS
10. Advanced Inorganic Chemistry, Cotton and Wilkinson, Wiley Eastern
11. Quantum Chemistry,R. K. Prasad.
12. Text book of Coordination Chemistry, K.SomaSekharrao and K.N.K. Vani, Kalyani Publishers.
13. Theoretical Inorganic Chemistry by G.S.Manku, Tata McGrawHill, 2000, reprint.
14. Concise co-ordination chemistry, R.Gopal, Ramalingam, Vikas Publishing, House, 2014.
15. Inorganic Chemistry – Huheey, Keuter, L.Keiter, 4th edition, Pearson education, Asia.

CH1T3: ORGANIC CHEMISTRY – I

Subject Code	CH1T3	I A Marks	30
No. of Lecture Hours / Week	4	End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Seminar	----	Exam Hours	03

Objectives: 1. To provide proper insight on the topics of aromaticity and antiaromaticity in benzenoid & non-benzenoid aromatic compounds.

2. To emphasize the significance of reactive intermediates in organic synthesis.
3. To provide ample knowledge on the topic of stereochemistry and conformational analysis in order to make a student to understand organic reaction mechanisms.

Course: Organic chemistry (code CH1T3)			
S.No	COURSE OUTCOMES	PO`S	PSO's
	The post graduate will be able to		
1	Interpret the concept of aromaticity and the main properties of benzenoid and non-benzenoid aromatic compounds and distinguish between aromatic, non-aromatic and anti aromatic compounds by their structures and chemical consequence of aromaticity.	1,2,7	2,3
2	Understand the structure, stability, properties and generation of various reactive intermediates and reactive species and their role in organic reaction mechanisms.	1,2,5	1
3	Have a clear conceptual understanding of the nature of carbon-carbon multiple bond, various types of additions, with various reagents, mechanism, orientation and stereochemistry and also aknowledge some important synthetic reactions of CO and CN and crams rule.	2,6,7	2,3
4	Understand the definition types of elimination reactions and differentiate between the various mechanisms, orientation rules and perceives factors favouring elimination over substitution.	1,2,4	1
5	Have knowledge and understanding of various types of aliphatic and aromatic nucleophilic substitution reactions, their mechanisms, stereochemistry and various factors affecting nucleophilic substitution reactions	1,2,4	2

UNIT-I

Nature of Bonding in Organic Molecules: Localised and Delocalized, Delocalised chemical bonding conjugation, cross conjugation, hyper conjugation, Tautomerism.

Aromaticity: Concept of Aromaticity, Aromaticity of five membered, six membered rings .- Non benzonoid aromatic compounds:-cyclopropenylcation,

Cyclobutadienyldication,cyclopentadienylanion-
tropylliumcationcyclooctatetraenyldianion.Homoaromaticity, Anti aromaticity.

UNIT–II

Reactive intermediates:

Generation, Structure, Stability, Detection and Reactivity of Carbocations, Carbanions, Free radicals, Carbenes, Nitrenes and Arynes.

Reactive Species: Generation and reactivity of Electrophiles, Nucleophiles, Dienophiles, Ylids.

UNIT–III

Addition Reactions: Additions: Addition to carbon – carbon multiple bonds, HX, X2, HOX, stereo chemistry of addition, formation and reaction of epoxides, syn and anti hydroxylation, hydrogenation(catalytic and Non catalytic), synthetic reactions of CO and CN and Cram's rule.

UNIT–IV

Eliminations Reactions:

Types of elimination (E1,E1CB,E2) reactions, mechanisms, stereochemistry and orientation, Hofmann and Saytzeff's rules, Syn elimination versus anti elimination. Competitions between elimination and substitution. Dehydration, dehydrogenation, decarboxylative elimination, pyrolytic elimination.

UNIT–V

Substitution Reactions:

Aliphatic Nucleophilic substitutions:

The SN2, SN1, mixed SN1 and SN2 and SNireactions : Mechanism, effect of structure, nucleophile, leaving group on substitutions. The neighbouring group mechanism, neighbouring group participation by σ and π bonds, anchimeric assistance.

Aromatic Nucleophilic substitution:

The SNAr, SN1 mechanisms and benzyne mechanism. Reactivity- effect of substrate structure, leaving group and attacking nucleophile. The Von-Richter, Sommelet – Hauser and Smiles rearrangements.

References:

1. Advanced organic chemistry – reaction, mechanism and structure, Jerry March, John Wiley.
2. Advanced organic chemistry, F.A.Carey and R.J.Sundberg,Plenum.
3. A guide book to Mechanism in organic chemistry, Peter Sykes, Longman.
4. Organic chemistry ,I.L.Finar, Vol. I & II, Fifth ed. ELBS,1975.
5. Organic chemistry, Hendrickson, Cram and Hammond (McGraw – Hill).
6. Stereo Chemistry of carbon compounds – E.L. Eliel.
7. Modern organic Reactions, H.O.House, Benjamin.

8. An introduction to chemistry of Heterocyclic compounds, R.M.Acheson.
9. Structure and mechanism in organic chemistry, C.K.Ingold, Cornell University Press.

10. Principles of organic synthesis, R.O.C.Norman and J.M.Coxon, Blakie Academic & Professional
11.Reaction Mechanism in Oganic Chemistry, S.M.Mukherji and S.P.Singh, Macmillan.
12. Basic Principles of Organic Chemistry by J. B. Roberts and M. Caserio.
13. Stereo Chemistry of Organic compounds, P. S. Kalsi, New Age International.

CH1T4: PHYSICAL CHEMISTRY – I

Subject Code	CH1T4	I A Marks	30
No. of Lecture Hours / Week	4	End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Seminar	----	Exam Hours	03

Objectives: 1. The main objective of the course is to impart the theoretical knowledge and applications of the important terms and laws of Physical Chemistry.

2. The course provides a basic understanding of the core areas of physical chemistry based around the theme of systems, states and processes topics covered on thermodynamic, kinetics and electro Chemistry.
4. The objective of the course is to understand and apply the laws of the thermodynamics and kinetics.

Course: Physical chemistry (code CH1T4)			
S.No	COURSE OUTCOMES	PO`S	PSO's
	The student will be able to		
1	Understand the core areas of physical chemistry based around the theme of systems, states and process covered on thermodynamics.	1,2,7	1
2	Understand the important aspects of surface phenomenan and the physical chemistry involved in it.	1,2,5	2
3	Understand the basic concepts of electrochemical cells, concentration cells in producing electricity from chemicals.	1,2,7	2
4	Understand the theories of reaction rates, mechanisms of Collision theory, primary and secondary salt effects.	1,3,7	1,3
5	Understand the method of bond length, bond strength determination, identification of functional groups present in the molecule from the microwave and IR spectra of molecules.	1,2,6	3

UNIT-I

Thermodynamics - I

Classical thermodynamics - Brief review of first and second laws of thermodynamics - Entropy change in reversible and irreversible processes - Entropy of mixing of ideal gases - Entropy and disorder – Free energy functions - Gibbs-Helmholtz equation - Maxwell partial relations - Conditions of equilibrium and spontaneity - Thermodynamic derivation of Raoult's law.

UNIT – II

Surface phenomena and phase equilibria- Surface tension - capillary action - pressure difference - across curved surface (young - Laplace equation) - Vapour pressure of small droplets (Kelvin equation) - Gibbs-Adsorption equation - BET equation - Estimation of surface area - catalytic activity of surfaces – ESCA , X- ray fluorescence and Auger electron spectroscopy.

UNIT - III

Electrochemistry – I - Electrochemical cells - Measurement of EMF - Nernst equation – Equilibrium constant from EMF Data - pH and EMF data - concentration cells with and without transference – Liquid junction potential and its determination - Activity and activity coefficients - Determination by EMF Method - Determination of solubility product from EMF measurements. Debye Huckel limiting law and its verification.

UNIT - IV

Chemical kinetics- Methods of deriving rate laws - complex reactions - Rate expressions for opposing, parallel and consecutive reactions involving unimolecular steps. Theories of reaction rates -collision theory - Steric factor - Activated complex theory - Thermodynamic aspects – Unimolecular reactions - Lindemann's theory - Lindemann-Hinshelwood theory. Reactions in solutions - Influence of solvent - Primary and secondary salt effects.

UNIT – V

Microwave Spectroscopy and Rotational Vibrational Spectroscopy: Motion of molecules-Degrees of freedom –Energy associates with the degrees of freedom Type of spectra. **Microwave spectroscopy**: Classification molecules, rigid rotator model, effect of isotopic substitution on the transition frequencies, Intensities non-rigid rotator-Microwave spectra of polyatomic molecules. **RotationalVibrational Spectroscopy**: Harmonic oscillator, vibrational energies of diatomic molecules, zero-point energy, force constant and bond strengths, anharmonicity Morse potential energy diagram. Vibration – rotation spectroscopy. PQR branches, Born–Openheimer approximation, selection rules, normal modes of vibration group frequencies, overtones, hot bands, applications.

REFERENCE BOOKS:

1. Physical chemistry, G.K.Vemulapalli (Prentice Hall of India).
2. Physical chemistry, P.W.Atkins. ELBS
3. Chemical kinetics - K.J.Laidler, McGraw Hill Pub.
4. Text book of Physical Chemistry, Samuel Glasstone, Macmillan pub.
5. Polymer Sceince, Gowriker,Viswanadham, Sreedhar
7. Elements of Nuclear Science, H.J.Arniker, Wiley Eastern Limited.
8. Quantitative Analysis, A.I. Vogel, Addison Wesley Longmann Inc.
9. Physical Chemistry-G.W.Castellan, Narosa Publishing House, Prentice Hall
10. Physical Chemistry, W.J.Moore, Prentice Hall
11. Polymer Chemistry – Billmayer

CH1L1: INORGANIC CHEMISTRY PRACTICAL

Subject Code	CH1L1	I A Marks	30
No. of Practical Hours / Week	6	End Exam Marks	70
Total Number of Practical Hours	80	Total Marks	100
Seminar	----	Exam Hours	06

Course: Inorganic Chemistry Lab (code CH1L1)			
S.No	COURSE OUTCOMES	PO`S	PSO's
	The post graduate will be able to		
1	Understand the importance of Inorganic qualitative analysis and its use in research and industry.	1,2,5	2
2	Comprehend the procedures / tests for the identification of cations and anions.	1,2,6	3
3	Interpret the need for separation of interfering radical in Inorganic qualitative analysis.	1,2,3	2
4	Know that complexes can be synthesized by simple procedures.	1,2,6	2

List of experiments:

1. Preparation of Potassium trisoxalatoferrate(III).
2. Preparation of Tris thiourea copper (1)sulphate.
3. Preparation of Cis and trans potassium diaquodioxalatochromium(III).
4. Preparation of Hexa ammine cobalt (III)chloride.
5. Determination of Zn^{2+} with potassium Ferrocyanide.
6. Determination of Mg^{2+} usingEDTA.
7. Determination of Ni^{2+} usingEDTA.
8. Determination of hardness of water usingEDTA.
9. Gravimetric determination of nickel using dimethylglyoxime.
10. Gravimetric determination of Copperusingammonium thiocyanate.
11. Gravimetric determination of Zn using diammonium hydrogenphosphate.
12. Semi micro qualitative analysis of six radicalmixtures

(One interfering anion and one less familiar cation for each mixture) (minimum three mixtures).

Anions: S^{2-}, SO^{2-}, Cl^{-}, Br^{-}, I^{-}, $NO3^{-}$, $SO4^{2-}$, $CH3COO^{-}$, $C2O4^{-2}$, $C4H4O6^{-2}$, $PO4^{3-}$, $CrO4^{2-}$,

Cations: Ammonium ($NH4^{+}$)

1st group: Hg^{+}, Ag^{+}, Pb^{+2}, Tl^{+}, W^{+6}.

2nd group: Hg^{+2}, Pb^{+2}, Bi^{+3}, Cu^{+2}, Cd^{+2}, Sn^{+2}, Sn^{+4}, Mo^{+6}.

3rd group: Fe^{+2}, Fe^{+3}, Al^{+3}, Cr^{+3}, Ce^{+4}, Th^{+4}, Ti^{+4}, Zr^{+4}, VO^{+2}, $UO2^{+2}$, Be^{+2}.

4th group:Zn^{+2},Mn^{+2}, Co^{+2}, Ni^{+2}.

5^{th} group: Ca^{+2}, Ba^{+2}, Sr^{+2}.

6^{th} group: Mg^{+2}, K^{+}, Li^{+}.

Text books/ Reference books:

1. Vogels Text Book of Quantitative analysis, revised. J. Bassett, R.C. Denny, G.H. Jeffery and J. Mendhan,ELBS.
2. Synthesis and Characterization of Inorganic Compounds, W.L. Jolly. PrenticeHall.
3. Practical Inorganic Chemistry by G. Pass and H. Sutcliffe Chapman andHall.
4. Practical Inorganic Chemistry by. K. Somasekhara Rao and K.N.K. Vani. Kalyanipublishers.

CH1L2: ORGANIC CHEMISTRY PRACTICAL-I

Subject Code	CH1L2	I A Marks	30
No. of Practical Hours / Week	4	End Exam Marks	70
Total Number of Practical Hours	80	Total Marks	100
Seminar	---	Exam Hours	06

Course: Organic chemistry Lab (code CH1L2)			
S.No	COURSE OUTCOMES	PO`S	PSO's
	The post graduate will be able to		
1	Understand the importance of organic compound synthesis and its use in research and industry.	1,2,6	2
2	Understand the procedures for the different steps for the organic compound synthesis.	1,5,6	2
3	Understand the mechanisms for the synthesis of organic compounds in different steps.	1,2,7	3
4	Understand the recrystallisation of organic compound in various steps for the organic compound synthesis.	1,2,4	2

List of experiments:

1. Separation of Binary mixtures of Carboxylic acid + Neutral organic compounds (Solvent extractionmethod).
2. Separation of Binary mixtures of Basic nature + Neutral organic compounds (Solvent extraction method).
3. Separation of Binary mixtures of Phenolic compounds + Neutral organic compounds (Solvent extractionmethod).
4. Preparation of Phthalimide from Phthalic anhydride – HighTemperature.
5. Preparation of p-nitro acetanilide – Lowtemperature.
6. Preparation of Iodoform – Roomtemperature.
7. Column chromatography - separate the given mixture of o-and p-nitroaniline.
8. Paper chromatography - separate the given mixture of sugars or aminoacids.
9. Thin layer chromatography - separate the given mixture of phenols or 2,4-DNP derivatives of carbonylscompounds.
10. Preparation of Sodium wire - to make Sodium Wire for solventdrying.
11. Preparation of SodiumGranules.
12. Preparation of Sodiumt-butoxide.
13. Preparation of Grignard Reagent and its usage onereaction.
14. Preparation of Wittigreagent.
15. Preparation of ButylLithium.

Text books/ Reference books:

1. A.I. Vogel, "A Text Book of Practical Organic Chemistry",Longman
2. A.I. Vogel, "Elementary Practical Organic Chemistry",Longman
3. F.G. Mann and B.C. Saunders, "Practical Organic Chemistry",Longman
4. Reaction and Synthesis in Organic Laboratory, B.S. Furniss, A.J. Hannaford, Tatchell, University Science Books millsvalley.
5. Purification of Laboratory chemicals, manual, W.L.F. ArmaregoEDDPerrin
6. Reaction and Synthesis in Organic Chemistry Laboratory, Lutz-Friedjan- Tietze, TheophilEicher, University ScienceBook.

Model Question paper

A.G &S.G. Siddhartha College, Vuyyuru – 521165

PG Department of Chemistry

Sem I

Dt : XX/XX/2021 Time : 9.00 to 12.00 am Marks : 70M

Paper – II, General Chemistry

SECTIO|N-A

Answer all the questions. Each question carries 2 marks (10X2=20M)

All Units carries equal Marks.

1. Write equation for student's t-test and explain terms in it.
2. Explain Measure of control tendency.
3. Explain terms primary and secondary standards in titrimetric analysis.
4. Explain titration of strong acid versus strong base.
5. Explain drying techniques of Hexane, Benzene & toluene.
6. Draw apparatus for Steam distillation and Explain principle.
7. Write applications of Thin-layer chromatography.
8. Explain packing of column in adsorption chromatography.
9. Explain R_T values in HPLC and principle of HPLC.
10. Write Instrumentation diagram of Gas liquid chromatography.

SECTIO|N-B

Answer any 5 Questions from the following. Each Question carries 10 Marks (5X10=50M)

(Minimum ONE Question from Each Unit).

11. Write Brief account of Classification of Errors
12. Explain precipitation reactions and Indicators used
13. Explain Solvent extraction in brief.
14. Write basic principle of ascending and descending types of paper chromatography.
15. Explain apparatus, Mobile phase and stationary phases in column chromatography.
16. Write about basic principle, Instrumentation and working of Gas chromatography.
17. Write principles of Normal and reversed phases in HPLC and Draw Instrumentation diagram.
18. Explain Gaussian distribution and Accuracy.

Note: All units are must be covered for Questions.

Model Question paper

A.G &S.G. Siddhartha College, Vuyyuru – 521165

PG Department of Chemistry

Sem I

Dt : XX/XX/2021 Time : 9.00 to 12.00 am Marks : 70M

Paper – II, Inorganic Chemistry

SECTIO|N-A

Answer all questions to be answered. Each question carries 2 marks (10X2=20M)

All Units carries equal Marks.

1. Write Schrodinger's wave Equation and explain terms in it.
2. Explain Eigen values and Eigen Functions.
3. Write Classification of Interhalogen compounds
4. Write Magnetic properties of Lanthanides.
5. Write about Non- valency cohesive forces and their types.
6. Explain Inter molecular hydrogen bonding with example.
7. Draw crystal field splitting in square planar complexes.
8. What is John-Teller effect?
9. Write about Hard Acids and Soft Bases with example.
10. Explain Statistical effect.

SECTIO|N-B

Answer 5 Questions to be answered. Each Question carries 10 Marks (5X10=50M)
(Minimum ONE Question from Each Unit).

11. Write Schrodinger's wave equation for particle in one dimensional box.
12. Discuss about halogen oxides and oxy fluorides.
13. I) what are the important postulates of VSPER theory.

    II) Derive shapes of XeFu, XeF_2 using VSPER theory.
14. Explain splitting of d-orbital's in trigonal bipyramidal and square pyramidal crystal fields.
15. Explain step-wise and overall formation constants.
16. Explain determination of formation constant by spectrophotometric method (Job's method)
17. Explain splitting of d-orbital's in octahedral and tetrahedral complexes.
18. Explain rigid- rotator system in quantum mechanics.

AG & SG SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)VUYYURU-521165

Aided by the Governmentof A.P, Re-Accredited by NAAC with 'A'Grade

2021-2022

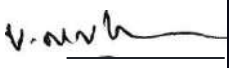
PG Department of Chemistry

Minutes of the meeting of Board of Studies
11-11-2021

MINUTES OF BOARD OF STUDIES

Minutes of meeting of Board of studies in PG Department of Chemistry held on 11-11-2021 at 7.00 pin in the PG Department of Chemistry through online (Google meet)

Members Present

S.No	NAME		Signature
1	**Dr. V.Sreeram** Head, Dept. ofChemistry(P.G) AG & SG S College,Vuyyuru.	Chairman	
2	**Prof.C.Suresh Reddy** Department ofChemistry S.V. University,Tirupati.	University Nominee	
3	**Prof. Koya Prabakar Rao** Department of Chemistry Vignan University, Guntur.	Subject Expert	
4	**Dr.M.Sivanath**Ass ociate prof. Dept. of Chemistry A.N.R.College, Gudivada.	Subject Expert	
5	**Dr.G.Raja** Manager(Q.A) Biophore India pharamaceuticals. Hyderbad.	Representative from Industry	
6	**Abdul Raheem**	One Post Graduate Meritorious Aluminous nominated by the Principal	
7	**N.V.Srinivasa Rao** Department of Mathematics AG & SG S College, Vuyyuru.	Representative Science Faculty Other Dept.	
8	**V.N.V.Kishore** Dept. of Chemistry(P.G) AG & SG S College, Vuyyuru	Member	
9	**Dilshad Begum** Dept. of Chemistry(P.G) AG & SG S College, Vuyyuru	Member	
10	**M.Rekha** Dept. of Chemistry(P.G) AG & SG S College, Vuyyuru	Member	

AGENDA:

1. To Review and modified syllabus and model question papers, discuss & approve modalities of lab courses.
2. To suggest methodologies for innovative methods of teaching
3. Any other matter with the permission of the Chair
4. Molecular Spectroscopy, Rotational Vibrational Spectroscopy, Symmetry and Group theory in chemistry in paper I semester I
5. To recommend the changed syllabus potentiometry V in semester I

Resolutions

Resolution –I

1. Resolved to recommend the framed Syllabus & Model Question Papers for theory courses of SEM III and approve the modalities of Lab Courses as prescribed by BOS members.
2. Resolved to conduct assignments etc., for Internal Assessment Tests.
3. It is resolved to change the syllabus in III, IV, V units namely Introduction to Molecular Spectroscopy, Rotational Vibrational Spectroscopy, Symmetry and Group theory in chemistry in paper I semester I
4. It is resolved to add potentiometry in paper IV of semester I

4 Resolution –II

Resolved to adopt online teaching methods like as ZOOM, Microsoft teams, Google meet etc for ICT (Information and communication technologies) teaching

Resolution –III

5. Nil

BOS Meeting- PG Chemistry-11-11-2021, 7.00PM.through Online (Google Meet) Syllabus

approval letter through mail.

1 Prof.C.Suresh Reddy
Dear Dr. Sreeram Greetings
of the day
Happy to participate In the today's BOS meeting. I have gone through the syllabus and it is fine. I am here with approving the same syllabus.
This is for your kind information and necessary action in this regard. Prof .C.Suresh Reddy

Prof. C. Suresh Reddy, FAPAS, MNASc Department of Chemistry
S.V.U. College of Sciences Sri Venkateswara University
Tirupati-517 502, A.P., India
Mobile: 98496949582
.Prof.K.prabhakara Rao

Dear sir,
I am here accepting the proposed syllabus. Thank you. Warm regards
Prof. KoyaPrabhakara Rao

Ph.D. (IIT Madras) (Postdoc-Japan 5yrs)
Head, Division of Chemistry # VGF-8&9A, H-Block
Department of Science and Humanities VFSTR (Deemed to be University), Vadlamudi,
Guntur Dt, Pincode: 522213, Andhra Pradesh India. Phone (Office): 918632344762,
Mobile: +919676157858
Email: drkpr_sh@vignan.ac.in; kprao2005@gmail.comwebsite1:https://sites.google.com/site/drkoyaprabhakararaowebsite/website2:http://www.vignan.ac.in/bshprabhakararao.php
3.Dr.M.Sivanath

I have gone through your mail regarding the Third & First semester and open electiveSyllabus.
It is fine and approved.
This is for your kind information and necessary action in this regard. Warm regards

Dr.M.Sivanath,
Associate prof., Dept. of Chemistry,sivanath23@gmail.com
Vice principal, Additional Director, ANR College, Gudivada

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
(Autonomous)
DEPARTMENT OF CHEMISTRY
M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

Appendix - I

Scheme of Instruction and Evaluation for **M.Sc. (Organic Chemistry)** programme for the batch of students admitteddur ing2021–2022

Semester – I

Paper	Title of the Paper	Instruction Hours Per Week			Credits(T+P)	Evaluation		
		L	T	P		CIA MARKS	SEE MARKS	SEE DURATION
Paper-I	General Chemistry	4	1	--	4	30	70	3 hours
Paper-II	Inorganic Chemistry - I	4	1	--	4	30	70	3 hours
Paper-III	Organic Chemistry - I	4	1	--	4	30	70	3 hours
Paper-IV	Physical Chemistry - I	4	1	--	4	30	70	3 hours
Pract-I	Inorganic Chemistry	--	--	6	3	30	70	6 hours
Pract-II	Organic Chemistry	--	--	6	3	30	70	6 hours
	Sub-Total	16	4	12	16+4+12=32			

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Vuyyuru- 521165.

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Title of the Paper: GENERAL CHEMISTRY

Semester: I

Course Code	**20CH1T1**	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2020-21	Year of Offering: 2021 - 22	Year of Revision: 2021-22	60%

Course Objective: The main objective of this paper is to give abasic and updated knowledge for the students on Treatment of analytical data, Titrimetric Analysis, Rotational-Vibration Spectroscopy, Symmetry and Group theory in chemistry.

Course Outcomes:-

CO1: Recollect the concepts of titrimetric analysis, specific statistical rules, microwave Spectroscopy, rotational vibrational spectroscopy and group theory in chemistry

CO2: Identify the role of titrimetric analysis, specific statistical rules, microwave spectroscopy, Rotational vibrational spectroscopy and group theory in chemistry.

CO3: Demonstrate knowledge of titrimetric analysis, microwave spectroscopy, rotational Vibrational spectroscopy and group theory in chosen job role.

CO4: Test the conceptual knowledge gained in titrimetric analysis, statistical rules / principles, Microwave spectroscopy, rotational vibrational spectroscopy and group theory in chemistry

Syllabus

Course Details:-

Unit	Learning Units	Lecture Hours
I	**Treatment of analytical data** : Classification of errors – Determinate and indeterminate errors –Minimisation of errors – Accuracy and precision – Distribution of random errors – Gaussian distribution – Measures of central tendency – Measures of precision – Standard deviation – Standard error of mean – student's t test – Confidence interval of mean – Testing for significance – Comparison of two means – F – test – Criteria of rejection of an observation – propagation of errors – Significant figures and computation rules – Control charts – Regression analysis – Linear least squares analysis.	12
II	**Titrimetric Analysis:**Classification of reactions in titrimetric analysis- Primary and secondary standards-Neutralisation titrations-Theory of Neutralization indicators-Mixed indicators- Neutralisation curves- Displacement titrations-Precipitation titrations-Indicators for precipitation titrations-Volhard method-Mohr method- Theory of adsorption indicators- Oxidation reduction titrations-Change of electrode potentials during titration of Fe(II) with Ce(IV)- Detection of end point in redox titrations- Complexometric titrations- Metal ion indicators-Applications of EDTA titrations-Titration of cyanide with silver ion.	12
III	**Introduction to Molecular Spectroscopy:** Motion of molecules-Degrees of freedom –Energy associates with the degrees of freedom-Type of spectra**.** **Microwave spectroscopy**: Classification of molecules, rigid rotator model, effect of isotopic substitution on the transition frequencies, Intensities non- rigid rotator-Microwave spectra of polyatomic molecules.	12
IV	**Rotational Vibrational Spectroscopy**: Harmonic oscillator, vibrational energies of diatomic molecules, zero-point energy, force constant and bond strengths, anharmonicity, Morse potential energy diagram. Vibration – rotation spectroscopy. PQR branches, Born–Openheimer approximation, selection rules, normal modes of vibration, group frequencies, overtones, hot bands,applications.	12

V	**Symmetry and Group theory in chemistry:** Symmetry elements, symmetry operation, definition of group, sub group, relation between order of a finite group and its sub group. GMT tables Abelian and non-abelian groups. Point group. Schonfiles symbols, Find out Point group of a molecule (yes or no Method). Representation of groups by Matrices (representation for the Cn, Cnv, Cnh, Dn etc. groups to be worked out, explicitly). Character of a representation. The great Orthogonality theorem (without proof) and its importance. Character tables and their use. Construction of Character tables.	12

Reference Books:

1. Vogel's text book of quantitative analysis. (3rd edition)Addition Wesley LongmannInc.

2. Quantitative analysis R.A Day and A.L.Underwood. Prentice HallPvt.Ltd.

3. Fundamentals of Analytical Chemistry – Skoog andWest

4. Instrumental Methods of analysis – B KSharma.

Course Focus: Employability &**E**ntrepreneurship.

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NAAC reaccredited at 'A'level

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Title of the Paper: INORGANIC CHEMISTRY-I

Semester: I

Course Code	**20CH1T2**	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2020-21	Year of Offering: 2021 - 22	Year of Revision: 2021-22	Percentage of Revision: 0%

CourseObjective: The main objective of this paper is to give abasic and updated knowledge for the students on Quantum Mechanics, Chemistry of non- transition elements, Structure and Bonding, Metal–ligand bonding, Metal–ligand Equilibriain solutions.

Course Outcomes:-

After completion of the course, the student will be able to

CO1: Memorize the basic concepts of Quantum chemistry, Co-ordination chemistry and Chemical Bonding.

CO2: Comprehend the role of basic and advanced concepts of Quantum chemistry, Co-ordination Chemistry and Chemical bonding.

CO3: Execute the conceptual knowledge gained in the concepts of Quantum chemistry, Co-ordination Chemistry and Chemical bonding in chosen job role

CO4 : Compare and distinguish one concept from the other in inorganic chemistry and in correlation With other chemistries as well

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Introduction to Exact Quantum Mechanical Results:** Schrodinger equation, importance of wave function, Operators, Eigen values and Eigen functions, derivation of wave equation using operator concept. Discussion of solutions of Schrodinger's equation to some model systems viz. particle in one dimensional box (applications), three-dimensional box, Rigid rotator system and the Hydrogen atom. Variation theorem, linear variation principle, perturbation theory (first order and non-degenerate), Application of variation method to the Hydrogen atom	12
II	**Chemistry of non- transition elements:** Halogen oxides and oxyfluorides, Spectral and Magnetic properties of Lanthanides and Actinides. Analytical applications of Lanthanides and Actinides. Synthesis, properties and structure of B-N, S-N, P-N cyclic compounds. Intercalation compounds. **Metal π- complexes:** preparation, structure and bonding in Nitrosyl, Dinitrogen and Dioxygencomplexes.	12
III	**Structure and Bonding:** pπ-dπ bonding, Bent's rule, Non-valence cohesive forces, VSEPR theory. Molecular Orbital theory, Molecular orbitals in triatomic (BeH_2) molecules and ions (NO_2^-) andenergy level diagrams. Walsh diagrams for linear (BeH_2) and bent (H_2O) molecules	12
IV	**Metal–ligand bonding:** Crystal Field Theory of bonding in transition metal complexes-Splitting of d-orbitals in octahedral, tetrahedral, square planar, Trigonal bipyramidal and Square pyramidal fields. Tetragonal distortions - Jahn-Teller effect. Applications and limitations of CFT. Experimental evidences for covalence in complexes. Molecular Orbital Theory of bonding for Octahedral, tetrahedral and square planar complexes. π-bonding and MOT - Effect of π - donor and π -acceptor ligands on Δo. Experimental evidence for π - bonding in complexes	12
V	**Metal – ligand Equilibria in solutions:** Step wise and over all formation constants. Trends in stepwise constants (statistical effect and statistical ratio). Determination of formation constants by Spectrophotometric method (Job's method) and pH metric method (Bjerrum's). Stability correlations - Irwing -William's series. Hard and soft acids and bases (HSAB).	12

Reference Books:

1. Inorganic Chemistry Huheey, Harper andRow.
2. Physical methods in inorganic chemistry, R.S. Drago. Affliated East-West Pvt.Ltd.
3. Concise inorganic chemistry, J. D. Lee,ELBS.
4. Modern Inorganic Chemistry ,W. L. Jolly,McGrawHill.
5. Inorganic Chemistry , K. F. Purcell and J. C. Kotz Holt Saundersinternational.
6. Concepts and methods of inorganic chemistry ,B. E. Douglas andD.H.M.C.
7. Daniel, oxfordPress.
8. Introductory quantum mechanics ,A. K.Chandra
9. Quantum Chemistry ,R. K.Prasad.
10. Inorganic Chemistry ,Atkins,ELBS
11. Advanced Inorganic Chemistry ,Cotton and Wilkinson, WileyEastern
12. Quantum Chemistry,Levine.
13. Text book of Coordination chemistry ,K.SomaSekharraoand K.N.K. Vani, Kalyani Publishers.
14. Theoretical Inorganic Chemistry by G.S.Manku, Tata Mc GrawHill, 2000,reprint.
15. Concise co-ordination chemistry, R.Gopal, Ramalingam, Vikas Publishing, House,2014.
16. Inorganic Chemistry – Huheey, A.Keiter, L.Keiter, 4th edition, Pearson education,Asia.

Course Focus: Employability &**E**ntrepreneurship.

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Title of the Paper: ORGANIC CHEMISTRY-I
Semester: I

Course Code	**20CH1T3**	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2020-21	Year of Offering: 2021 - 22	Year of Revision: 2021-22	Percentage of Revision: 0%

CourseObjective: The main objective of this paper is to give abasic and updated knowledge for the students on Quantum Mechanics, Chemistry of non- transition elements, Structure and Bonding, Metal–ligand bonding, Metal–ligand Equilibriain solutions.

Course Outcomes:

After completion of the course, the student will be able to:

CO1: Recollectthebasicconceptsofaromaticity, reactiveintermediates, addition, eliminationand Substitutionreactions

CO2: Explainthebasicandadvancedconceptsofaromaticity, reactiveintermediates,addition, Elimination and substitution reactions.

CO3: Solvehighlevelconceptsinorganicchemistrywithconceptualknowledgegainedinaromaticity, Reactiveintermediates, addition, eliminationandsubstitutionreactions

CO4: Exercisetheknowledgeaboutaromaticity, reactiveintermediates, addition, eliminationand Substitutionreactionsinunderstandingthepropertiesoforganiccompounds.

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Nature of bonding:** Localised and Delocalized, Delocalised chemical bonding conjugation, cross conjugation, hyper conjugation, Tautomerism. **Aromaticity**: Concept of Aromaticity, Aromaticity of five membered, six membered rings - Non benzonoid aromatic compounds:-cyclopropenylcation, Cyclobutadienyldication, cyclopentadienyl anion-tropyllium cation and cyclooctatetraenyl dianion. Homoaromaticity, Anti aromaticity	12
II	**Reactive intermediates & Reactive Species:** **Reactive intermediates:** Generation, Structure, Stability, Detection and Reactivity of Carbocations, Carbanions, Free radicals, Carbenes, Nitrenes andArynes. **Reactive Species:** Generation and reactivity of Electrophiles, Nucleophiles, Dienophiles, Ylids.	12
III	**Addition Reactions:** Additions: Addition to carbon – carbon multiple bonds, HX, X2, HOX, stereo chemistry of addition, formation and reaction of epoxides, syn and anti hydroxylation, hydrogenation(catalytic and Non catalytic), synthetic reactions of CO and CN and Cram's rule.	12
IV	**Eliminations Reactions**:Types of elimination (E1, E1cB, E2) reactions, mechanisms, stereochemistry and orientation, Hofmann and Saytzeff's rules, Syn elimination versus anti elimination. Competitions between elimination and substitution.Dehydration, dehydrogenation, dehalogenation, decarboxylative elimination, pyrolytic eliminations.	12
V	**Substitution Reactions:** **Aliphatic Nucleophilic substitutions:**The SN^2, SN^1, mixed SN^1 and SN^2 and SN^i reactions : Mechanism, effect of structure, nucleophile, leaving group on substitutions. The neighbouring group mechanism, participation by σ and π bonds, anchimeric assistance. **Aromatic Nucleophilic substitution:**TheSN^{Ar} (Addition – Elimination), SN^1(Ar) mechanisms and benzyne mechanism (Elimination – Addition). Reactivity- effect of substrate structure, leaving group and attacking nucleophile. The Von-Richter, Sommelet – Hauser and Smilesrearrangements.	12

Reference Books:

1. Advanced organic chemistry- Reaction, mechanism and structure, Jerry March, JohnWiley.
2. Advanced organic chemistry, F.A. Carey and R.J. Sundberg, Springer, NewYork.
3. A guide book to Mechanism in organic chemistry, Peter Sykes,Longman.
4. Organic chemistry, I.L. Finar, Vol. I & II, Fifth ed.ELBS.
5. Organic chemistry, Hendrickson, Cram and Hammond (McGraw –Hill).
6. Modern organic Reactions, H.O. House,Benjamin.
7. Structure and mechanism in organic chemistry, C.K. Ingold, Cornell UniversityPress.
8. Principles of organic synthesis, R.O.C. Norman and J.M. Coxon, Blakie Academic &Professional.
9. Reaction Mechanism in Organic Chemistry, S.M. Mukherji and S.P. Singh,Macmillan.
10. Basic Principles of Organic Chemistry by J. B. Roberts and M.Caserio.

Course Focus: Employability &**E**ntrepreneurship.

A.G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

Vuyyuru-521165.

NAAC reaccredited at 'A 'level

Autonomous -ISO 9001 – 2015Certified

Title of the Paper: PHYSICAL CHEMISTRY-I

Semester: I

Course Code	**20CH1T4**	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2020-2021	Year of Offering: 2021 - 22	Year of Revision:2021-22	Percentage of Revision: 20%

Course Objective: The main objective of this paper is to give a basic and updated knowledge for the students on Thermodynamics, Surface phenomena and phase equilibria, Electrochemistry, Chemical kinetics, Potentiometry.

Course Outcomes:-

After the completion of the course, Students will be able to

CO1**:** Recall the basic concepts of thermodynamics ,surfacechemistry, electrochemistry,chemical Kinetics and potentiometry in detail.

CO2:Apply the spontaneous and nonspontaneous reaction and derive various thermodynamic and Chemical kinetic derivations.

CO3:Describe the physical significance of thermodynamics,chemicalkinetics and electrochemistry in Explaining the chemical properties, reactivity of molecules.

CO4:Analyse the important techniques of surfaces with the help of ESCA,Auger electronspectroscopy and potentiometric techniques of complexometric, neutralization, oxidation and reduction Titrations.

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Thermodynamics - I**Classical thermodynamics - Brief review of first and second laws of thermodynamics - Entropy change in reversible and irreversible processes - Entropy of mixing of ideal gases - Entropy and disorder – Free energy functions - Gibbs-Helmholtz equation - Maxwell partial relations - Conditions of equilibrium and spontaneity - Free energy changes in chemical reactions: Van't Hoff reaction isotherm - Van't Hoff equation - Clausius Clapeyronequation - partial molar quantities - Chemical potential - Gibbs- Duhem equation - partial molar volume - determination of partial molar quantities - Fugacity - Determination of fugacity - Thermodynamic derivation of Raoult'slaw..	12
II	**Surface phenomena and phase equilibria** - Surface tension - capillary action - pressure difference - across curved surface (young - Laplace equation) - Vapour pressure of small droplets (Kelvin equation) - Gibbs-Adsorption equation - BET equation - Estimation of surface area - catalytic activity of surfaces – ESCA , X- ray fluorescence and Auger electron spectroscopy. **Surface active agents** - classification of surface active agents - Micellization - critical Micelle concentration (CMC) - factors affecting the CMC of surfactants, microemulsions - reverse micelles - Hydrophobic interaction.	12
III	**Electrochemistry – I -** Electrochemical cells - Measurement of EMF - Nernst equation – Equilibrium constant from EMF Data - pH and EMF data - concentration cells with and without transference – Liquid junction potential and its determination - Activity and activity coefficients - Determination by EMF Method - Determination of solubility product from EMF measurements. Debye Huckel limiting law and its verification.Effect of dilution on equivalent conductance of electrolytes - Anomalous behaviour of strong electrolytes. Debye Huckel-Onsagar equation - verification and limitations, conductometric titrations.	12
IV	**Chemical kinetics**- Methods of deriving rate laws - complex reactions - Rate expressions for opposing, parallel and consecutive reactions involving unimolecular steps. Theories of reaction rates -collision theory - Steric factor - Activated complex theory - Thermodynamic aspects – Unimolecularreactions - Lindemann's theory - Lindemann-Hinshelwood theory. Reactions in solutions - Influence of solvent - Primary and secondary salt effects - Elementary account of linear free energy relationships - Hammet-Taft equation - Chain reactions - Rate laws of H_2-Br_2, photochemical reaction ofH_2 - Cl_2, Decomposition of acetaldehyde and ethane - Rice-Herzfeldmechanism.	12

V	**Potentiometry:** Advantages of potentiometric methods - Reference electrode - Standard hydrogen electrode .Acid- alkali or Neutralisation titration, Oxidation – reduction titrations, Precipitation titrations, complexometric titrations, Methods of end point location (Graphical, Differentiation method, Pinkhof- Treadwell method). Calomel electrode -Indicator electrodes: Metal-metal ion electrodes - Inert electrodes -Membrane electrodes - theory of glass membrane potential - Direct potentiometry, potentiometric titrations - Applications.	12

Reference Books:

1. Physicalchemistry,G.K.Vemulapalli(PrenticeHallofIndia).
2. Physical chemistry, P.W.Atkins.ELBS
3. Chemicalkinetics-K.J.Laidler,McGrawHillPub.
4. TextbookofPhysicalChemistry,SamuelGlasstone,Macmillanpub.
5. PolymerSceince,Gowriker,Viswanadham,Sreedhar
7. Elements of Nuclear Science, H.J.Arniker, Wiley EasternLimited.
8. Quantitative Analysis, A.I. Vogel, Addison Wesley LongmannInc.
9. PhysicalChemistry-G.W.Castellan,NarosaPublishingHouse,PrenticeHall
10. PhysicalChemistry,W.J.Moore,PrenticeHall
11. Polymer Chemistry –Billmayer

Course Focus: Employability & Entrepreneurship.

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Autonomous -ISO 9001 – 2015Certified

Title of the Paper: Practical – I – Inorganic Chemistry (20CH1L1)

Semester: I

S.No	COURSE OUTCOMES	PO`S
	After completion of the course, the student will be able to :	
1	Memorize the basic principles involved in quantitative and qualitative inorganic analysis.	1,7
2	Understand the importance of inorganic qualitative and quantitative analysis and their use in research and industry.	2,6
3	Applytheproceduresofquantitativeanalysisandtestsforidentificationofcationsand anions in chosenfield.	1,5
4	Evaluate how far these methods are accurate in quantitative determination.	1,4

List of experiments:

1. Preparation of Potassium trisoxalato ferrate(III).
2. Preparation of Tris thiourea copper (1)sulphate.
3. Preparation of Cis and trans potassium diaquodioxalato chromate(III).
4. Preparation of Hexa ammine cobalt (III)chloride.
5. Determinationof Zn^{2+} withpotassiumferrocyanide.
6. Determinationof Mg^{2+} usingEDTA.
7. Determinationof Ni^{2+} usingEDTA.
8. Determination of hardness of water usingEDTA.
9. Gravimetric determination of nickel using dimethylglyoxime.

10. Gravimetric determination of Zn using diammonium hydrogenphosphate.

11. Semi micro qualitative analysis of six radicalmixtures

(One interfering anion and one less familiar cation for each mixture)

(minimum three mixtures).

Anions: S^{2-} , SO_3^{2-} , Cl^-, Br^-, I^- , NO_3^-, SO_4^{2-}, CH_3COO^-, $C_2O_4^{-2}$, $C_4H_4O_6^{-2}$, PO_4^{3-}, CrO_4^{2-}, BO_3^{3-}

Cations: Ammonium (NH_4^+)

1st group: Ag^+, Pb^{+2}, W^{+6}

2nd group: Pb^{+2}, Bi^{+3}, Cu^{+2}, Cd^{+2}, Sn^{+2}, Sn^{+4} , Mo^{+6}.

3rd group: Fe^{+2}, Fe^{+3}, Al^{+3}, Cr^{+3}, Ce^{+4}, Th^{+4}, Zr^{+4}, VO^{+2}, Be^{+2}.

4th group: Zn^{+2}, Mn^{+2}, Co^{+2},

Ni^{+2}. 5th group: Ca^{+2}, Ba^{+2}, Sr^{+2}.

6th group: Mg^{+2}, K^+, Li^+.

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Autonomous -ISO 9001 – 2015Certified

Title of the Paper: Organic Chemistry (20CH1L2)

Semester: I

S.No	COURSE OUTCOMES	PO`S
	After completion of the course, the student will be able to :	
1	Understandtheimportanceoforganiccompoundsynthesisandseparationandtheir research andindustry.	2,5,6
2	Understand the mechanisms for the synthesis of organic compounds in different steps.	1,7
3	Applytheprocedureofsynthesisandseparationoforganiccompoundsinrequired field.	1,5,7
4	Interprettheroleofseparationoforganiccompoundsandsynthesisinthecoreareasof research.	1,5,6

List of experiments:

1. Separation of Binary mixtures of Carboxylic acid + Neutral organic compounds (Solvent extractionmethod).
2. Separation of Binary mixtures of Basic nature + Neutral organic compounds (Solvent Extractionmethod).
3. Separation of Binary mixtures of Phenolic compounds + Neutral organic compounds (Solvent extractionmethod).
4. Preparation of Phthalimide from Phthalic anhydride – HighTemperature.
5. Preparation of p-nitro acetanilide – Lowtemperature.
6. Preparation of Iodoform – Roomtemperature.

7. Paper chromatography - separate the given mixture ofsugars.
8. Paper chromatography - separate the given mixture of aminoacids.
9. Thin layer chromatography - separate the given mixture ofphenols
10. Thin layer chromatography - separate the given mixture of 2,4-DNP derivatives of carbonylscompounds.

Text books/ Reference books:

1. A.I. Vogel, "A Text Book of Practical Organic Chemistry",Longman

2. A.I. Vogel, "Elementary Practical Organic Chemistry",Longman

3. F.G. Mann and B.C. Saunders, "Practical Organic Chemistry",Longman

4. Reaction and Synthesis in Organic Laboratory, B.S. Furniss, A.J. Hannaford,Tatchell, University Science Books mills valley.

5. Purification of Laboratory chemicals, manual, W.L.F. Armarego EDDPerrin

6. Reaction and Synthesis in Organic Chemistry Laboratory, Lutz-Friedjan-Tietze,TheophilEicher,University ScienceBook.

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M.Sc. DEGREE EXAMINATION

FIRST SEMESTER

Paper-I :: General Chemistry - I

Time:3hours **Maximum Marks:70**

SECTION – A

Answer all the questions. Each question carries2marks. (10x2=20M)

1. Discuss the role of control charts in largescaleproduction. (CO-2)
2. What are the measuresofaccuracy? (CO-1)
3. Explain the terms primary & secondary standards intitrimetricanalysis. (CO-2)
4. Enumerate the significance ofmixedindicators. (CO-2)
5. Give an account on classification of molecules in microwave spectroscopy. (CO-2)
6. Write a short note on degreesoffreedom. (CO-2)
7. What arehotbands? (CO-1)
8. Define zero point energy and discussitssignificance. (CO-2)
9. List out the possible symmetry elements and write the point group ofthe moleculeHCHO. (CO-3)
10. Define a class. Explain withanexample. (CO-2)

SECTION – B

(10x5=50M)

UNIT - I

11. a) Write notes ondeterminateerrors. (CO-2)

(Or)

b)(i) What are the criteria for rejection ofanobservation? (CO-2)

(ii) Write notes on significant figures andcomputationalrules. (CO-2)

UNIT – II

12. a) Explain the theory ofneutralizationindicators. (CO-2)

(Or)

b) Describe the Volhard & Mohr method inprecipitationtitrations. (CO-2)

UNIT – III

13. a) Explain the electromagnetic spectrum and discuss the interaction of electromagnetic radiationwithmatter. (CO-2)

(Or)

b) Discuss the applications ofmicrowavespectroscopy. (CO-3)

UNIT - IV

Elaborate the formation of PQR branches in vibrational rotationalspectrum.(CO-3)

(Or)

b) What is Born – oppenheimer approximation? How a break down in approximation occurs? (CO-2)

UNIT - V

15.a) Enumerate the role of group theory in IR &Ramanspectroscopy. (CO-3)

(Or)

b) Explain the construction of C_{2V}charactertable. (CO-2)

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M.Sc. DEGREE EXAMINATION

FIRST SEMESTER

Paper-II :: Inorganic Chemistry - I

Time:3hours **Maximum Marks:70**

SECTION – A

Answer all the questions. Each question carries2marks. (10x2=20M)

1. Explain the significance ofapproximationmethods. (CO -2)
2. Define operator. Explain the significance of operators in quantum mechanics. (CO -2)
3. Discuss aboutIntercalationcompounds. (CO -1)
4. Enumerate the significance of naturaloxygencarriers. (CO -2)
5. Explain the role of VSEPR theory in predicting the geometryof molecule. (CO -2)
6. Give an account on important features ofMOtheory. (CO -2)
7. Explain the splitting of d-orbitals in square pyramidalcrystalfield. (CO -2)
8. Discuss the drawbacks of valencebondtheory. (CO -1)
9. Derive a relation between stepwise and overallformationconstants. (CO -3)
10. What is chelate effect? Explain withanexample. (CO -2)

SECTION–B **(10x5=50M)**

UNIT - I

11.a) Write down the wave equation for rigid rotor and solve it to get eigen functions.(CO-3)

(Or)

b) Arrive at the expression for first order correction of eigen values in perturbation method. (CO - 3)

UNIT – II

12. a) Write an account on phosphorus-nitrogencyclic compounds. (CO -2)

(Or)

b) Explain the structure and bonding innitrosylcomplexes. (CO -2)

UNIT – III

13. a) Draw and explain the molecular orbital energy level diagram for BeH_2 molecule.(CO-3)

(Or)

b) Explain the evidences for $p\pi - d\pi$ bonding in non-transition metal compounds.(CO-4)

UNIT - IV

14. a) Discuss tetragonal distortion in an octahedral complex with a suitable example.(CO -3)

(Or)

b) Why CN^- and CO cause greater crystal field splitting and I^- and Br^- cause lesser crystal fieldsplitting?Explain. (CO -4)

UNIT - V

15. a) Describe the spectrophotometric method for the determination of stability Constant. (CO -3)

(Or)

b) Give a detailed account onHSABtheory. (CO -2)

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M.Sc. DEGREE EXAMINATION

FIRST SEMESTER

Paper-III :: Organic Chemistry - I

Time:3hours **Maximum Marks:70**

SECTION – A

Answer all the questions. Each question carries2marks. (10x2=20M)

1. Explain anti aromaticity with example. (CO - 1)
2. Explain cross conjugation with example. (CO - 2)
3. Explain the structure of nitrenes. (CO - 1)
4. Discuss the structure of carbenes (CO - 1)
5. Discuss cram's rule with suitableexamples. (CO - 2)
6. Write notes on epoxidation. (CO - 2)
7. Define Hoffmann's rule. Give suitable examples. (CO - 2)
8. Discuss syn elimination versus anti elimination. (CO - 2)
9. Give mechanism of Von-Richter rearrangement. (CO - 2)
10. Write noters on SNi mechanism. (CO - 1)

SECTION – B

(10x5=50M)

UNIT - I

11. a) Define delocalized chemical bonding. What are different types of delocalized chemicalbonding. (CO -2)

(Or)

b) Explain the following terms (i) Cross Conjugation (ii)Hyper Conjugation. (CO -2)

UNIT - II

12. a) Discuss the generation, stability and reactivityofcarbocations. (CO -3)

(Or)

b) Explain synthesis and few reactions of thefollowing

(i) Free radicals(ii)Carbanions (CO -2)

UNIT - III

13. a) Give an account of the addition of the following to carbon carbon multiple bonds (i) HX (ii)HOX (CO - 2)

(Or)

b) Discuss in detail about thefollowing

(i) Syn and Anti hydroxylation (ii) Hydrogenation (CO -1)

UNIT – IV

14. a) Discuss pyrolytic eliminations anditsorientation. (CO -1)

(Or)

b) Write a detailed account ofE1CBmechanism. (CO -1)

UNIT – V

15. a) What is anchimeric assistance. Discuss neighbouring group participationby σ andπbonds. (CO -2)

(Or)

b) Explain the following (i) Benzyne mechanism (ii)SN^{Ar}mechanism. (CO -2)

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M.Sc. DEGREE EXAMINATION

FIRST SEMESTER

Paper-IV :: Physical Chemistry - I

Time:3hours **Maximum Marks:70**

SECTION – A

Answer all the questions. Each question carries2marks. **(10x2=20M)**

1. Explain the second lawof thermodynamics. (CO-2)
2. Write the Gibbs Duham equation and describe all thetermspresent. (CO-2)
3. Discuss briefly the surfaceactiveagents. (CO-2)
4. Explain the microemulsionsin brief. (CO-2)
5. Write the nernest equation and describe all the terms presentin it. (CO-2)
6. Explain the principle inconductometrictitrations. (CO-2)
7. Write the mechanism in Lindemann's theory ofunimolecularreations. (CO-2)
8. Describe the mechanism in decompositionofAcetaldehyde. (CO-3)
9. Describe the advantages of potentiometric methods over classical methods.(CO-3)
10. Explain the calomel electrodeinshort. (CO-2)

SECTION–B **(10x5=50M)**

UNIT - I

11.a) Derive the Maxwell'sthermodynamicrelations. (CO-3)

(Or)

b) What is fugacity? Give its physical significance. Describe the different methods of determinationoffugacity. (CO-3)

UNIT - II

12. a) Discuss the theory involved in ESCA. How are this techniques used in the analysisofsurfaces? (CO-2)

(Or)

b) What is CMC? How is it determined? What are the factors effecting CMC? (CO-2)

UNIT - III

13.a)What is activity? How is activity coefficient determinedfromEMF? (CO-2)

(Or)

b)What is the effect of dilution on equivalent conductance ofelectrolytes? (CO-2)

UNIT – IV

14.a)Discuss the kinetics ofconsecutivereactions. (CO-2)

(Or)

b)Discuss the kinetics of H_2 – Br_2 reactionindetail. (CO-3)

UNIT - V

15.a) Explain the theory of precipitation titrationsindetail. (CO-2)

(Or)

b) Discuss the potentiometric titrationsindetail. (CO-2)

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A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

CIA Practicals

Total Marks – 30 M

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M.Sc. DEGREE EXAMINATION

External Practical Model Paper

Time:6hours **Maximum Marks:70**

1. To write the principle and procedure / mechanism relatedto practical as listed in thepracticalsyllabus – 5M

2. Record – 10M

3. Experiment (Procedure / Tabulation /calculationetc.,) – 50M

4. Result / Graphs / Yield/Report – 5 M

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(Autonomous)
DEPARTMENT OF CHEMISTRY
M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

Appendix - I

Scheme of Instruction and Evaluation for **M.Sc. (Organic Chemistry)** programme for the batch of students admitteduring2020–2021

Semester – III

Paper	Title of the Paper	Instruction Hours Per Week			Credits(T+P)	Evaluation		
		L	T	P		CIA MARKS	SEE MARKS	SEE DURATION
Paper-I	Advanced Organic Spectroscopy	4	1	--	4	30	70	3 hours
Paper-II	Organic Reactions & Mechanisms	4	1	--	4	30	70	3 hours
Paper-III	Organic Synthesis	4	1	--	4	30	70	3 hours
Paper-IV	Chemistry of Natural Products	4	1	--	4	30	70	3 hours
Paper-V	Open Elective-(Polymer Chemistry)	4	--	--	4			
Pract-I	Organic Preparations	--	--	6	3	30	70	6 hours
Pract-II	Mixture Analysis	--	--	6	3	30	70	6 hours
	Sub-Total	20	4	12	20+4+12=36			

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Title of the Paper: ADVANCED ORGANIC SPECTROSCOPY

Semester: III

Course Code	**20CH3T1**	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2020-21	Year of Offering: 2021 - 22	Year of Revision: ----	Percentage of Revision: 0%

CourseObjective: Themainobjectiveofthispaperistogiveabasicandupdatedknowledgeforthe studentsonProton&13CNMRSpectroscopy,StructuralElucidationofOrganiccompoundsUsing UV, IR,1H-NMR,13C-NMR, 2D NMR spectroscopy and Optical Rotatory Dispersion (ORD) & CD spectroscopy.

Course Outcomes:-

CO1: Summarizetheprinciple,theoryandadvancedaspectsof^{1}HNMR,^{13}CNMR,2DNMR, ORD&CDspectroscopictechniques.

CO2: Displaytheknowledgegainedintheareasof^{1}HNMR,^{13}CNMR,2DNMR,ORD&CD Spectroscopictechniquesinchosenjobrole.

CO3: Interpretthespectraldataof^{1}HNMR,^{13}CNMR,2DNMR,ORD&CDinelucidatingthe Structure of themolecule.

CO4: Assessthathowfarthespectraldataof^{1}HNMR,^{13}CNMR,2DNMR,ORD&CDareuseful inestablishingthestructureofthemolecule.

Syllabus

Course Details:-

Unit	Learning Units	Lecture Hours
I	**Proton NMR Spectrscopy**: Determination of structure of organic compounds using PMR data. Spin system, Nomenclature of spin system, spin system of simple and complex PMR spectrum (Study of AB – A2 – AB2. ABX – ABC – AMX interactions) Simplification of complex spectra- nuclear magnetic double resonance, chemical shift reagents, solvent effects on PMR Spectrum . Nuclear Overhauser Effect (NOE).	12
II	**13C-NMR spectroscopy:** Similarities and Difference between PMR and CMR-CMR recording techniques -BBC-BBD-SFORD-Gate pulse CMR spectrum. General considerations, chemical shift (aliphatic, olefinic, alkyne, aromatic, heteroaromatic and carbonylcarbon), coupling constants.Typical examples of CMR spectroscopy – simple problems.	12
III	**ORD& CD Curves:** Optical rotatory dispersion : Theory of optical rotatory dispersion – Cotton effect –CD curves-types of ORD and CD curves-similarities and difference between ORD and CD curves. α- Halo keto rule, Octant rule – application in structural studies.	12
IV	**2D NMR spectroscopy:** Definitions and importance of COSY, DEPT, HOMCOR, HETCOR,INADEQUATE, INDOR, INEPT, NOESY, HOM2DJ, HET2DJ. Study of COSY ,DEPT, HOMCOR, HETCOR, INADEQUATE INDOR INEPT ,NOESY HOM2DJ, HET2DJ, taking simple organic compounds as examples.	12
V	Structural Elucidation of Organic compounds Using UV, IR, 1H-NMR, 13C-NMR and Mass spectroscopy.	12

Reference Books:

1. Introduction to Spectroscopy – D. L. Pavia, G.M. Lampman, G. S. Kriz, 3rdEd. (Harcourt College publishers).
2. Spectrometric identification of organic compounds R. M. Silverstein, F. X. Webster, 6th Ed.John Wiley andSons.
3. Spectroscopic methods in organic chemistry - D. H. Williams and I Flemming McGraw Hill, 4thedition.
4. Absorption spectroscopy of organic molecules – V. M.Parikh
5. Organic structural Spectroscopy- Joseph B.Lambert, Shurvell, Lightner,Cooks, Prentice-Hall (1998).
6. Organic structures from spectra –Field L.D., Kalman J.R. and Sternhell S. 4thEd. John Wiley and sonsLtd.
7. Organic spectroscopy – Principle & Applications – Jag Mohan, Narosa, 2ndedition, Publishinghouse.

Course Focus: Employability &**E**ntrepreneurship.

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Title of the Paper: ORGANIC REACTIONS & MECHANISMS
Semester: III

Course Code	**20CH3T2**	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2020-21	Year of Offering: 2021 - 22	Year of Revision: -----	Percentage of Revision: 0

CourseObjective: Themainobjectiveofthispaperistogiveabasicandupdatedknowledgeforthe studentsonOxidations,Reductions,MolecularRearrangements,PericyclicReactionsandOrganic PhotoChemistry.

Course Outcomes:-

CO1 : Acquire sound knowledge of oxidations, reductions, molecularrearrangements, pericyclic reactions and photochemistry.
CO2 : Understand the concepts involved in oxidations, reductions, molecularrearrangements, pericyclic reactions and photochemistry.
CO3 : Apply the conceptual knowledge gained in oxidations, reductions, molecular rearrangements, pericyclic reactions and photo chemistry in chosen fields.
CO4 : Analyse and categorise the various types oxidations, reductions, molecular rearrangements, pericyclic reactions and photo chemistry in a given reactions.

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Oxidations** Definition and types of Oxidations, oxidations with ruthenium tetroxide, NBS, iodobenzenediacetate, Tl(III) nitrate, Chromium (VI) oxidants, Lead tetra acetate, SeO2, MnO2, Ag2CO3, Oppenauer oxidation, perhydroxylation using KMnO4, OsO4, HIO4, oxidation with iodine silver carboxylate (Woodward and Prevostconditions), Definition & mechanism of epoxidation by peracids.	12

II	**Reductions** Definition and types of reductions, reduction by dissolving metals - Reduction with metal and liquid ammonia (Birch Reduction of aromatic compounds), Reduction with metal acid - Clemensons reduction, Reduction by hydride transfer reagents, Aluminiumalkoxide - MeerweinPondorfVerley Reduction, $LiAlH_4$, $NaBH_4$, Diisobutylaluminiumhydride(DIBAL), Sodium cyanoborohydride, trialkyl borohydrides, Reduction with diimide,. Wolff-Kishnerreduction.	12
III	**Molecular Rearrangements** Migration to electron deficient carbon atom**.** Pinacole-Pinacolone rearrangement, Wagner-Meerwein rearrangement, Dienone-Phenol rearrangement, Benzil-Benzilic acid rearrangement, Favorski rearrangement, ARNDT Eistert rearrangement,Sommelet – Hauser rearrangement. Migration to electron deficient hetero atom:.Wolf, Hofmann, Curtius, Lossen, Schmidt, Beckmann rearrangement, Baeyer-Villiger rearrangement, Stevens, Neber rearrangements. Fries, Fischer-Hepp,Orton,Bamberger,Dakin,CumeneHydroperoxide rearrangement.	12
IV	**Pericyclic Reactions – I:** Definition, classification of pericyclic reactions, Molecular Orbital energy level diagrams, electronic configuration in ground and first excited states of Ethylene, 1,3-Butadiene, 1,3,5 – Hexatriene, allyl system, stereo chemical notations – suprafacial, antarafacial, conrotatory and disrotatory modes, Woodward and Hoffmann selection rules. **Electrocyclic reactions**: Mechanism, Stereochemistry of (4n) and (4n+2) π systems. PMO, FMO and correlation methods. **Cyclo additions**: Mechanism, stereochemistry of (2+2) and (4+2) π systems, PMO, FMO and correlation methods. **Sigmatropic rearrangements**: Classification, mechanism for FMO and PMO approach under thermal and photo chemical conditions. (Detailed treatment of Claisen, Cope rearrangements fluxional molecules, aza-cope rearrangements).	12
V	**Photochemistry:** Photochemical processes: Energy transfer, sensitization and quenching. Singlet and triplet states and their reactivity. Photochemistry of olefins – conjugated olefins, Aromatic compounds–isomerisation–additions. Photochemistry of carbonyl compounds – Norrish type I and II reactions –Paterno – Buchi Reaction. Photoreduction, Photochemical rearrangements–Photo Fries rearrangement, Di-π-methane rearrangement, Barton reaction.	12

Reference Books:

1. Molecular reactions and Photochemistry by Charles Dupey and O. Chapman, PrenticeHall.
2. Reaction mechanism in organic chemistry. 3rd edition, S.M.Mukherji&singh.
3. Advanced Organic Chemistry-Reactions, Mechanisms and Structure, Jerry March, John Wiley and sons, 6thedition.
4. Advanced Organic Chemistry, F.A. Carey and R.J Sundberg,Plenum.
5. Modern methods of organic synthesis, Cambridge University press, 3rd edition,W.Carruthers.
6. Organic Reaction Mechanisms, V.K.Ahluwalia, 4th edition,Narosa.
7. Reactions, rearrangements and reagents.S.N.Sanyal,4thedition.
8. Organic Photo chemistry and Pericyclic reactions' M.G.AroraAnmol Publications Pvt.Ltd.
9. Fundamentals of Photochemistry by K.K.Rohatgi–Mukherjee New Age internationalpublishers.

Course Focus: Employability &**E**ntrepreneurship.

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Title of the Paper: ORGANIC SYNTHESIS
Semester: III

Course Code	**20CH3T3A**	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2020-21	Year of Offering: 2021 - 22	Year of Revision: -----	Percentage of Revision: 0%

CourseObjective: Themainobjectiveofthispaperistogiveabasicandupdatedknowledgeforthe studentsonFormationofC-Csingle&doublebonds,Diels–Aiderandrelatedreactions,Retro SyntheticAnalysisandProtectingGroups.

Course Outcomes:

CO1 : Memorize the concepts, principles and theories related to formation of C – C single bond, C – C double bond, Diel's Alder related reactions. Protecting groups and disconnection approach in organic synthesis.

CO2 : Understand the role and significance of formation of C – C single bond, C – C double bond, Diel's Alder related reactions. Protecting groups and disconnection approach in organic synthesis.

CO3 : Apply the conceptual knowledge gained in formation of C – C single bond, C – C double bond, Diel's Alder related reactions. Protecting groups and disconnection approach in organic synthesis as and when required.

CO4 : Analyze the role of various reagents in carrying out the organic reactions like formation of C – C single bond,C – C double bond, Diel's Alder related reactions. Protecting groups and disconnection approach in organic synthesis.

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Formation of carbon-carbon single bonds:** Alkylation of relatively acidic methylene groups, alkylation of ketones, enamine and related reactions, umplong (dipole inversion). Allylic alkylation of alkenes, alkylation of α-thiocarbanions-α- selenocarbanions, formation of carbon carbon single bonds by the addition of free radicals to alkenes, synthetic applications of carbenes and carbenoids.	12

II	**Formation of carbon-carbon double bonds** Pyrolytic syn elimination reactions sulphoxide-sulphonate rearrangement, synthesis of allyl alcohols, the witting reaction, alkenes from sulphones, decarboxylation of β-lactones, alkenes from aryl sulphonyl hydrazones. Stereo selective synthesis of tri and tetra substituted alkenes, oxidative decarboxylation of carboxylic acids, stereospecific synthesis from 1,2-diols, reductive dimerization of carbonyl compounds.	12
III	**Diels–Aider and related reactions**: The dienophile, heterodienophile, oxygen as dienophile, The diene, acyclic dienes, heterodienes, 1,2-dimethylene cycloalkanes, vinyl cycloalkenes, and vinyl arenes, cyclic dienes and furans. Intra molecular Diels –Alder reactions, stereochemistry and mechanism of Diels – Alder reaction, retro Diels – Alder reaction, catalysis by lewis acids, photosensitized Diels- Alder reactions and 1,3-dipolar cycloaddition reactions, the ene reaction.	12
IV	**Disconnection approach** Introduction to Retro-synthetic analysis, Disconnection approach with suitable examples, Definitions: FGI, Disconnection, synthons, synthetic equivalent, reagent, target molecule, General strategy: choosing a disconnection, greatest simplification, symmetry, high yielding steps, recognizable startingmaterials. Chemo, regio and stereo selectivity with examples. One group C-C disconnections-Alcohols, carbonyl compounds, alkene synthesis, two group disconnections: 1,3 – dicarbonyl compounds, α,β – unsaturated carbonyl compounds.	12
V	**Protecting groups:** Theory and importance of functional group protection and deprotection in organic synthesis:-Protecting agents for the protection of functional groups: Hydroxyl group, Amino group, Carbonyl group and Carboxylic acid group carbon-carbon multiple bonds; chemo- and regioselective protection and deprotection. Illustration of protection and deprotection in organic synthesis.	12

Reference Books:

1. Modern methods of Organic synthesis ,W. Carruthers Cambridge Press (3rdedition)
2. Principles of Organic synthesis by, ROC Norman, 3rd edition, CRCpress.
3. Modern Method of Organic Synthesis ,Carruthers and ColdhamSachinkumar Ghosh, Canbridge New Central Book Agency,1stedition.
4. Advances in Organic Reaction mechanism and structure, J. March, 6th edition, McGrewHill
5. Organic Synthesis: Ratnakumarkar, vol – II, NCBAPublications.

Course Focus: Employability &**E**ntrepreneurshi

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Autonomous -ISO 9001 – 2015Certified

Title of the Paper: CHEMISTRY OF NATURAL PRODUCTS

Semester: III

Course Code	**20CH3T4B**	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2020-2021	Year of Offering: 2021 - 22	Year of Revision: ------	Percentage of Revision: 0%

Course Objective: The main objective of this paper is to give a basic and updated knowledge for the students on Alkaloids, Terpenoids, Steroids, Flavonoids, Isoflavonoids and Plant pigments.

Course Outcomes:-

CO1 : Memorize the concepts related to Alkaloids, Terpenoids, Steroids, Flavonoids and Isoflavonoids andPigments.

CO2 : Understand the chemical role of Alkaloids, Terpenoids, Steroids, Flavonoids and Isoflavonoids andPigments.

CO3 : Execute the conceptual knowledge gained in the areas of Alkaloids, Terpenoids, Steroids, Flavonoids and Isoflavonoids and Pigments.

CO4 : Analyze the role of methods involved in structure elucidation of Alkaloids, Terpenoids, Steroids, Flavonoids and Isoflavonoids and Pigments.

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Alkaloids:** Introduction, Definition, occurrence, role of alkaloids in plants, classification, isolation and general methods for structural elucidation of alkaloids. Structure elucidation of Morphine, Quinine.	12
II	**Terpenoids**:Introduction,Definition,nomenclature,classification, isolation, isoprene rule and general methods for structural elucidation of Terpenoids. Structure elucidationof Zingiberene, , farnesol.	12
III	**Steroids:** Introduction, Definition, nomenclature, classification. Occurrence, isolation, physiological action, structure elucidation of Androsterone, Progesterone.	12
IV	**Flavonoids and Isoflavonoids:** Introduction, Definition, classification, isolation, physiological action, structure elucidation of Kaempferol and Quercetin.	12
V	**Pigments:** Introduction, classification of natural pigments, introduction and classification of carotenoids, functions of carotenoids in plants and animals, structure and synthesis of α – carotene and β – carotene.	12

Reference Books:

1. Organic Chemistry, Vol:2, I.L.Finar, 5thEdition.
2. Chemistry of Natural Products,K.W.Bentley, oxford AT the clarendon press, 1stedition.
3. ChemistryofNaturalproductsbyP.S.KalsiKalyaniPublishers.1983, low cost university edition.
4. Chemistry and physiology ofalkaloids by ManskeVol.I&II,VII, Academic press Inc., publishers Newyork, 1stedition.

Course Focus: Employability & Entrepreneurship.

A.G. & S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

Vuyyru-521165 NAAC

reaccredited at 'A' level

Autonomous -ISO 9001 – 2015Certified

Title of the Paper: POLYMER CHEMISTRY

Semester: III

Course Code	**20OECH**	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2021 - 22	Year of Offering: 2021 - 22	Year of Revision: ----	Percentage of Revision: ----

CourseObjective: Themainobjectiveofthispaperistogiveabasicandupdatedknowledgeforthe students on Polymerchemistry.

Course Outcomes:

CO1 : Memorize the concepts related to polymer chemistry

CO2 : Understand the concepts of polymer chemistry

CO3 : Apply the knowledge gained in polymer chemistry in chosen job role.

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	Introduction, Classification of polymers, Polymerization, chain polymerization, step polymerization, Co polymerization, Free radical chain polymerization, cationic polymerization, anionic polymerization, Polymerization Techniques, Graft and Block Copolymers.	12
II	Polymer Synthesis,Isolation and Purification of polymers, Polymer Fractionation, Molecular weight determination,Molecular weight determination curve, Processing Techniques.	12
III	Polymer Reactions–Introduction, Hydrolysis, Acidolysis, Aminolysis, Hydrogenation, Addition and Substitution Reactions, Cyclisation reactions, Cross-linking Reactions.	12

IV	Polymer Degradation – Definition, Types of Degradation, Thermal Degradation, Mechanical Degradation, Degradation by Ultrasonic Waves, Photodegradation, Degradation by High-Energy Radiation, Oxidative Degradation, Hydrolytic Degradation.	12
V	Plastics, Fibres, Elastomers-Polyethylene, Polystyrene, PolyEsters, PolyAcrylonitrile, Polyurethanes, Polyvinyl Chloride, Polyisoprenes. Resins–Phenol Formaldehyde Resin, Urea Formaldehyde and Melamine–Formaldehyde Resins,Epoxy Polymers, Silicon Polymers.	12

Reference Books:

1. Textbook of Polymer Science byFrod,W.Billmayer,
2. An Introduction to Polymer Chemistry byMoore.
3. Polymer Chemistry-An Introduction byM.P.Stevens.
4. Polymer Science –VRGowariker, NVViswanathan,JayadevSreedhar.

Course Focus : Employability .

A.G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

Vuyyuru-521165.

NAAC reaccredited at 'A'level

Autonomous -ISO 9001 – 2015Certified

Title of the Paper: ORGANIC PREPARATIONS

Semester: III

Course Code	**20CH3L1**	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2020-21	Year of Offering: 2021 - 22	Year of Revision: -----	Percentage of Revision:0%

Course Objective: The main objective of this paper is to give a basic and updated knowledge for the students on organic chemistry practical.

Course Outcomes:-

CO1: Memorize the principle involved in various organic preparations.

CO2: Understand the mechanism involved in organic preparation.

CO3: Apply the knowledge of organic preparations in their chosen field.

Syllabus

Course Details:-

1. Preparation of organic compounds: Three stage preparations by reactions involving nitration, halogenation, oxidation, reduction, alkylation, acylation, condensation and rearrangement. (A student is expected to prepare at least five different organic compounds by making use of the reactions given above).

2. Green Procedures for organic compound preparations (atleast 5preparations).

Course Focus: Skill Development & Employability

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Title of the Paper: Mixture Analysis

Semester: III

Course Code	**20CH3L2**	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2020-21	Year of Offering: 2021 - 22	Year of Revision: -----	Percentage of Revision: 0 %

Course Objective: The main objective of this paper is to give a basic and updated knowledge for the students on Analysis of organic binary mixtures.

Course Outcomes:-

CO1 : Get familiarized with the tests involved to identification of various functional groups.

CO2 : Understand the theory involved in identification and separation of the given organic mixture based on the solubility

CO3 : Apply the knowledge to identify various functional groups present in the given organic compound by using a systematic procedure.

Syllabus

Course Details:-

Analysis of organic binary mixtures: Separation and identification of organic binary mixtures (The students must be given training in at least 10 mixtures with different functional groups).

Note: For semester end examinations the student has to submit at least two solid derivatives for each individual component.

Course Focus: Skill Development & Employability

M.Sc. DEGREE EXAMINATION
THIRD SEMESTER
Paper-I:: ADVANCED ORGANIC SPECTROSCOPY

Time:3hours **Maximum Marks:70**

SECTION – A

Answer all the questions. Each question carries2marks. (10x2M=20M)

1. a) Explain the importance ofDoubleirradiation. (CO-1)
   b) Write a short note on nomenclature ofspinsystems. (CO-1)
   c) Explain the α, β &γ effects in 13 C NMR withsuitableexamples. (CO-1)
   d) Discuss the importance of off resonance decouplingCMRspectrum. (CO-1)
   e) What isCottoneffect? (CO-1)
   f) Predict the sign of cotton effect in 3-methyl cyclohaxanone when substituent is in equatorial position. (CO-1)
   g) What information is possible from theCOSYexperiment? (CO-2)
   h) Discuss about various periods involved in2D NMR. (CO-1)
   i) Discuss briefly the IR signals for the compound $C_6H_5 – CH_2 – O – CO – CH_3$. (CO-2)
   j) Predict the possible number of ^1H NMR signals for the compound $CH_3 – (CO) – CH_2 – CH_3$.(CO-2)

SECTION–B **(10x5=50M)**

UNIT - I

2. a) Explain the effect of solvent onPMR spectrum. (CO-2)

(Or)

b) Differentiate between first order and non firstorder PMR spectrumswithexamples. (CO-2)

UNIT – II

3. a) Discuss the importance of BBD & SFORD techniques in 13CNMRspectroscopy. (CO-2)

(Or)

b) A compound of MF C_4H_{10} in its CMR Spectrum show 17.1(q) 67.4(T). Determine the structure of compound by usingCMRdata. (CO-2)

UNIT – III

4. a) Explain the following i) Axial halo ketone rule ii) Types of optical rotatory dispersioncurves. (CO-1)

(Or)

b) Explain the applications ofOctantrule. (CO-2)

UNIT – IV

5 a) What information about a compound can be obtained from the 2D INADEQUATEexperiment? (CO–2)

b) Discuss the importance of NOESY technique withsuitableexample. (CO–2)

UNIT – V

6 a) Deduce the structure of the compound consistent with the following data elemental analysis: C=32.14%H 5.35% and Cl 62.5% UV: No absorption above 210 nm, IR (CCl_4) 2941,2265 and 1460cm-1PMR δ 2.72(septet,J=6.7,1H),1.33(doublet,J=6.7,6H) (CO–3)

(Or)

b) Deduce the structure of the compound consistent with the following data elemental analysis: C=32.14%H 5.35% and Cl 62.5% UV: No absorption above 210 nm IR (CCl_4) 2940,1265 and 690cm-1 and PMR δ3.5(2H,D),3.3(1H,m)and1.25(3H,d) (CO-3)

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M.Sc. DEGREE EXAMINATION
THIRD SEMESTER
Paper-II:: ORGANIC REACTIONS & MECHANISMS

Time:3hours **Maximum Marks:70**

SECTION – A

Answer all the questions. Each question carries2marks. (10x2M=20M)

1. a) Discuss oxidationswithHIO4. (CO-2)
   b) Define oxidation and discuss the various typesofoxidations. (CO-1)
   c) Write notes on reductionwithdiimide. (CO-1)
   d) Give the definition and mechanism ofclemmenson'sreduction. (CO-2)
   e) Discuss Dienonephenolrearrangement. (CO-1)
   f) Write an account ofWolfrearrangement. (CO-2)
   g) What are pericyclic reactions? Givetheclassification. (CO-1)
   h) Write the molecular orbital energy level diagram for 1,3–Butadiene. (CO-2)
   i) Write notes onenergytransfer. (CO-1)
   j) ExplainBartonreaction. (CO-2)

SECTION–B **(5x10M=50M)**

UNIT - I

2. a) Explain oxidations withi)RuO_4 ii)SeO_2 (CO-3)

(Or)

b) Explain oxidations with i) $KMnO_4$ ii)MnO_2 (CO-3)

UNIT – II

3. a) Discuss Birch reduction ofaromatic compounds. (CO-2)

(Or)

b) Discuss the reductionswith$LiAlH_4$. (CO-2)

UNIT – III

4 a) Explain the following
   i) Wagner Meerweinrearrangement ii) Benzil – Benzilicacidrearrangement. (CO-2)

(Or)

i) Baeyer Villigerrearrangement ii) Cumenehydroperoxiderearrangement. (CO-2)

UNIT - IV

5. a) Apply correlation method to 4nπ electrocyclic reaction for thermal and photochemical conditions. (CO-3)

(Or)

b) Apply FMO method to 1,5 sigmatropic shift and write Woodward and Hoffmann rules byPMOmethod. (CO-3)

UNIT - V

6 a) Discuss Norish type – I and type –IIreactions. (CO-2)

(Or)

b) Explain the following i) photochemistry of olefins ii) Di – π – methane rearrangement.(CO-2)

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M.Sc. DEGREE EXAMINATION
THIRD SEMESTER
Paper-III:: ORGANIC SYNTHESIS

Time:3hours **Maximum Marks:70**

SECTION – A

Answer all the questions. Each question carries2marks. (10x2M=20M)

1. a) What are acidicmethylene groups? (CO-2)
   b) Explainaboutcarbenes. (CO-1)
   c) Discuss in short aboutsynelimination. (CO-1)
   d) Elaborate Wittig reaction withanexample. (CO-2)
   e) Describe dienophile withanexample. (CO-1)
   f) What are lewis acids? Explain withan example. (CO-2)
   g) Enumerate the significance of Disconnection approach inorganicsynthesis. (CO-2)
   h) Write a short noteonsynthon. (CO-1)
   i) Discuss the role of functional group protection & deprotection in organic synthesis.(CO-2)
   j) Explain the importance ofregioselectiveprotection. (CO-2)

SECTION–B **(5x10M=50M)**

UNIT - I

2. a) Explain enamine andrelatedreactions. (CO-2)

(Or)

b) Discuss in detail the synthetic applications of carbenes and carbenoids with examples. (CO-2)

UNIT – II

3. a) Write an account of reductive dimerisationof carbonyl compoundswithexamples. (CO-2)

(Or)

b) Discuss any three methods for the stereoselective synthesis of tri and tetra substituted alkenes. (CO-2)

UNIT – III

4. a) What is Diels Alder reaction? Discuss the mechanismandstereochemistry. (CO-2)

(Or)

b) Write note on 1,3 – dipolarcycloaddition reactions. (CO-2)

UNIT - IV

5. a) Discuss the various methods of disconnectionofalcohols. (CO-3)

(Or)

b) Give an account of disconnections of 1,3 –dicarbonylcompounds. (CO-2)

UNIT – V

6. a) Discuss about the protecting agents to protect the following functionalgroups
   (i) AMINOgroup (ii)carboxylicacid. (CO-3)

(Or)

b) List out the reagents and apply them for the protection and deprotection of hydroxyl and carbonyl groups. (CO-3)

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M.Sc. DEGREE EXAMINATION
THIRD SEMESTER
Paper-IV:: CHEMISTRY OF NATURAL PRODUCTS

Time:3hours **Maximum Marks:70**

SECTION – A

Answer all the questions. Each question carries2marks. (10x2M=20M)

1. a) What arealkaloids?Explain. (CO-2)
   b) Discuss the general classificationofalkaloids. (CO-1)
   c) DiscussIsoprenerule. (CO-1)
   d) Write the structureofZingiberine. (CO-2)
   e) Write the synthesisoffarnesol. (CO-2)
   f) Discuss the nomenclatureof steroids. (CO-1)
   g) Give a short notes on classificationofflavonoids? (CO-1)
   h) Discuss the isolation of flavonoidsandisoflavonoids. (CO-2)
   i) Discuss the classification ofnaturalpigments. (CO-1)
   j) Discuss the functions of carotenoidsinplants. (CO-2)

SECTION–B **(10x5=50M)**

UNIT - I

2. a) Outline the synthesisof Morphine. (CO-2)

(Or)

b) Discuss the structure elucidationofQuinine. (CO-3)

UNIT – II

3. a) Explain the structure elucidationof santonin. (CO-2)

(Or)

b) Write notes on structure elucidation ofabieticacid. (CO-2)

UNIT – III

4. a) Establish the structure of nucleus and size of the rings A,B,C and D incholesterol. (CO-3)

(Or)

b) Establish the structure of progesterone and write any one method of synthesis. (CO-3)

UNIT - IV

5. a) Write structure elucidationofkaempferol. (CO-3)

(Or)

b) Write structure elucidationofQuercetin. (CO-3)

UNIT - V

6. a) Discuss the structure elucidation of α–carotene. (CO-3)

(Or)

b) Discuss the structure elucidation of β-carotene (CO-3)

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M.Sc.
DEGREEEXAMINATION
THIRD SEMESTER
POLYMERCHEMISTRY

Time:3hours **Maximum Marks:70**

SECTION – A

Answer all the questions. Each question carries2marks. (10x2M=20M)

1. a) Discuss about classification ofpolymers. (CO-1)
   b) Explain one polymerization reaction which involves free radical mechanism. (CO-2)
   c) Give a short account on isolation of polymers. (CO-1)
   d) Describe the purification method of polymers. (CO-1)
   e) What is hydrolysis? Explain with an example. (CO-2)
   f) What is cross – linking reaction? Explain its impact. (CO-2)
   g) List out the types of degradation methods. (CO-1)
   h) Explain ultrasonic waves degradation with an example. (CO-2)
   i) What are elastomers? Explain in brief. (CO-2)
   j) Discuss the method for the synthesis of polystyrene. (CO-2)

SECTION–B **(10x5=50M)**

UNIT - I

2. a) Explain in detail about cationic polymerization withsuitableexamples. (CO-2)

(Or)

b) Give a detailed account on Graft andBlockcopolymers. (CO-2)

UNIT – II

3. a) Discuss in detail about molecularweightdetermination. (CO-2)

(Or)

b) Explain elaborately about variousprocessingtechniques. (CO-2)

UNIT – III

4. a) Illustrate the following with suitable examples (i) Aminolysis (ii)Cyclisationreactions. (CO-2)

(Or)

b) Write an account on addition & substitution reactions withsuitableexamples. (CO-2)

UNIT – IV

5 a) Describe the following degradation methods with suitableexamples
   (i) Thermaldegradation (ii)Photodegradation (CO–2)
   b) Discuss the significance of oxidative degradation andhydrolytic degradation. (CO–2)

UNIT – V

6 a) Give an account on the following (i) Polyacrylonitrile(ii)Polyurethanes (CO–2)

(Or)

b) Elaborate the following in detail (i) Epoxy polymers (ii)Siliconpolymers (CO-2)

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AG & SG SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE(AUTONOMOUS)VUYYURU-521165

Aided by the Government of A.P, Re-Accredited by NAAC with 'A' Grade

2021-2022

PG Department of Chemistry

26-03-2022

MINUTES OF BOARD OF STUDIES

Minutes of meeting of Board of studies in PG Department of Chemistry held on 26-03-2022 at 12.00 pm in the PG Department of Chemistry through online (Zoom meeting)

Members Present

S.No	NAME		Signature
1	**Dr. V.Sreeram** Head, Dept. ofChemistry(P.G) AG & SG S College,Vuyyuru.	Chairman	
2	**Prof.C.Suresh Reddy** Department ofChemistry S.V. University,Tirupati.	University Nominee	
3	**Prof. Koya Prabakar Rao** Department of Chemistry Vignan University, Guntur.	Subject Expert	
4	**Dr.M.Sivanath** Associate prof. Dept. of Chemistry A.N.R.College, Gudivada.	Subject Expert	
5	**Dr.G.Raja** Manager(Q.A) Biophore India pharamaceuticals. Hyderbad.	Representative from Industry	
6	**Abdul Raheem**	One Post Graduate Meritorious Aluminous nominated by the Principal	
7	**N.V.Srinivasa Rao** Department of Mathematics AG & SG S College, Vuyyuru.	Representative Science Faculty Other Dept.	
8	**V.N.V.Kishore** Dept. of Chemistry(P.G) AG & SG S College, Vuyyuru	Member	
9	**Dilshad Begum** Dept. of Chemistry(P.G) AG & SG S College, Vuyyuru	Member	
10	**M.Rekha** Dept. of Chemistry(P.G) AG & SG S College, Vuyyuru	Member	

A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE(Autonomous)

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

II SEMESTER

Paper Code & Title: 20CH2T1: ORGANIC SPECTROSCOPY

No. of hours per week: 04 Total credits: 04

Total marks: 100 (Internal: 30 M & External: 70M)

Course: Organic Spectroscopy (code 20CH2T1)		
S.No	COURSE OUTCOMES	PO`S
	The graduate will be able to	
1	Memorize the basic principles and theory involved in molecular absorption spectroscopy.	2,7
2	Comprehend the advanced concepts of molecular absorption spectroscopy.	1,2,5
3	Apply the knowledge of spectroscopy in establishing the structure of organic molecules.	1,5,7
4	Analyze the spectral data to ascertain the structure of unknown molecules.	1,4,2

UNIT- I

UV- Visible Spectroscopy:

Mechanics of measurement – Energy transitions – Simple chromophores – Auxochrome, Absorption shifts (Bathochromic shifts, Hypsocromic shift, Hyper chromic shift, Hypo chromic shift). UV absorption of Alkenes – polyenes, unsaturated cyclic systems .

UV absorption of Carbonyl compounds α,β-unsaturated carbonyl systems - UV absorption aromatic systems – solvent effects – geometrical isomerism – acid and base effects – typical examples – calculation of λmax values for simple molecules using Woodward -Fieser rules

AGENDA:

1. To prepare syllabus and model question papers, discuss & approve modalities of lab courses.
2. To Suggest methodologies for innovative methods of teaching.
3. Any other matter with the permission of the Chair.

Resolution –I

1. Resolved to recommend the framed Syllabus & Model Question Papers for theory courses and approve the modalities of Lab Courses as prescribed by BOS members.
2. Resolved to conduct assignments etc., for Internal Assessment Tests.
3. To recommend the changed syllabus Radioactivity and isotopes in Unit V of semester I

Resolution –II

1. Resolved to adopt online teaching methods like as ZOOM, Microsoft teams, Google meet etc for ICT (Information and communication technologies) teaching.

Resolution –III

1.Resolved to implement changed syllabus in II& IV Semesters

UNIT – II

IR Spectroscopy:

Mechanics of measurement – Fundamental modes of vibrations -Stretching and bending vibrations – Factors effecting vibrational frequency-hydrogen bonding.

Finger print region and its importance. Typical group frequencies for – CH,

-OH, -NH, -CC, -CO and aromatic systems - Application in structural determination Examples – simple problems.

UNIT – III

Nuclear Magnetic Resonance Spectroscopy (1HNMR – First Order PMR):

Introduction:Nuclear spin-Basic principle of -NMR - nuclear resonance –saturation-Larmor's frequency-Relaxation- Instrumentation(Cw and FT) shielding and de shielding of magnetic nuclei- chemical shift and its measurements, factors influencing chemical shift, spin–spin interactions and factors influencing spin -spin coupling- Dynamic NMR- coupling constant J. and factors effecting J value.

UNIT – IV

Mass Spectrometry I

Introduction- ionization methods-EI, CI, ES, MALDI and FAB – advantages and disadvantages-molecular ion peak and its importance, meta stable peak, Nitrogen rule and extension of nitrogen rule. Determination of Molecular weight and determination of molecular formulae- Isotopic Peaks- Identification of single chlorine atom and double chlorine atom single bromine atom and double bromine atoms in organic compounds. Instrumentation.

UNIT – V

Mass Spectrometry II

Fundamental fragmentation process- Stevenson's rule- radical site initiated cleavage-charge site initiated cleavage- two bond cleavage- Retrodielalder cleavage- Mc-Lafferty rearrangement and other cleavages. Mass spectral fragmentation of alkanes, cycloalkanes, alkenes, alkynes, aromatic hydrocarbons, alcohols, phenols, thiols, ethers, carbonyl containing compounds (Aldehydes, ketones, esters and carboxylic acids), nitrogen compounds, alkyl chlorides and alkyl bromides, Examples of mass spectral fragmentation of organic compounds with respect to their structure determination.

Text books/ Reference books:

1. Introduction to Spectroscopy – D. L. Pavia, G.M. Lampman, G. S. Kriz, 3rd Ed. (Harcourt college publishers).

2. Spectrometric identification of organic compounds R. M. Silverstein, F. X. Webster, 6th Ed.

John Wiley and Sons.

3. Spectroscopic methods in organic chemistry - D. H. Williams and I. FlemmingMc.Graw Hill.

4. Absorption spectroscopy of organic molecules – V. M. Parikh

5. Nuclear Magnetic Resonance – Basic Principles- Atta-Ur-Rehman, Springer-Verlag (1986).

6. One- and Two-dimensional NMR Spectroscopy – Atta-Ur-Rehman, Elsevier (1989).

7.Organic structure Analysis- Phillip Crews, Rodriguez, Jaspars, Oxford University Press (1998).

8. Organic structural Spectroscopy- Joseph B. Lambert, Shurvell, Lightner, Cooks, Prentice-Hall

(1998).

9. Organic structures from spectra –Field L.D., Kalman J.R. and Sternhell S. 4th Ed. John Wiley

and sons Ltd.

NOTE: PercentageofChange - 0%

A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE(Autonomous)

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

II SEMESTER

Paper Code & Title: 20CH2T2: INORGANIC CHEMISTRY-II

No. of hours per week: 04 Total credits: 04

Total marks: 100 (Internal: 30 M & External: 70M)

Course: Inorganic chemistry (code 20CH2T2)		
S.No	COURSE OUTCOMES	PO`S
	The graduate will be able to	
1	Memorizethe fundamental concepts of Metallic&non metallic clusters, Inorganic reaction mechanisms, organo metallic chemistry, electronic spectra& magnetic properties of complexes and bioinorganic chemistry.	2,7
2	Comprehendthe basic and advanced concepts of metallic&non metallic clusters, Inorganic reaction mechanisms, organo metallic chemistry, electronic & magnetic properties of complexes and bioinorganic chemistry.	1,2,6
3	Applythe conceptual knowledge gained in the concepts of metallic & nonmetallic clusters, inorganic reaction mechanisms, organometallic chemistry, electronic &magnetic properties of complexes and bio inorganic chemistry in other fields of chemistry as well as in research.	1,2,7
4	Analyzethe role of metallic &non metallic clusters / cages, inorganic reaction mechanisms, organo metallic chemistry, electronic &magnetic properties of complexesand bio inorganic chemistry in understanding the similarities and differences among the concepts of chemistry.	1,3,2
5	Assess that how far the concepts of metallic&non metallic clusters, Inorganic reaction mechanisms, organo metallic chemistry, electronic & magnetic properties of complexes and bioinorganic chemistry are useful in rendering theoretical explanations for the concepts in chemistry.	1,7,2

Unit-I: Non-metal cages and metal clusters:

Structure and bonding in phosphorous-oxygen,phosphorous-Sulphur cages; structure and bonding in higher boranes with (special reference to B12icosahedra). Carboranes,metalloboranes, metallocarboranes. Classification- LNCs and HNCs,Isoelectronic and Isolobal relationships, electron counting rules: Wade's and Lauher's rules. M-Mmultiple bonding; preparation, structure and bonding in dinuclear [Re2Cl8] 2- ion, trinuclear[Re3Cl9], tetra nuclear W4(OR)16, hexa nuclear [Mo6Cl8]4+ and [Nb6Cl12]2-.

Unit-II: Organometallic chemistry of transition metals:

Classification and electron countingrules, hapticity, synthesis, structure and bonding of Olefinic complexes, Acetylene complexes,ferrocene, dibenzene chromium, cyclo heptatriene and tropylium complexes of transition metals.Reactions of organometallic compounds - oxidative addition reductive elimination, insertion andelimination. Applications of organometallic compounds, Catalytic hydrogenation,
Hydroformylation, alkene polymerization.

Unit-III: Reaction mechanism of transition metal complexes:

Kinetics of octahedral substitution,acid hydrolysis, base hydrolysis-conjugate base (CB) mechanism. Direct and indirect evidences infavour of CB mechanism. Anation reactions. Reactions without metal-ligand bond cleavage. Factorsaffecting the substitution reactions in octahedral complexes. Trans effect on substitution reactions insquare planar complexes. Mechanism of redox reactions, outer sphere mechanism, cross reactionsand Marcus –Hush equation, inner sphere mechanism.

Unit-IV: Term symbols and Electronic spectra: Term symbols:

Term symbols and theirderivation, Microstates, Hund's rules to predict ground terms and ground states. List of groundenergy and higher energy terms from d1 to d9 configurations;

Electronic spectra of transitionmetal complexes:

Spectroscopicterms. Selection rules, Slator–Condon parameters, Racahparameters, Term separation energies for dn configurations, Orgeldiagrams. Tanabe-Sugano diagrams for d1 to d9 configurations. Calculations of Dq, B and βparameters. Charge transfer spectra.

Unit-V: Bio-inorganic chemistry and Magnetic properties of complexes:

Storage and transportof dioxygen by Hemoglobin and Myoglobin,Vitamin B12 and its importance.

Magnetic properties of transition metal complexes:

Types of magnetism, factors affecting Paramagnetism, anomalous magnetic moments - Orbital and spin contribution, spin-orbit coupling andmagnetic moments chiro optical properties, cotton effect and Faraday effect.

Text books/ Reference books:

1. Inorganic Chemistry by Huheey. Harper and Row.

2. Concise inorganic chemistry by J. D. Lee, ELBS.

3. Inorganic chemistry, K.F. Purcell and J.C. Kotz, Holt Saunders international

4. Organometallic chemistry by R.C. Mehrotra and A. Singh. New Age International.

5. Advanced Inorganic Chemistry by Cotton and Wilkinson, Wiley Eastern

6. Inorganic reaction mechanism by Basolo and Pearson, Wiley Eastern

7. Bioinorganic Chemistry by K. Hussan Reddy

8. Biological Aspects of inorganic chemistry by A. W.Addiso, W. R. Cullen, D.Dorphin and G.

J. James. WelieyInterscience.

9. Photochemistry of coordination compounds by V. BalzaniandV.Carassiti. Academic Press.

10. Text book of Coordination chemistry by K. Soma Sekhara Rao and K.N.K. Vani, Kalyani Publishers.

NOTE: PercentageofChange - 0%

A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE(Autonomous)

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

II SEMESTER

Paper Code & Title:20CH2T3: ORGANIC CHEMISTRY -II

No. of hours per week: 04 **Total credits: 04**

Total marks: 100 **(Internal: 30 M & External: 70M)**

Course: Organic chemistry (code 20CH2T3)		
S. No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Understand the basic and advanced concepts of stereochemistry, conformational analysis, green chemistry, nanochemistry and named reactions.	2,7
2	Apply the concepts related to stereochemistry, conformational analysis, green and nano chemistry in establishing the mechanism of the reaction.	1,2,3
3	Assess that how far the knowledge gained in stereochemistry, green chemistry and nanochemistry is useful in understanding the nature of product.	1,5,6
4	Evaluate the role of stereochemistry, green principles and nano chemistry in establishing the mechanism of a reaction as well as in other areas of chemistry.	1,4,7

Unit-I: Named reactions:

Aldol condensation, Benzoin condensation, Cannizzaro condensation, claisen condensation, Dieckmann condensation, Perkin condensation, Stobbe condensation, Reformatsky reaction, Mannich reaction, Reimer-Tiemann reaction, Vilsmeier-Haack reaction, Shapiro

reaction,McMurray reaction, Michael addition reaction, Wittig reaction, Stork – Enamine reaction,Acyloin condensation, Robinson ringannulation and Simmon-Smith reaction.

Unit-II: Stereo Chemistry-I:

Concept of chirality, Recognitionof Symmetry elements. Definition and classification of Stereoisomers, Enantiomer, Diastereomer, Homomer, Epimer, Anomer, Configuration and Conformation, Configurational nomenclature: D,L and R, S nomenclature. Molecular representation of organic molecules: Fischer, Newman and Sawhorse projections and their inter-conversions.Geometrical Isomerism. Cis-trans, E, Z- and Syn and anti nomenclature, Methods of determining configuration of Geometrical isomers using physical, spectral and chemical methods.

Unit-III: Stereo Chemistry-II:

Definition of Conformation, Conformational analysis of acyclic molecules – alkanes and substituted alkanes. Conformational analysis of monocyclic molecules – cyclohexane – chair, boat and twist boat - mono and disubstituted cyclohexanes and conformation around carbon hetero atom bonds having C–O & C–N. Confirmationand intramolecular hydrogen bonding.

Unit-IV: Green chemistry & Phase transfer catalysis:

Introduction to Green chemistry, Principles and concepts of Green chemistry, Green Catalysis, Biocatalysis, renewable resources, Green Reagents, examples of green reactions-synthesis of Ibuprofen, Clean Fischer-Indole synthesis comparison of the above with conventional methods. Introduction to Microwave organic synthesis: introduction, advantages and disadvantages. Applications: solvents (water and organic solvents), solvent free reactions (Solid state reactions).

Unit-V: Chemistry of Nanomaterials:

Introduction, carbon nanotubes: structure of single and multi-walled carbon nanotubes, synthesis-solid and gaseous carbon source-based production techniques, synthesis with controlled orientation. Growth mechanism of carbon nano tubes-catalyst free growth, catalyst activated growth, general propertiesand applications.

Text books:

1. Advanced organic chemistry –Reaction, mechanism and structure, Jerry March, John Wiley.

2. A guide book to Mechanism in organic chemistry, Peter Sykes, Longman.

3. Organic chemistry, I.L. Finar, Vol. I & II, Fifth ed. ELBS, 1975.

4. Stereo Chemistry of carbon compounds – E.L. Eliel.

5. Nano, The Essentials: T. Pradeep, The Mc. Graw Hill & Co.

6. Principles of organic synthesis, R.O.C. Norman and J.M. Coxon, Blakie Academic & Professional.

7. Reaction Mechanism in organic chemistry, S.M. Mukherji and S.P. Singh, Macmillan.

8. Green chemistry Theory and Practice by Paul T. Anastas and John C. Warner, Oxford University press.

9. Methods and reagents for Green chemistry, PietroTundo, AlvisePerosa, FulvioZecchini, John Willey& sons Inc.

NOTE: PercentageofChange - 0%

A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE(Autonomous)

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

II SEMESTER

Paper Code & Title: 20CH2T4: PHYSICAL CHEMISTRY-II

No. of hours per week: 04 Total credits: 04

Total marks: 100 (Internal: 30 M & External: 70M)

Course: Physical chemistry (code 20CH2T4)		
S.No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Remember the concepts of thermodynamics, polymer chemistry, electro chemistry, chemical kinetics, photo chemistry.	1,2,7
2	Understand the concepts of thermodynamics, polymer chemistry, electro chemistry, chemical kinetics, photo chemistry.	1,2,7
3	Apply the concepts of thermodynamics, polymer chemistry, electro chemistry, chemical kinetics, photo chemistryin research and other allied fields.	1,2,4
4	Analyze the role and significance of concepts of thermodynamics, polymer chemistry, electro chemistry, chemical kinetics, photo chemistry.	1,2,7
5	Evaluate the role of concepts of Radio activity and isotopes in chemistry and applications of radio isotopes in industry and medicine	1,2,7

Unit-I: Third law of Thermodynamics and Statistical thermodynamics:

Nernst Heat theorem -Third law of thermodynamics - Its limitations - Determination of absolute entropy -

Thermodynamic probability and most probable distribution, Entropy and probability - Boltzmann-Plank equation. Ensembles, Maxwell-Boltzmann distribution, Fermi-Dirac statistics,

Bose Einsteinstatistics. Partition function - calculation of thermodynamic properties in terms of partition function- Chemical equilibrium and partition function - Translational, rotational and electronic partitionfunction - Entropy of Monoatomic gases (Sackur-Tetrode equation).

Unit-II: Polymer chemistry and Raman Spectroscopy:

Classification of polymers - Free radical,ionic and Zeigler -Natta Polymerization - kinetics of free radical polymerization -Techniques ofpolymerization -Glass transition temperature - Factors influencing the glass transition temperature.Number average and Weight average, Molecular weights –molecular weights determinations –Membrane Osmometry, Light scattering phenomenon. Classical and quantum theories of Ramaneffects, pure rotational, vibrational and Vibrational- rotational Raman spectra, selection rules,
mutual exclusion principle.

Unit-III: Electro Chemistry-II:

Reference electrode - Standard hydrogen electrode. Calomelelectrode -Indicator electrodes: Metal-metal ion electrodes - Inert electrodes -Membrane electrodes- theory of glass membrane potential, potentiometric titrations, advantages of potentiometrictitrations, Conductometric titrations. Electrode potentials - Double layer at the interface - rate ofcharge transfer - Decomposition potential - Over potential - Tafel plots - Derivation of Butler-Volmer equation for one electron transfer - electro chemical potential

Unit-IV: Chemical kinetics and Photo chemistry:

Branching Chain Reactions – Hydrogenoxygenreaction - lower and upper explosion limits - Fast reactions - Study of kinetics by flowmethods - Relaxation methods - Flash photolysis. Acid base catalysis –protolytic and prototropicmechanism. Enzyme catalysis - Michelis-Menten kinetics.

Photochemistry:

Quantum yield and itsdetermination, Actinometry, Reactions with low and high quantum yields, Photo sensitization,Exciplexes and Excimers, Photochemical equilibrium, Kinetics of collisional quenching - Stern-Volmer equation.

Unit-V:

Radioactivity and Isotopes: Introduction to radioactivity, properties of alpha rays, beta rays and gamma rays, theory of radioactive disintegration, rate of disintegration, Geiger – Nuttal rule, radioactive equilibrium. Isotopes - radioactive and non-radioactive isotopes, group displacement law. Analysis of isotopes – Aston's mass spectrograph, Dempster's method, Bainbridge's method. Separation methods of isotopes. Applications of Radio isotopes in Industry and medicine.

Text books/ Reference books:

1. Physical chemistry, G.K. Vemulapalli (Prentice Hall of India).

2. Physical chemistry, P.W. Atkins. ELBS.

3. Chemical kinetics - K.J. Laidler, McGraw Hill Pub.

4. Text book of Physical Chemistry, Samuel Glasstone, Macmillan pub.

5. Statistical Thermodynamics - M.C.Gupta.

6. Polymer Sceince, Gowriker,Viswanadham, Sreedhar.

7. Quantitative Analysis, A.I. Vogel, Addison Wesley Longmann Inc.

8. Physical Chemistry by G.W.Castellan, Narosa Publishing House, Prentice Hall.

9. Physical Chemistry by W.J. Moore, Prentice Hall.

10. Polymer Chemistry by Billmayer.

11. Fundamentals of Physical Chemistry by K K. Rohatgi-Mukherjee. Wiley Eastern Ltd publications.

12. Statistical Thermodynamics by M.Dole.

13. Fundamentals of photochemistry by Rohatgimukherjee, New Age international Publications.

14. Essentials of Nuclear chemistry by H.J.Armikar, New Age international Publications.

NOTE: PercentageofChange – 20%

A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE(Autonomous)

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

II SEMESTER

Paper Code & Title: CH206L1: ORGANIC CHEMISTRY PRACTICAL-II

No. of hours per week: 03 Total credits: 03

Total marks: 100 (Internal: 30 M & External: 70M)

Course Learning Objective(S): The main objective of this paper is to give a practical knowledge
for the students on Organic chemistry practical.

List of experiments:

1. Preparation of organic compounds: Single stage preparations by reactions involvingnitration,
halogenation, oxidation, reduction, alkylation, acylation, condensation andrearrangement.
(A student is expected to prepare at least 5 different organic compounds bymaking use of the reactions given above).

2. Preparation of organic compounds: Two stage preparations by reactions involving nitration,
halogenation, oxidation, reduction, alkylation, acylation, condensation and rearrangement.
(A student is expected to prepare at least 5 different organic compounds by making use of the reactions given above).

3. Systematic qualitative analysis of organic compounds with different functional groups (5 different compounds)

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of
Organic chemistry practical.

Text books/ Reference books:

1. A.I.Vogel, "A Text Book of Practical Organic Chemistry", Longman

2. A.I.Vogel, "Elementary Practical Organic Chemistry", Longman

3. Practical Organic Chemistry, F.G.Mann and B.C.Saunders, Longman4. Reaction and Synthesis in Organic Laboratory, B.S.Furniss, A.J.Hannaford, Tatchell,
University Science Books Mills valley.

5. Purification of Laboratory chemicals, manual, W.L.F. Armarego EDD Perrin.

6. Reaction and Synthesis in Organic Chemistry Laboratory, Lutz-Friedjan-Tietze,
TheophilEicher, University Science Book.

NOTE: PercentageofChange - 0%

A.G.&S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

II SEMESTER

Paper Code & Title: 20OECH: (OPEN ELECTIVE-I)

CHEMISTRY IN DAILY LIFE

No. of hours per week: 04 **Total credits: 04**

Total marks: 100 **(Internal: 30 M & External: 70M)**

Course: CHEMISTRY IN DAILY LIFE (code 20OECH)		
S.No	COURSE OUTCOMES	PO`S
	The graduate will be able to	
1	Memorize the basic concepts related to chemistry in daily life like – chemistry Laboratory safety symbols, environmental chemistry, bioinorganic chemistry, vitamins, antibiotics and hormones.	2,7
2	Understand the concepts like chemistry Laboratory safety symbols, environmental chemistry, bioinorganic chemistry, vitamins, antibiotics and hormones.	1,2,6
3	Apply the knowledge gained in the concepts like chemistry Laboratory safety symbols, environmental chemistry, bioinorganic chemistry, vitamins, antibiotics and hormones in future job roles.	1,4,7

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on Chemistry Laboratory safety symbols – Meaning, Environmental Chemistry, Bioinorganic Chemistry, Biological functions of Hormones and Medicinal chemistry.

Unit-I: Chemistry Laboratory safety symbols – Meaning:

Corrosive, carcinogenic, Harmful, toxic, dangerous to environment, Explosive, flammable, Narcotic, Oxidizing, Lachrymatory, Radioactive, irritant, gases under pressure, general laboratory safety precautions.

Unit-II: Environmental Chemistry:

Ambient air quality standards, Acid rain, Smog, Greenhouse effect, Bhopal gas tragedy, Vishakhapatnam polymer industry tragedy, Renewable and Nonrenewable energy resources, DO, COD, BOD, Toxicity of lead, mercury, arsenic and Cadmium.

Unit-III: Bioinorganic Chemistry:

Essential elements, biological significance of Na, K, Mg, Ca, Fe, Metalloporphyrin – Structure and functions of hemoglobin, Myoglobin.

Unit-IV: Biological functions of Hormones:

Introduction,Types of harmones, Role of Anderstrone, Progestrone and thyroxin, action of cortisone, Insulin.

Unit-V: Medicinal Chemistry:

The role of vitamins – K,E,D,C,B – complex, classification of antibiotics, mechanism of antibiotics action - role of ampicillin, chloromycetin and amoxicillin as antibiotics.

Text books/ Reference books:

1. Laboratory safety for Chemistry Students by Robert H. Hill and David Finster

2. A Text book of Environmental chemistry by W. Moore and F.A. Moore

3. Environmental Chemistry by Samir K. Banerji

4. Organic Chemistry by G. Mare Loudan, Purdue University

5. Unified Chemistry by O.P. Agarwal, Paper-III, JPNP Publications.

6. Hormones and Endocrine system – Kleine, Rossemanith.

7. Principles of Biochemistry-Leninger.

8. Essentials of Medical pharmacology- K. D. Tripathi.

A.G.&S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

II SEMESTER

Paper Code & Title: 20OECH: (OPEN ELECTIVE-I)

CHEMISTRY IN DAILY LIFE

No. of hours per week: 04 **Total credits: 04**

Total marks: 100 **(Internal: 30 M & External: 70M)**

Course: CHEMISTRY IN DAILY LIFE (code 20OECH)		
S.No	COURSE OUTCOMES	PO`S
	The graduate will be able to	
1	Memorize the basic concepts related to chemistry in daily life like – chemistry Laboratory safety symbols, environmental chemistry, bioinorganic chemistry, vitamins, antibiotics and hormones.	2,7
2	Understand the concepts like chemistry Laboratory safety symbols, environmental chemistry, bioinorganic chemistry, vitamins, antibiotics and hormones.	1,2,6
3	Apply the knowledge gained in the concepts like chemistry Laboratory safety symbols, environmental chemistry, bioinorganic chemistry, vitamins, antibiotics and hormones in future job roles.	1,4,7

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on Chemistry Laboratory safety symbols – Meaning, Environmental Chemistry, Bioinorganic Chemistry, Biological functions of Hormones and Medicinal chemistry.

Unit-I: Chemistry Laboratory safety symbols – Meaning:

Corrosive, carcinogenic, Harmful, toxic, dangerous to environment, Explosive, flammable, Narcotic, Oxidizing, Lachrymatory, Radioactive, irritant, gases under pressure, general laboratory safety precautions.

Unit-II: Environmental Chemistry:

Ambient air quality standards, Acid rain, Smog, Greenhouse effect, Bhopal gas tragedy, Vishakhapatnam polymer industry tragedy, Renewable and Nonrenewable energy resources, DO, COD, BOD, Toxicity of lead, mercury, arsenic and Cadmium.

Unit-III: Bioinorganic Chemistry:

Essential elements, biological significance of Na, K, Mg, Ca, Fe, Metalloporphyrin – Structure and functions of hemoglobin, Myoglobin.

Unit-IV: Biological functions of Hormones:

Introduction,Types of harmones, Role of Anderstrone, Progestrone and thyroxin, action of cortisone, Insulin.

Unit-V: Medicinal Chemistry:

The role of vitamins – K,E,D,C,B – complex, classification of antibiotics, mechanism of antibiotics action - role of ampicillin, chloromycetin and amoxicillin as antibiotics.

Text books/ Reference books:

1. Laboratory safety for Chemistry Students by Robert H. Hill and David Finster

2. A Text book of Environmental chemistry by W. Moore and F.A. Moore

3. Environmental Chemistry by Samir K. Banerji

4. Organic Chemistry by G. Mare Loudan, Purdue University

5. Unified Chemistry by O.P. Agarwal, Paper-III, JPNP Publications.

6. Hormones and Endocrine system – Kleine, Rossemanith.

7. Principles of Biochemistry-Leninger.

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A.G.&S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

II SEMESTER

Paper Code & Title: 20OECH: (OPEN ELECTIVE-I)

CHEMISTRY IN DAILY LIFE

No. of hours per week: 04 **Total credits: 04**

Total marks: 100 **(Internal: 30 M & External: 70M)**

Course: CHEMISTRY IN DAILY LIFE (code 20OECH)		
S.No	COURSE OUTCOMES	PO`S
	The graduate will be able to	
1	Memorize the basic concepts related to chemistry in daily life like – chemistry Laboratory safety symbols, environmental chemistry, bioinorganic chemistry, vitamins, antibiotics and hormones.	2,7
2	Understand the concepts like chemistry Laboratory safety symbols, environmental chemistry, bioinorganic chemistry, vitamins, antibiotics and hormones.	1,2,6
3	Apply the knowledge gained in the concepts like chemistry Laboratory safety symbols, environmental chemistry, bioinorganic chemistry, vitamins, antibiotics and hormones in future job roles.	1,4,7

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on Chemistry Laboratory safety symbols – Meaning, Environmental Chemistry, Bioinorganic Chemistry, Biological functions of Hormones and Medicinal chemistry.

Unit-I: Chemistry Laboratory safety symbols – Meaning:

Corrosive, carcinogenic, Harmful, toxic, dangerous to environment, Explosive, flammable, Narcotic, Oxidizing, Lachrymatory, Radioactive, irritant, gases under pressure, general laboratory safety precautions.

Unit-II: Environmental Chemistry:

Ambient air quality standards, Acid rain, Smog, Greenhouse effect, Bhopal gas tragedy, Vishakhapatnam polymer industry tragedy, Renewable and Nonrenewable energy resources, DO, COD, BOD, Toxicity of lead, mercury, arsenic and Cadmium.

Unit-III: Bioinorganic Chemistry:

Essential elements, biological significance of Na, K, Mg, Ca, Fe, Metalloporphyrin – Structure and functions of hemoglobin, Myoglobin.

Unit-IV: Biological functions of Hormones:

Introduction,Types of harmones, Role of Anderstrone, Progestrone and thyroxin, action of cortisone, Insulin.

Unit-V: Medicinal Chemistry:

The role of vitamins – K,E,D,C,B – complex, classification of antibiotics, mechanism of antibiotics action - role of ampicillin, chloromycetin and amoxicillin as antibiotics.

Text books/ Reference books:

1. Laboratory safety for Chemistry Students by Robert H. Hill and David Finster

2. A Text book of Environmental chemistry by W. Moore and F.A. Moore

3. Environmental Chemistry by Samir K. Banerji

4. Organic Chemistry by G. Mare Loudan, Purdue University

5. Unified Chemistry by O.P. Agarwal, Paper-III, JPNP Publications.

6. Hormones and Endocrine system – Kleine, Rossemanith.

7. Principles of Biochemistry-Leninger.

8. Essentials of Medical pharmacology- K. D. Tripathi.

A.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE(Autonomous)

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

II SEMESTER

Paper Code & Title: CH207L2: PHYSICAL CHEMISTRY PRACTIAL

No. of hours per week: 03 Total credits: 03

Total marks: 100 (Internal: 30 M & External: 70M)

Course Learning Objective(S): The main objective of this paper is to give a practical knowledge

for the students on Inorganic and Physical chemistry experiments.

List of experiments:

1. Relative strengths of acids by studying the hydrolysis of ethyl acetate / methyl acetate.

2. Determination of equilibrium constant of KI3 KI + I2 by partition coefficient.

3. Determination of unknown concentration of potassium iodide by partition coefficient method.

4. Distribution coefficient of Benzoic acid between Benzene and water.

5. Determination of critical solution temperature of phenol-water system.

6. Study of the effect of electrolyte on the miscibility of phenol-water system.

7. Determination of Coordination number of cuprammoniumcation.

8. Potentiometric determination of Fe(II) with Cr (VI).

9. Potentiometric determination of Fe(II) with Ce (IV).

10. pH-metric determination of strong acid with strong base.

11. Conductometric titration of strong acid with strong base.

12. Conductometric titration of strong acid + Weak acid with strong base.

13. Dissociation constant of weak acid (CH3COOH) by conductometric method.

14. Determination of cell constant.

15. Verification of Beers Law using potassium permanganate/Potassium dichromate.

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge ofInorganic and Physical chemistry experiments.

Text books/ Reference books:

1. Experimental Physical chemistry by V.D. Athawale, Parul Mathur, New Age International publishers.

2. Physical chemistry experiments by V. P. Kudesia, Pragati Prakasan publishers.

3. Advanced practical Physical chemistry by J.B. Yadav, Krishna's educational publishers.

NOTE: Percentage of Change–27% (Increment)

M.Sc. DEGREE EXAMINATION
SECOND SEMESTER

Paper-I :: ORGANIC SPECTROSCOPY

Time: 3 hours **Maximum Marks: 70**

SECTION – A

Answer all the questions. Each question carries 2 marks. (10x2=20M)

1. Discuss Auxochromes in UV visible spectroscopy in short. (CO-2)
2. Explain Wood ward fieser rules. (CO-2)
3. What is finger print region in IR Spectroscopy and discuss its importance (CO-3)
4. Discuss the mechanics of measurements in IR Spectroscopy in short. (CO-2)
5. Illustrate the basic principle of NMR spectroscopy. (CO-1)
6. What is chemical shift? Explain the significance of δ – scale. (CO-2)
7. Elaborate the importance of nitrogen rule in Mass Spectrometry. (CO-2)
8. Explain the role EI technique in ionization of molecules. (CO-2)
9. What is Stevenson's rule? (CO-1)
10. Write the list out the general modes of fragmentation. (CO-1)

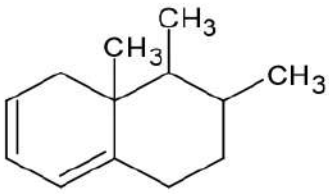
SECTION – B (10x5=50M)

UNIT - I

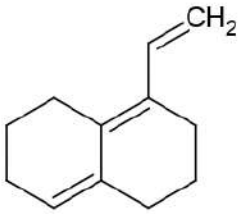
11.a)Write a detaild note on i)Types of shifts in UV ii) Electronic transitions in UV.(CO-2,L-2) **(Or)**

b) Calculate the λ max of the following compounds (CO-4,L-4)

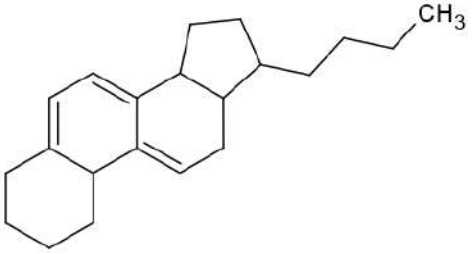
(i)



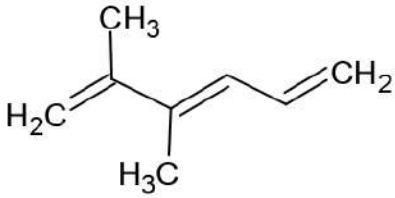
(ii)



(iii)



(iv)



UNIT – II

12.a) Write a note on i) fundamental modes of vibrations ii) Factors effecting IR stretching frequency of organic compounds. (CO-3,L-3)

(Or)

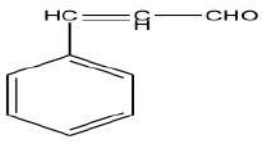
b) How will you distingwish o-hydroxybenzaldehyde and p-hydroxybenzaldehyde on the basis of IR spectroscopy ii) How will you distinguish the following pairs by the use of their IR spectra (i) CH_3CH_2CHO and CH_3COCH_3 (ii) CH_3CH2NH_2 and CH_3NHCH_3 (CO-3,L-3)

UNIT – III

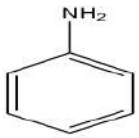
13. a) Define Chemical shift. Give an account on Chemical exchange in NMR. (CO- 2)

b) Predict the number of signals and their chemical shift in each of the following compounds (CO-3)

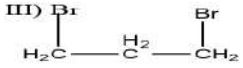
I)



II)



III)



(Or)

c) A compound of Molecular weight 122, in its PMR Spectrum shows 1.4(T,3H) .0(Q,2H), 6.8-7.2(M,5H). Write structure of compound using above data. (CO-3)

d) Explain the coupling constant in NMR and describe about various types of coupling constants (CO-2)

UNIT - IV

14 a) The mass spectrum of an unknown compound shows a molecular ion peak at m/z =78 with a relative intensity of 23.6 and the relative intensities of the isotopic peaks are as follows m/z 79(1.00), 80(7.55), 81(.25) .what is the molecular formula of this unknown? (CO- 3)

(Or)

b) what is the principle of mass spectrometry?. Discuss some quantitative and qualitative applications of mass spectrometry. (CO-2)

UNIT - V

15 a) In the mass spectrum of 1-hexanol , a very weak molecular ion peak appears at m/z = 102 . Some other prominent peaks appear at m/z values of 100,99,84 56(base peak) and 31 . What are the most probable species responsible for the above mentioned peak positions. (CO-3)

(Or)

b) How mass spectrum is useful to distinguish between $1^0,2^0,3^0$ aliphatic amines? (CO- 4)

c) Illustrate Mc Lafferty rearrangement with suitable examples (CO-2)

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M.Sc. DEGREE EXAMINATION
SECOND SEMESTER

Paper-II :: Inorganic Chemistry - II

Time: 3 hours **Maximum Marks: 70**

SECTION – A

Answer all the questions. Each question carries 2 marks. (10x2=20M)

1. Write a short note on Phosphorous-Sulphur cages. (CO-2)
2. Explain the bonding aspects of $[Nb_6Cl_{12}]^{-2}$. (CO-2)
3. Define hapticity. (CO-1)
4. Elaborate the classification of organometallic compounds. (CO-1)
5. Derive rate law ofAnation reaction. (CO-2)
6. Write note on complementary and non-complementary reactions. (CO-2)
7. Discuss how Hund's rules can be used to predict ground terms. (CO-2)
8. Derive the ground term of d^3 and d^9 metal ions. (CO-3)
9. Give a short account on Faraday Effect. (CO-2)
10. Deliberate the effect of spin orbital coupling on magnetic moments.(CO-3)

SECTION – B **(10x5=50M)**

UNIT - I

11.a) Describe the bonding and structure in higher boranes and Metalloboranes. (CO-2)

(Or)

b) Discuss the structure and bonding in $[Re_2Cl_8]^{2-}$ ion. (CO-2)

UNIT – II

12. a) Elucidate the applications of organometallic compounds in catalytic hydrogenation and hydro formylation. (CO-3)

(Or)

b) Explain oxidative addition, reductive elimination reactions of organometallic compounds. (CO-2)

UNIT – III

13. a) Explain the outer sphere mechanism of redox reactions. (CO-2)

(Or)

b) Discuss the direct and indirect evidences in favour of conjugate base mechanism. (CO-3)

UNIT - IV

14. a) Discuss the calculation of D_q and β parameters. (CO-3)

(Or)

b) Draw the orgel diagram and Tanabe Sugano diagram for d^2 and d^9 Configuration and explain. (CO-2)

UNIT - V

15. a) Discuss the storage of dioxygen by myoglobin and write its importance. (CO-2)

(Or)

b) Describe the factors affecting para magnetism. (CO-2)

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M.Sc. DEGREE EXAMINATION
SECOND SEMESTER

Paper-III :: Organic Chemistry - II

Time: 3 hours **Maximum Marks: 70**

SECTION – A

Answer all the questions. Each question carries 2 marks. (10x2=20M)

1. Explain Shaciro reaction. (CO - 2)
2. Explain stobbe condensation. (CO - 2)
3. Write notes on configuration and conformation. (CO - 1)
4. Explain enantiomers with suitable examples. (CO - 1)
5. Draw the structures of the cyclohexane boat and twist boat structures. (CO - 1)
6. Discuss conformation and intramolecular hydrogen bonding. (CO - 2)
7. Discuss Clean Fischer Indole synthesis (CO - 3)
8. Write notes on Biocatalysis. (CO - 1)
9. Define nano explain. (CO - 1)
10. Write general properties of carbon nano tubes. (CO - 1)

SECTION – B **(10x5=50M)**

UNIT - I

11. a) Discuss the mechanism of the following
(i) Benzoin condensation. (ii) Reformatsky reaction. (CO - 2)

(Or)

b) Discuss the definition and mechanism of
(i) Wittig reaction (ii) Acyloin condensation.
(CO - 2)

UNIT - II

12. a) Explain the various elements of symmetry with suitable examples. (CO - 1)

(Or)

b) Discuss the various methods for determination of configuration of geometrical isomers
with suitable examples. (CO - 1)

UNIT - III

13. a) Discuss the conformational analysis of cyclohexane and explain the stabilites.(CO - 1)

(Or)

b) Write an account of comformation around C – N and C – O hetero atom bond(CO -1)

UNIT – IV

14. a) Discuss the principles of green chemistry. (CO - 2)

(Or)

b) Explain the theory, principle and advantages of MicroWave (MW) organic synthesis. (CO - 2)

UNIT – V

15. a) Explain growth mechanism of carbon nanotubes. (CO - 2)

(Or)

b) Give an applications of carbon nanotubes. (CO - 2)

M.Sc. DEGREE EXAMINATION
SECOND SEMESTER

Paper-IV :: Physical Chemistry - II

Time: 3 hours **Maximum Marks: 70**

SECTION – A

Answer all the questions. Each question carries 2 marks. **(10x2=20M)**

1. Explain briefly Nernst Heat theorem. (CO-2,L-2)
2. Discuss Third law of thermodynamics in short. (CO-2,L-2)
3. Demonstrate Classification of polymers. (CO-3,L-3)
4. Describe the Free radical polymerization with appropriate mechanism. (CO-2,L-2)
5. Explain Branching Chain Reactions in short. (CO-2,L-2)
6. Discuss briefly Hydrogen oxygen reaction with appropriate mechanism. (CO-2,L-2)
7. Discuss briefly Double layer at the interface. (CO-2,L-2)
8. Expalin over potential in short. (CO-2,L-2)
9. What are Schoenfiles Symbols. (CO-2,L-2)
10. Define group theory and Sub group. (CO-2,L-2)

SECTION – B **(10x5=50M)**

UNIT - I

11. a) Derive Fermi-Dirac statistics (CO-3,L-3)

b) Derive Bose Einstein statistics (CO-3,L-3)

(Or)

c) Derive Chemical equilibrium interms of partition function. (CO-3,L-3)

d) Derive Entropy of Monoatomic gases (Sackur-Tetrode equation). (CO-3,L-3)

UNIT - II

(ii) a) Illustrate Zeigler -Natta Polymerization with suitable example. (CO-3,L-3)

b) What is Glass transition temperature ? Demonstrate Factors influencing the glass transition temperature. (CO-3,L-3)

(Or)

c) Differentiate between Number average and Weight average weight of a polymer in detail. (CO-3,L-3)

UNIT - III

13.a) Discuss wirh a neat labelled diagram Standard hydrogen electrode and Calomel electrode in detail. (CO-2,L-2)

(Or)

b) Demonstrate the Conductometric titrations in detail with a neat labelled graphs. (CO-3,L-3)

UNIT – IV

14.a) What are Fast reactions ? Discuss the Study of kinetics by flow methods and Relaxation methods With a neat labeled diagram. (CO-3,L-3)

(Or)

b) Differentiate between protolytic and prototropic mechanisms of Acid Base catalysis. (CO-3,L-3)

UNIT - V

15.a) Construct the Character table for C3V pont group using the implications of orthogonality theorm (CO-2,L-2)

(Or)

b) State the axioms of Group theory and show that C2V is an abelian group. (CO-2,L-2)

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A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS &SCIENCE(Autonomous)
Department of Chemistry

CIA Practicals

Total Marks – 30 M

1. Lab Performance / per experiment – 20 Marks

Experiment	– 10 Marks
Observation	– 5 Marks
Result / Yield / Report	– 5 Marks

2. Semester End Internal Exam – 10 Marks

Experiment	– 7 Marks
Result / Yield / Report	– 3 Marks

M.Sc. DEGREE EXAMINATION

Internal Practical Model Paper

(Regulation 2017-2018)

Time: 6 hours **Maximum Marks: 30**

1. Experiment – 20 Marks
2. Result / Graphs / Yield / Report – 10 Marks

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M.Sc. DEGREE EXAMINATION

External Practical Model Paper

(Regulation 2017-2018)

Time: 6 hours Maximum Marks: 70

1. To write the principle and procedure / mechanism related to practical as listed in the practical syllabus – 5 M
2. Record – 10 M
3. Experiment (Procedure / Tabulation / calculation etc.,) – 50 M
4. Result / Graphs / Yield / Report – 5 M

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A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

IV SEMESTER

20CH4T1: MOOCS – ORGANIC CHEMISTRY - I

Course: MOOCS – ORGANIC CHEMISTRY - I		
S.No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Recollect the concepts of stereochemistry, conformational analysis, CD & ORD, nature of bonding, aromaticity, chemical kinetics and reactive intermediates.	2,7
2	Identify the role of stereochemistry, conformational analysis, CD & ORD, nature of bonding, aromaticity, chemical kinetics and reactive intermediates.	1,2,3
3	Demonstrate the knowledge of stereochemistry, conformational analysis, CD & ORD, nature of bonding, aromaticity, chemical kinetics and reactive intermediates in chosen fields..	1,6,7
4	alyse the conceptual knowledge in stereochemistry, conformational analysis, CD & ORD, nature of bonding, aromaticity, chemical kinetics and reactive intermediates in the reactions.	1,5,6

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on Heterocyclic Chemistry.

UNIT-I

Stereo Chemistry : Concept of chirality, Recognition of Symmetry elements. Definition and classification of Stereoisomers, Enantiomer, Diastereomer, Homomer, Epimer, Anomer, Configuration and Conformation, Configurational nomenclature: D,L and R, S nomenclature.

Molecular representation of organic molecules: Fischer, Newman and Sawhorse projections and their inter-conversions. Geometrical isomerism. Cis-trans, E, Z- and Syn and Anti

nomenclature, Methods of determining configuration of Geometrical isomers using physical, spectral and chemical methods.

UNIT-II

Conformational Analysis and ORD, CD Curves:

Definition of Conformation, Conformational analysis of acyclic molecules – alkanes and substituted alkanes. Conformational analysis of monocyclic molecules – cyclohexane – chair, boat and twist boat - mono and disubstituted cyclohexanes and conformation around carbon hetero atom bonds having C–O & C–N. Confirmation and intramolecular hydrogen bonding.

Optical rotatory dispersion: Theory of optical rotatory dispersion – Cotton effect –CD curves-types of ORD and CD curves-similarities and difference between ORD and CD curves. α- Halo keto rule, Octant rule – application in structural studies.

UNIT-III

Nature of bonding and Aromaticity: Nature of bonding: Localised and Delocalized, Delocalised chemical bonding, conjugation, cross conjugation, hyper conjugation, Tautomerism.

Aromaticity: Concept of Aromaticity, Aromaticity of five membered, six membered rings - Non benzonoid aromatic compounds:-cyclopropenylcation, Cyclobutadienyldication, cyclopentadienyl anion-tropyllium cation and cyclooctatetraenyl dianion. Homoaromaticity, Anti aromaticity.

Aromatic Nucleophilic substitution: The SNAr (Addition – Elimination), SN1(Ar) mechanisms and benzyne mechanism (Elimination – Addition). Reactivity- effect of substrate structure, leaving group and attacking nucleophile. The Von-Richter, Sommelet – Hauser and Smiles rearrangements.

UNIT-IV

Chemical kinetics- Methods of deriving rate laws - complex reactions - Rate expressions for opposing, parallel and consecutive reactions involving unimolecular steps. Theories of reaction rates -collision theory - Steric factor - Activated complex theory - Thermodynamic

aspects – Unimolecular reactions - Lindemann's theory - Lindemann-Hinshelwood theory. Reactions in solutions - Influence of solvent - Primary and secondary salt effects.

UNIT- V

Reactive intermediates, Reactive Species, Linear free energy relations: Generation, Structure, Stability, Detection and Reactivity of Carbocations, Carbanions, Free radicals, Carbenes, Nitrenes and Arynes.

Reactive Species: Generation and reactivity of Electrophiles, Nucleophiles, Dienophiles, Ylids.

Elementary account of linear free energy relationships - Hammet - Taft equation - Chain reactions – Rate laws of H_2-Br_2, photochemical reaction of H_2 - Cl_2, Decomposition of acetaldehyde and ethane - Rice- Herzfeld mechanism.

Referencebooks:

1. Some Modem Methods of Organic Synthesis W.Caruthers, Cambridge University Press, Cambridge.
2. Organic Synthesis viz Boranes, HerbetC. BrownGray,
W.KramerAlanB.LevyandM.MarkMidl
and John Willy & Sons, NewYork.
3. Heterochemistry, T.L.Gilchrist, Longmanscienceandtech.
4. Anintroduction to the Chemistry of Heterocyclic Compounds, R.M.Acheson, Interscience Publishers, NewYork
5. Principle of Organic Chemistry, RocNorman, J.M.Coxon, NelsonThroms
6. Advanced Organic Chemistry, F.ACarey and R.J.Sundberg.Plenum.
7. Heterocyclic chemistry by JaiJackLie, Springer publications.
8. Chemical kinetics - K.J.Laidler, McGraw Hill Pub.

20CH4T2A :HETERO CYCLIC CHEMISTRY

Course:HETERO CYCLIC CHEMISTRY		
S.No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Memorize the synthetic routes and reactions related to three, four, five, six membered and fused heterocyclic compounds.	2,7
2	Understand the concepts of synthesis and reactions of three, four, five, six membered and fused heterocyclic compounds.	1,7
3	Apply the conceptual knowledge gained in the synthesis and reactions of organic synthesis three, four, five, six membered and fused heterocyclic compounds as and when required.	1,6,4
4	Analyse and categorize the various reactions involved in the synthesis of three, four, five, six membered and fused heterocyclic compounds	1,5,7

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on Heterocyclic Chemistry.

UNIT-I

Definition, Classification and Nomenclature (Hantzsch Widman System) of hetero cycles.

Three membered Heterocyclic Compounds: Synthesis, reactivity, and importance of the following ring systems: Aziridines, Oxiranes, Thiiranes, azirine.

UNIT-II

Four membered Heterocyclic Compounds: Synthesis, reactivity, and importance of the following ring systems :Azitidines, oxetanes, Thietanes.

Fused systems: Synthesis and reactivity of Penicillins G and V.

UNIT-III

Five membered Heterocyclic Compounds with two hetero atoms: Synthesis, reactivity, aromatic character, and importance of the following heterocycles: Pyrazole, Imidazole, Oxazole, Isoxazole, Thiazole.

Fused systems: Synthesis and reactivity of Indoles and Benzimidazoles.

UNIT-IV

Six-membered Heterocyclic Compounds with two hetero atoms: Synthesis, reactivity, aromatic character and importance of the following heterocycles: Pyridazines, Pyrazine, Oxazine, Thiazine.

Fused systems: Acridines and Benzodiazines.

UNIT- V

Larger ring and other Heterocycles: Synthesis and reactivity of Azepines, Oxepines and Thiepines. Synthesis and reactivity of Benzodiazepines.

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of Heterocyclic Chemistry.

Reference books:

1. Some Modem Methods of Organic Synthesis W.Caruthers, Cambridge University Press, Cambridge.
2. Organic Synthesis viz Boranes, HerbetC. BrownGray, W.KramerAlanB.Levy and M.MarkMidlandJohnWilly&Sons, NewYork.
3. Heterochemistry, T.L.Gilchrist, Longman science and tech.
4. Anintroduction to the Chemistry of Heterocyclic Compounds, R.M.Acheson, Interscience Publishers, NewYork
5. Principle of Organic Chemistry, RocNorman, J.M.Coxon, Nelson Throms
6. Advanced Organic Chemistry, F.ACarey and R.J.Sundberg. Plenum.
7. Heterocyclic chemistry by Jai JackLie, Springer publications.

20CH4T2 B : GREEN CHEMISTRY

Course:GREEN CHEMISTRY		
S.No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Memorize the principles of green chemistry and concepts related to green organic synthesis.	2,7
2	Understand the role and significance of green organic synthesis.	1,5,7
3	Exercise the basic and advanced knowledge gained on green organic synthesis in chosen job role.	1,4,6
4	nalyse how far green methods are environmentally benign over conventional methods of synthesis.	1,3

Unit-I

Principles of Green Chemistry: Prevention of waste / by-products, atom economy, Hazardous products-Designing of safer chemicals-energy requirements Selection of appropriate solvents and starting materials-Use of protecting groups and catalysis-Designing of biodegradable products. green organic synthesis of paracetamol, catechol, adipic acid, urethane and ibuprofen.

Unit-II

Microwave assisted reactions: Theory ofMicrowave, advantages, disadvantages, applications- water as solvent: Hoffmann elimination, hydrolysis, oxidation of Toluene, oxidation of alcohols, hydrolysis of methyl benzoate to benzoic acid.

Organic solvents: Esterification reactions, Fries rearrangement, Ortho ester Claisen rearrangement, DielsAlder reactions, synthesis of chalcones, decarboxylation.

Solid state reactions (solvent free): De acetylation, deprotection, saponification of esters, synthesis of anhydrides from dicarboxylic acid, synthesis of nitriles from aldehydes.

Unit-III

Phase Transfer Catalysis: Definition, Mechanism, Types, advantages and applications of PTC – C-alkylation, N-alkylation, Darzen's reaction, Wittig reaction, Benzoyl cyanides from benzoyl chloride, alcohols from alkyl halides, Crown ethers – Introduction,synthetic

applications: esterfication, saponification, Anhydride formation, $KMnO_4$ oxidation, aromatic substitution, elimination.

Unit-IV

Ultrasound assisted green synthesis: Introduction, instrumentation, types of sono chemical reactions – Homogeneous reactions – Curtius rearrangement of Benzoyl azide to phenyl isocyanate. Heterogeneous Liquid-Liquid reactions - Esterification, saponification, Hydrolysis, substitutions, additions. Heterogeneous Solid – Liquid Reactions–oxidation, reduction, hydroboration, coupling, Bouveault reaction, Strecker reaction.

Unit-V

Ionic liquids: Definition-Types of Ionic Liquids- properties- Application in organic synthesis- alkylation, allylation, oxidation, hydrogenation, hydroformylation, alkoxycarbonylation, carbon-carbon bond forming reactions-suzuki coupling, Heck reaction, stille coupling.

Textbooks/Referencebooks:

1. New Trends in Green Chemistry by V.K.Ahluwalia, M.Kidwai.

2. Green Chemistry: Environment Friendly Alternatives by Rashmi Sanghi, M.M.Srivastava

3. Green Solvents for Organic Synthesis by V.K.Ahluwalia, RajenderS.Varma.

20CH4T3 A: TECHNIQUES FOR MODERN INDUSTRIAL APPLICATIONS

COURSE :**TECHNIQUES FOR MODERN INDUSTRIAL APPLICATIONS**		
S.No	COURSE OUTCOMES:	PO`S
	The student will be able to	
1	Comprehend the concepts of purification methods and chromatographic methods.	2,7
2	Exercise the knowledge gained in purification and chromatographic techniques in their chosen job role.	1,4,6
3	Exercise that how far the purification and chromatographic techniques are useful in assessing the purity of the compound.	1,3,7
4	Evaluate that how far a compound is purified / separated using purification and chromatographic techniques.	1,5,7

UNIT-I

Classical Methods of purification Recrystallization: Basic principle, choice of solvent, seeding, filtration, centrifugation and drying. Concepts of fractional crystallization.

Distillation: Basic principle. Distillation types- continuous distillation, batch distillation, fractional distillation, vacuum distillation and steam distillation.

UNIT-II

Thin Layer chromatography:

Basic Principle, Common stationary phases, Methods of preparing TLC plates, Selection of mobile phase, Development of TLC plates, Rf value. Application of TLC in monitoring organic reactions. identification and quantitative analysis.

UNIT-III

Paper chromatography:

Basic Principle, Ascending and descending types. Selection of mobile phase, Development of chromatograms, One and two dimensional paper chromatography, Applications of paper chromatography.

UNIT-IV

Gas chromatography:

Basic Principle, Different types of GC techniques. Selection of columns and carrier gases. Instrumentation. detectors; Rf values. Applications in the separation, identification and quantitative analysis of organic compounds.

UNIT-V

High Performance liquid chromatography(HPLC):

Basic Principle, Normal and reversed Phases. Selection of column and mobile phase. Instrumentation. Detectors; Rf values. Applications in the separation, identification and quantitative estimation of organic compounds.

SUGGESTED BOOKS:

1. Principles of Instrumental Analysis by D. A. Skoog, F. J. Holler and T. A. Nieman, Harcourt College Pub.
2. Separation Techniques by M. N. Sastri, Himalaya Publishing House (HPH), Mumbai.
3. Bio Physical Chemistry by A. Upadhyay, K. Upadhyay and N. Nath,(HPH) , Mumbai.
4. A Hand Book of Instrumental Techniques for Analytical Chemistry- Ed-F. A. Settle, Prearson Edn, Delhi.27
5. Introduction to Organic Laboratory Techniques-D. L. Pavia, G. M. Lampman,G. S. Kriz and R. G. Engel, Saunders College Pub (NY).
6. Instrumental methods of Chemical Analysis by B. K. Sharma, Goel Publish House, Meerut.
7. Instrumental methods of Chemical Analysis by H. Kaur, Pragati Prakasan, Meerut.
8. Protein Purification-Principles and practice, III Edn- R. K. Scopes, Narosa Publishing House , Delhi.

20CH4T3 B : NANO CHEMISTRY

Course:NANO CHEMISTRY		
S.No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Will be able to memorize the basic concepts of nanochemistry and nano materials.	2,7
2	Understand the basic and advanced concepts of nanochemistry and nano materials	1,5,7
3	Apply the knowledge gained in the field of nanochemistry as and when required.	1,3,6
4	Analyse the role of nanochemistry in various interdisciplinary sciences.	1,5

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on Nano Chemistry.

Unit-I

Introduction to Nano chemistry: Definition of terms-nanoscale, nanomaterials, nanoscience,

nanotechnology-scale of materials natural and manmade-nanoscience practiced during ancient

and modern periods-contributors to the field of Nanochemistry.

Unit-II

Synthesis of Nanomaterials: Top down and bottom- up approaches-synthesis of carbon nanotubes, quantumdots, gold and silver nanoparticles.

Unit-III

Characterization of Nano materials: Electron microscopy techniques-scanning electron microscopy, transmission electron microscopy and atomic force microscopy.

Unit-IV

Application of Nanomaterials: Solar cells-smart materials-molecular electronics-biosensors-drug delivery and therapy-detection of cancerous cells.

Unit-V

NanochemistryinNature: The science behind the nanotechnology in lotuseffect-self-cleaning property of lotus-gecko foot climbing ability of geckos-water strider-anti wetting property of water striders-spider silk mechanical properties of the spidersilk.

Textbooks/ Referencebooks:

1. Nano: The Essentials: Understanding Nanoscience and Nanotechnology, T.Pradeep, McGraw-Hill Professional Publishing,2008.
2. Introduction to Nanoscience, J.Dutta, H.F.Tibbals and G.L.Hornyak, CRCpress, BocaRaton, 2008.

20CH4T4: ORGANO METALLIC REAGENTS

Course:ORGANO METALLIC REAGENTS		
S.No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Memorize the synthetic roots and applications of organo metallic reagents.	2,7
2	Appreciate the methods of synthesis and reactivity of various organo metallic reagents	1,3,7
3	Investigate the conceptual knowledge in variousorgano metallic reagents in organic synthesis	1,6,3
4	Assess the role of specific organic reaction reagents in the synthesis	1,6,5

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on Organometallic Reagents.

UNIT-I

Organo Magnesium and Lithium compounds: Preparation of Grignard reagents with alkyl, allyl, and propargyl halides, alkylation reaction with carbonyl compounds, esters, imines and nitriles, epoxides, acids, acid chlorides, carbondioxide, carbondisulfide, sulfurdioxide. Preparation of alkyllithium reagents, Lithium Di isopropyl amide (LDA) and its synthetic applications.

Unit-II

Organo Copper and Nickel compounds: Organo copper reagents - preparation, reactions, organocuprates, lithium organocuprates (Gilmanreagents). Organonickel compounds: π-allylnickel complexes, preparation of 1,5 cyclic dienes, nickelcarbonyl.

Unit-III

Organo Palladium compounds: Preparation of palladium reagents, π-allyl palladium complexes – formations, reactions – prenylation, formation of conjugated dienes, synthesis of macro cyclic nitrogen hetero cyclic. Heck reaction, Stille coupling reaction, Sonogashira coupling reaction, suzuki coupling reaction.

Unit-IV

Organoboranes: Preparation of Organobornaes viz hydroboration with BH_3-THF, dicylohexyl boranes, disiamylborane, thexylborane, 9-BBN and catechol boranes .protonolysis, oxidation, isomerization and cyclization. Free radical reactions of organoboranes, reactions with α-bromoketones, α-bromoesters, carbonylation, the cyanoborate process and the reaction of alkenyl boranes and trialkyltrialkynyl borates.

Unit-V

Organosilanes: Synthetic applications of organo silicon compounds, protection of functional groups, trimethylsilly ethers, sillylenolethers, trimethylsilyliodide, trimethylsilyl triflate, Peterson olefination. Synthetic applications of α-silylcarbanion and β-silylcarbonyl compounds, alkenylsilanes, Allylsilanes, the β-effect - control of rearrangement of carbonium ions by silicon.

Referencebooks:

1. Organometallic in Synthesis AManualbyMSchlosser, L.Hegedus, B.Lipshutzetal, JohnWily&sons.

2. Modern methods of organic synthesis by W.Carruthers (Cambridge).

3. Organic synthesis by H.O.House.

4. Organo metallics: Aconcise introduction, ChristophElschenbroich, 3rdedition,Willey-VCH.

5. Advanced Organic Chemistry, F.ACarey and R.J.Sundberg.Plenum.

6. Transition metals in the synthesis of complex organic molecules, Hegedus, L.S,secondedition, University Science, Book ,CA,1999.

7. Organo metallic Chemistry and Catalysis, Astruc, D,Springer Verlag, 2007.

8. Organo transition metal chemistry: Applications to organic synthesis, Davies, S.G,Pergamon
Press, NewYork, 1986.

Add on Course in Chemistry (PG)

ORGANOMETALLIC CHEMISTRY & METAL MEDIATED ORGANIC SYNTHESIS

Overview

The course covers an advance level of organometallic chemistry and recent development of cross coupling reactions and their applications in organic synthesis,

Syllabus

UNIT – I

Introduction of Organometallic Chemistry, Ligand Substitution Reactions, Oxidative Addition [1.Concerted Mechanism], Oxidative Addition [2.SN2 Mechanism], Oxidative Addition[3.RadicalMechanism],Reductive Elimination, Insertion and elimination.

UNIT – II

Hydrogenation of Alkenes, Hydrosilation reaction, Hydroformylation reaction, Alkene dimerization, Alkene polymerization, Monsanto acetic acid process, Wacker process, Synthetic gasoline, Synthetic gas

UNIT - III

Asymmetric hydrogenation ,Kumada Coupling reaction ,Suzuki coupling reaction, Stille coupling reaction,Sonogashira coupling reaction, Heck coupling reaction

UNIT – IV

Metathesis of olefins and alkynes ,Buchwald-Hartwig coupling reaction ,Kulinkovich Reaction and its mechanism,Pauson–Khand reaction,Glaser coupling reaction,Nozaki-Hiyama-Kishi coupling reaction

Reference books:

1. Organometallic Chemistry – R C Mehrotra and A Singh, New Age Publications

2. Inorganic Chemistry- Principles of Structure and Reactivity, James E Huheey, Ellen A. Keiter,
Richard L. Keiter, Pearson Education

3. Advanced Inorganic Chemistry- F A Cotton, G Wilkinson, Carlos A. Murillo, Manfred

Bochman- John wiley and Sons.

4. Inorganic Chemistry – Allan G Sharpe, Addison Wesley

5. Organic Synthesis – Michael B.Smith (2nd Edition – McGraw Hill

6. Name Reactions – Jie Jack Li – (2nd Edition – Springer)

7. Organic Chemistry – Clayden, Greeves, Warren and Wothers (Oxford University Press)

8. Advanced Organic Chemistry – Francis A.Carey and Richard J.Sundberg – Part B – Reactions and Synthesis. Kluwer Academic / Plenum Publishers.

9. Advanced Organic Chemistry – Francis A.Carey and Richard J.Sundberg – Part A – Structure and Mechanisms – Kluwer Academic / Plenum Publishers.

CH4L1: ORGANIC ESTIMATIONS

Course: ORGANIC ESTIMATIONS (20CH4L1)		
S.No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Memorize the basic principles involved in organic quantitative analysis.	1,3,5
2	Understand the importance of organic quantitative analysis and their use on research and industry.	
3	Exercise the procedure of quantitative analysis in chosen job roles.	
4	Evaluate how far these methods are accurate in quantitative determinations.	

Expt. 1: Estimation of phenol (bromination method)

Expt. 2: Estimation of aniline (Bromination method)

Expt.3: Estimation of sugars –glucose and sucrose by using Fehlings solution

Expt. 4: Determination of iodine value of oil or fat

Expt. 5: Determination of saponification value of oil or fat

Expt. 6: Estimation of vitamin 'C' in lime juice.

Expt. 7: Estimation of Nitro group

Expt. 8: Estimation of formaldehyde

Expt. 9: Isolation of caffeine from tea/coffee sample.

Part-III: Record Submission **10M**

20CH4L2: PROJECT WORK

Project: PROJECT WORK (code 20CH4L2)		
S.No.	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Acquire required skills to implement theoretical knowledge gained.	1,3,4,7
2	Assimilate the required knowledge for future research through practical knowledge gained in the project work.	1,2,7
3	Gain the required ability to start up own industry.	1,4,5,6
4	Comprehend the ability to draft and communicate the practical work.	1,2,7

The project will be assigned in the final semester. The project will be performed at the established industry (or) in the department under the supervision of the faculty or research institutes. It may involve experimental and/or theoretical work as well as critical review of the literature. Each of the students has to carry out original research in a topic in accordance with the work chosen under the guidance and supervision of a teacher in the concerned Department of the college.

- Isolation and characterization of Natural Products.
- Synthesis and characterization of Hetero Cyclic Compounds.
- Spectroscopical study of Organic compounds.
- Industrial visit and submit research findings of their Industrial visit / IIT's, CSIR Lab's, NIT's Central Universities etc.,

M.Sc. DEGREE EXAMINATION
FOURTH SEMESTER

Paper-I :: MOOCS

Time: 3 hours **Maximum Marks: 70**

SECTION – A

Answer all the questions. Each question carries 2 marks.
(10x2=20M)

11. What is toxicology and explain with a suitable example. (L-2)
12. Discuss any one method of quantitative analysis. (L-1)
13. Explain equilibria between strong and weak acids. (L-2)
14. Discuss salt hydrolysis in detail. (L-2)
15. Explain Beers law in detail. (L-2)
16. Discuss chromophores in detail. (L-2)
17. Explain uses of oxidizing and reducing agents. (L-1)
18. Discuss IR drop in electrochemical cells. (L-2)
19. Explain thermo gravimetric analysis. (L-3)
20. Discuss differencial thermal analysis. (L-2)

SECTION – B

(10x5=50M)

UNIT – I

21. a) Explain flow diagrams in detail. (L-2)

(Or)

b) Explain (i) Micro analytical balance (ii) Filtration techniques. (L-2)

UNIT – II

12. a) Explain the types of equilibria on basis of chemical analysis. (L-2)

(Or)

b) Discuss in detail (i) Titration curves (ii) Common ion effect. (L-2)

UNIT – III

13. a). Explain d – d, f – f transitions and its applications in detail. (L-2)

(Or)

b) Discuss chromophoric reagents and applying Beers law to mixtures. (L-2)

UNIT – IV

14. a) Discuss the (i) differential scanning calorimetry (ii) TG – plot. (L-3)

(Or)

b) Discuss (i) Geometric estimation (ii) Furnaces and crucibles (L-2)

UNIT - V

15. a) Discuss in detail potentiometric titrations with a neat labeled diagram. (L-2)

(Or)

b) Explain controlled potential caulirometry with a neat labeled diagram. (L-3)

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M.Sc. DEGREE EXAMINATION

FOURTH SEMESTER

Paper-II A :: Hetero Cyclic Chemistry

Time: 3 hours **Maximum Marks: 70**

SECTION – A

Answer all the questions. Each question carries 2 marks.
(10x2=20M)

1. Write any one method of synthesis of Thiirane. (L-2)
2. Write any one method of synthesis of azirine. (L-2)
3. Discuss the synthesis of oxetane. (L-1)
4. Discuss the reactivity of pencillin. (L-1)
5. Write down the structures of pyrazole and imidazole. (L-1)
6. Write the structure of Indole & Benzimidazole. (L-1)
7. Write one synthesis method of pyrazine. (L-2)
8. Discuss the reactivity of Benzodiazine. (L-2)
9. Write the synthesis of azepine. (L-2)
10. Write the structure of Benzodizepine. (L-1)

SECTION – B

(10x5=50M)

UNIT – I

1. a) Write the synthesis and reactivity of Aziridines and oxiranes. (L-2)

(Or)

b) Discuss the classifications and nomenclature (Hantzsch Widman system) of heterocycles. (L-1)

UNIT – II

12. a) Write the synthesis and reactivity of Azitidines and Thietanes. (L-2)

(Or)

b) Write the synthesis of Pencillin G and V. (L-2)

UNIT – III

13. a) Write the synthesis and reactivity of Oxazole and Thiazole. (L-2)

(Or)

b) Write the synthesis and reactivity of Indole. (L-2)

UNIT - IV

14.a) Write the synthesis and reactivity of Pyridazines and Oaxazine. (L-2)

(Or)

b) Write the synthesis and reactivity of acridine. (L-2)

UNIT - V

15.a) Write the synthesis and reactivity of Oxepines and Thiepines. (L-2)

(Or)

b) Write the synthesis and reactivity of Benzodiazepines. (L-2)

M.Sc. DEGREE EXAMINATION
FOURTH SEMESTER

Paper-II B :: GREEN CHEMISTRY

Time: 3 hours **Maximum Marks: 70**

SECTION – A

Answer all the questions. Each question carries 2 marks.
(10x2=20M)

1. Write the green synthesis of urethane. (L-2)
2. Define atom economy. Explain atom economy in rearrangement reaction with a suitable example. (L-2)
3. Explain the synthesis of nitriles from aldehydes. (L-2)
4. Give the disadvantages of microwave assisted organic synthesis. (L-1)
5. Discuss the various types of phase transfer catalysts. (L-2)
6. Write the mechanism of phase transfer catalysis. (L-2)
7. Write notes on ultrasound assisted homogeneous reactions. (L-2)
8. Write notes on ultrasound assisted strecker reaction. (L-2)
9. Write notes on hydroformylation. (L-2)
10. Write an account of oxidation with ionic liquids. (L-2)

SECTION – B

(10x5=50M)

UNIT – I

1. a) Write a brief account of twelve principles of green chemistry. (L-1)

(Or)

b) Out line the green synthesis of the following compounds:
(i) Ibuprofen (ii) paracetamol (iii) catechol. (L-2)

UNIT – II

12. a) Discuss microwave assisted reactions in organic solvents. (L-2)

(Or)

b) Discuss the theory and advantages of microwave. (L-2)

UNIT – III

13 a) Define phase transfer catalyst. Write notes on C – alkylation and N – alkylation using
PTC. (L-3)

(Or)

b) Discuss the synthetic applications of crown ethers. (L-3)

UNIT - IV

14.a) What is ultrasound assisted green synthesis. Discuss the instrumentation. (L-2)

(Or)

b) Write an account of the heterogeneous solid-liquid reactions. (L-2)

UNIT - V

15.a) Define ionic liquids. Mention the types of ionic liquids and properties. (L-2)

(Or)

b) Write the application of ionic liquids with respect to carbon – carbon bond formation
(i) Suzuki coupling (ii) stille coupling (L-3)

M.Sc. DEGREE EXAMINATION
FOURTH SEMESTER

Paper-III A:: TECHNIQUES FOR MODERN INDUSTRIAL APPLICATIONS

Time: 3 hours **Maximum Marks: 70**

SECTION – A

Answer all the questions. Each question carries 2 marks.
(10x2=20M)

1. Discuss the role of recrystallisation in purification of compounds. (L-2)
2. Explain the principle involved in batch distillation. (L-2)
3. Write the basic principle involved in TLC. (L-2)
4. Give an account on selection of mobile phase in TLC. (L-2)
5. Elaborate the basic principle involved in paper chromatography. (L-2)
6. Describe in brief about two dimensional paper chromatography. (L-2)
7. Explain the basic principle involved in Gas chromatrography. (L-2)
8. List out various types of carrier gases used in Gas chromatrography. (L-2)
9. What are normal phase and reverse phase techniques in HPLC? (L-2)
10. Write a short note on selection of mobile phase in HPLC. (L-2)

SECTION – B

(10x5=50M)

UNIT – I

11. a) Explain the following
(i) seeding (ii) filtration (iii) centrifugation (iv) drying (L-2)

(Or)

b) Explain the following (i) continuous distillation (ii) steam distillation. (L-2)

UNIT – II

12. a) What are the methods that are involved in the preparation of TLC plates? (L-2)

(Or)

b) Write a note on applications of TLC. (L-2

UNIT – III

13 a) Elaborate Ascending and Descending paper chromatrography. (L-2

(Or)

b) Write applications of paper chromatography. (L-3

UNIT - IV

14.a) Discuss about different types of columns used in gas chromatography. (L-3

(Or)

b) Explain few applications of gas chromatography.. (L-3

UNIT - V

15.a) Describe instrumentation of HPLC and explain the selection of the column.(L-3)

(Or)

b) Give a detailed account on applications of HPLC. (L-3)

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M.Sc. DEGREE EXAMINATION
FOURTH SEMESTER

Paper-III B : NANO CHEMISTRY

Time: 3 hours **Maximum Marks: 70**

SECTION – A

Answer all the questions. Each question carries 2 marks.
(10x2=20M)

1. What is bottom down approach? (L-1)
2. Explain the term nanoscale and nano material? (L-2)
3. Discuss the basic principle involved in TEM. (L-1)
4. Write a short note on natural and man made nano particles. (L-2)
5. What are quantum dots? Explain. (L-1)
6. List out the various types of techniques used in characterization of nanomaterials. (L-1)
7. Enumerate the role of nanomaterials in drug delivery. (L-2)
8. Give an account on biosensors. (L-2)
9. Explain in short about water strider. (L-2)
10. What is gecko foot climbing? (L-1)

SECTION – B

(10x5=50M)

UNIT – I

11. a) Define the following terms
(i) Nanoscale (ii) Nanomaterials (iii) Nanoscience (iv) Nanotechnology (L-1)

(Or)

b) Write a note nanoscience practiced during ancient and modern periods. (L-2)

UNIT – II

12. a) Explain top down and bottom-up approaches for the synthesis of nanotubes. (L-2)

(Or)

b) Write various methods for the synthesis of gold nanoparticles. (L-2)

UNIT – III

13 a) Write the principle and applications of scanning electron microscopy. (L-2)

(Or)

b) Write the principle and applications of atomic force microscopy. (L-3)

UNIT - IV

14.a) Write the applications of nanomaterials in solar cells and smart materials. (L-3)

(Or)

b) Explain the applications of detection of cancerous cells. (L-3)

UNIT - V

15.a) Write a note on lotus effect-self-cleaning property of lotus. (L-2)

(Or)

b) Write a note on spider silk mechanical properties of the spider silk. (L-2)

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M.Sc. DEGREE EXAMINATION
FOURTH SEMESTER

Paper-IV :: Organo Metallic Reagents

Time: 3 hours **Maximum Marks: 70**

SECTION – A

Answer all the questions. Each question carries 2 marks. (10x2=20M)

1. Explain the reaction of Grignard reagent with carbondioxide. (L-2)
2. Explain the preparation of grignard reagent with alkyl and allyl halide. (L-2)
3. What are Gilman reagents. Write any two reactions. (L-2)
4. Write the reactions of α,β – unsaturated carbonyl compounds with organocopper reagents. (L-2)
5. Write an account of suzuki coupling. (L-2)
6. Explain formation of π-allyl palladium complexes. (L-2)
7. Discuss the cyanoborate reaction. (L-2)
8. Write notes on isomerisation of organoboranes. (L-2)
9. Write an account of Peterson olefination. (L-2)
10. Write short notes of alkenyl silanes. (L-2)

SECTION – B

(10x5=50M)

UNIT – I

11. a) Explain the reaction of Grignard reagent with carbonyl compounds and Ester.(L-2)

(Or)

b) Write the preparation and uses of Lithium Di isopropyl amide (LDA). (L-2)

UNIT – II

12. a) Explain synthesis and reactions of lithium organo cuprates. (L-2)

(Or)

b) Write the synthesis and properties of π-allyl nickel complexes. (L-2)

UNIT – III

13 a) Explain the following reactions with mechanisms
(i) Heck reaction (ii) Still coupling reaction. (L-2)

(Or)

b) Explain the reactions of π – allyl palladium complexes. (L-2)

UNIT - IV

14.a) Write an account of Hydroboration. (L-2)

(Or)

b) Explain the protonolysis, oxidation, isomerisation reactions of organoboranes.(L-2)

UNIT - V

15.a) Write the synthetic applications of trimethyl silyl ethers and sillyl enol ethers. (L-3)

(Or)

b) Write the synthetic applications of α-silylcarbanion and β-silyl carbonyl compound (L-3)

AG & SG SIDDHARTHA DEGREE COLLEGE OF ARTS &SCIENCE
(AUTONOMOUS) VUYYURU- 521165

Re-Accredited by NAAC with 'A' Grade

2022-2023

PG Department of Chemistry

Minutes of the meeting of Board of Studies

03-04-2023

Members Present:-

S.No	NAME		Signature
1	**Dr. V.Sreeram** Head, Dept. ofChemistry(P.G) AG & SG S College,Vuyyuru.	Chairman	
2	**Prof.C.Suresh Reddy** Department ofChemistry S.V. University,Tirupati.	University Nominee	
3	**Prof. Koya Prabakar Rao** Department of Chemistry Vignan University, Guntur.	Subject Expert	
4	**Dr.M.Sivanath** Associate prof. Dept. of Chemistry A.N.R.College, Gudivada.	Subject Expert	
5	**Dr.G.Raja** Manager(Q.A) Biophore India pharamaceuticals. Hyderbad.	Representative from Industry	
6	**Abdul Raheem**	One Post Graduate Meritorious Aluminous nominated by the Principal	
7	**N.V.Srinivasa Rao** Department of Mathematics AG & SG S College, Vuyyuru.	Representative Science Faculty Other Dept.	
8	**V.N.V.Kishore** Dept. of Chemistry(P.G) AG & SG S College, Vuyyuru	Member	
9	**Dilshad Begum** Dept. of Chemistry(P.G) AG & SG S College, Vuyyuru	Member	
10	**M.Rekha** Dept. of Chemistry(P.G) AG & SG S College, Vuyyuru	Member	

A.G. & S.G. Siddhartha Degree College of Arts &Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)

DEPARTMENT OF CHEMISTRY (P.G)

Board of Studies for the academic Year 2022-23 (Even (2& 4th) Semesters)

1. Agenda:

Agendafor Board of studies in **Chemistry** on 03-04-2023 through online mode at 04:00P.M.

1. Approval of programme structure II Semester for the batch of students admitted in the year 2022-2023 onwards
2. Approval of syllabus for II semester for the batch of students admitted in the year 2022 – 2023 as per revised guidelines / curriculum of Krishna University and with no revision of syllabus of IV semester for the batch of students admitted in the year 2021-2023 batch.
3. Approval of the syllabus of semester – II & IV with course out comes drafted inline with levels of blooms taxonomy.
4. Approval of modified model question papers for II semester & unmodified model question papers for IV semester inline with Bloom's taxonomy.
5. Any other with the permission of the chair.

A.G.& S.G.SIDDHARTHADEGREE COLLEGE OF ARTS & SCIENCE
DEPARTMENT OF CHEMISTRY

PROPOSED COURSE STRUCTURE FOR PG PROGRAMS (SCIENCE SRTREAM)

UNDER CHOICE BASED CREDIT SYSTEM (CBCS)
W.E.F 2022-23 (R22 Regulations)

I SEMESTER

Course Code	Course Name	Teaching Hours/ week			CORE / IDC/DSE/ SEC/OEC/ MOOCS	Internal Marks	External Marks	No. of Credits
		Lecture	Practical	Tutorial				
22CH1T1	General Chemistry	4	0	0	Core	30	70	4
22CH1T2	Inorganic Chemistry	4	0	0	Core	30	70	4
22CH1T3	Introductory Organic Chemistry	4	0	0	Core	30	70	4
22CH1T4	Physical Chemistry	4	0	0	Core	30	70	4
COMPULSORY 22PG101	**Personality Development through Life Enlightenment Skills**	3	1	0	Core	30	70	3
22CH1L1	Inorganic chemistry Practical	0	6	0	Core	30	70	3
22CH1L2	Organic chemistry Practical -I	0	6	0	Core	30	70	3
TOTAL FOR FIRST SEMESTER						**210**	**490**	**25**

II SEMESTER

Course Code	Course Name	Teaching Hours/ week			CORE / IDC/DSE/ SEC/ OEC/ MOOCS	Internal Marks	External Marks	No. of Credits
		Lecture	Practical	Tutorial				
22CH2T1	Advanced Inorganic Chemistry	4	0	0	Core	30	70	4
22CH2T	Advanced	4	0	0	Core	30	70	4

2	OrganicChemistry							
22CH2T3	Advanced Physical Chemistry	4	0	0	Core	30	70	4
COMPULSORY 22PG201	**Research Methodology & IPR**	3	1	0	SEC	30	70	3
DOMAIN SPECIFIC ELECTIVE COURSES (CHOOSE ANY ONE)								
22CH2E1	Molecular Spectroscopy	4	0	0	DSE	30	70	4
22CH2E2	Instrumental methods of Analysis	4	0	0	DSE	30	70	4
22CH2E3	Analysis of foods & Drugs	4	0	0	DSE	30	70	4
LAB PRACTICALS								
22CH2L1	Physical chemistry Practical	0	6	0	Core	30	70	3
22CH2L2	Organic chemistry Practical-II	0	6	0	Core	30	70	3
TOTAL FOR SECOND SEMESTER						**210**	**490**	**25**

At the end of 2nd semester, every student must undergo summer Internship/ Apprenticeship/Project work/Industrial training/Research based Project work for Six weeks and must prepare a report concerned as per approved project guidelines, and submit the same to the University 14 days before the commencement of third semester end examinations.

III SEMESTER

Course Code	Course Name	Teaching Hours/ week			CORE / IDC/DSE / SEC/OEC/MOOCS	Internal Marks	External Marks	No. of Credits
		Lecture	Practical	Tutorial				
22CH3T1	Organic Spectroscopy	4	0	0	Core	30	70	4
DOMAIN SPE22CH3E1CIFIC ELECTIVE COURSES (CHOOSE ANY THREE)								
22CH3E1	Organic Reaction mechanism	4	0	0	DSE	30	70	4
22CH3E2	Organic Synthesis	4	0	0	DSE	30	70	4
22CH3E3	Natural Products	4	0	0	DSE	30	70	4
22CH3E4	Separation Techniques & Electro analytical	4	0	0	DSE	30	70	4

	techniques							
22CH3E5	Marine Chemistry or Chemistry of Drugs	4	0	0	DSE	30	70	4
22CH3E6	Antibiotics, Drugs, Vitamins & Steroid harmones	4	0	0	DSE	30	70	4
LAB PRACTICALS								
22CH3L1	Organic Preparations	0	6	0	Core	30	70	3
22CH3L2	Organic Binary mixture Analysis.	0	6	0	Core	30	70	3
OPEN ELECTIVE (INTERDISCIPLINARY/MULTIDISCIPLINARY) COURSES (CHOOSE ANY ONE)								
22OE301	Polymer Chemistry	3	0	0	OEC	30	70	3
22OE302	Basic Bio Chemistry	3	0	0	OEC	30	70	3
22OE303	Basic Analytical Chemistry	3	0	0	OEC	30	70	3
		3	0	0	OEC	30	70	3
		3	0	0	OEC	30	70	3
TOTAL FOR III SEMESTER						**210**	**490**	**25**

IV SEMESTER

Course Code	Course Name	Teaching Hours/ week			CORE / IDC/DSE/ SEC/OEC/MOOCS	Internal Marks	External Marks	No. of Credits
		Lecture	Practical	Tutorial				
22CH4T1	Advanced Organic Spectroscopy	4	0	0	Core	30	70	4
DOMAIN SPECIFIC ELECTIVE COURSES (CHOOSE ANY THREE)								
22CH4E1	Green Chemistry	4	0	0	DSE	30	70	4
22CH4E2	Techniques for Modern Industrial applications	4	0	0	DSE	30	70	4
22CH4E3	Nano Chemistry	4	0	0	DSE	30	70	4
22CH4E5	Bio-organic chemistry	4	0	0	DSE	30	70	4
22CH4E6	Bio-Inorganic Chemistry	4	0	0	DSE	30	70	4
22CH4E7	Environmental chemistry	4	0	0	DSE	30	70	4
LAB PRACTICALS								
22CH4L1	Organic Estimations	0	6	0	Core	30	70	3
ENTREPRENURAL & INNOVATION/IT SKILL RELATED TO DOMAIN SPECIFIC ELECTIVE								

COURSES (CHOOSE ANY ONE)								
22CH4E8	Asymmetric Synthesis	3	0	0	SEC	30	70	3
22CH4E4	Organo metallic Chemistry	3	0	0	SEC	30	70	3
22CH4E9	Heterocyclic chemistry	3	0	0	SEC	30	70	3
CHOOSE MOOCs FROM SWAYAM/NPTEL SOURCES								
MOOCS	22CH4M1							4
PROJECT WORK EVALUATION AND VIVA-VOCE - 22CH4P1							100	4
TOTAL FOR IV SEMESTER						**180**	**520**	**30**

Note: Students may be allowed to register and appear for MOOCS from the third semester itself. However, students are to complete the MOOCS successfully and submit pass certificate of the same to the University through the Principal of the College concerned for approval and endorsement of the same on grade cards and PCs and ODs as per the regulations of the University.

Resolutions/ Recommendations

Resolution –I

1. It is resolved and recommended to implement the course structure as per R 22 regulations of Krishna University.

Resolution –II

2. a) It is resolved and recommended to continue with the same syllabus for the course code 22CH2T1. However here after the course title will be referred as Advanced Inorganic chemistry instead of Inorganic chemistry – II.
   b) It is resolved and recommended to continue with the same syllabus for the course code 22CH2T2. However here after the course title will be referred as Advanced organic chemistry instead of Organic chemistry –II.
   c) It is resolved and recommended to continue with the same syllabus for the course code 22CH3T3. However here after the course title will be referred as Advanced Physical chemistry instead of Physical chemistry – II.
   d) It resolved and recommended to Introduce new paper Reasearch methdology & IPR with Course code 22PG201 for the batch students admitted in 2022-2023 and onwards
   e) It is resolved and recommended to implement the modified & modified semester syllabus and modified model question papers for all the papers of Second semester.

Resolution –III

3. Resolved and recommended to introduce the course outcomes in line with the guidelines of OBE

Following Bloom's Taxonomy for all the courses (both theory and practical) in semester –I I of M.Sc (org.Chemistry) for the students admitted in the academic year 2022-23 and onwards.

4. Resolved to implement the revised syllabus for both theory and practicals with revision for Semester-IV students admitted batch 2021-23. The courses of semesters II& IV are listed below.

Semester – II:

Paper	Title of the Paper	Code
Paper-I	Advanced Inorganic Chemistry	22CH2T1
Paper-II	Advanced organic Chemistry	22CH2T2
Paper-III	Advanced Physical Chemistry	22CH2T3
Paper-IV	Molecular Spectroscopy	22CH2E1
Paper-V	Research Methodology & IPR	22PG201
Practical-I	Physical Chemistry Practical	22CH2L1
Practical-II	Organic Chemistry Practical-II	22CH2L2

Semester – IV:

Paper	Title of the Paper	Code
Paper-I	MooCs(Analytical Chemistry)	22CH4T1
Paper-II	Hetero Cyclic Chemistry	22CH4T2A
Paper-III	Green Chemistry	22CH4T2B
Paper-IV	Techniques For Modern Industrial Applications	22CH4T3A
Paper-V	Nano Chemistry	22CH4T3B
Paper-VI	Organo Metallic Reagents	22CH4T4
Practical-I	Organic Estimations	22CH4L1
Practical-II	Project Work	22CH4L2

A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
DEPARTMENT OF CHEMISTRY
M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)
II SEMESTER
Paper Code & Title: 22CH2T1: ADVANCED INORGANIC CHEMISTRY

No. of hours per week: 04 **Total credits: 04**
Total marks: 100 **(Internal: 30 M & External: 70M)**

Course: Advanced Inorganic chemistry (code 22CH2T1)		
S.No	COURSE OUTCOMES	PO`S
	The graduate will be able to	
1	Memorize the fundamental concepts of Metallic & non metallic clusters, Inorganic reaction mechanisms, organo metallic chemistry, electronic spectra & magnetic properties of complexes and bioinorganic chemistry.	2,7
2	Comprehend the basic and advanced concepts of metallic & non metallic clusters, Inorganic reaction mechanisms, organo metallic chemistry, electronic & magnetic properties of complexes and bioinorganic chemistry.	1,2,6
3	Apply the conceptual knowledge gained in the areas of metallic & nonmetallic clusters, inorganic reaction mechanisms, organo metallic chemistry, electronic & magnetic properties of complexes and bio inorganic chemistry in other fields of chemistry as well as in research.	1,2,7
4	Analyze the role of metallic & non metallic clusters / cages, inorganic Reaction mechanisms, organo metallic chemistry, electronic & magnetic properties of complexes and bio inorganic chemistry in understanding the similarities and differences among the concepts of chemistry.	1,3,2

Unit-I: Non-metal cages and metal clusters:
Structure and bonding in phosphorous-oxygen, phosphorous-Sulphur cages; structure and bonding in higher boranes with (special reference to B12 icosahedra). Carboranes, metalloboranes, metallocarboranes. Classification- LNCs and HNCs**,** Isoelectronic and Isolobal relationships, electron counting rules: Wade's and Lauher's rules. M-M multiple bonding; preparation, structure and bonding in dinuclear [Re2Cl8] 2- ion, trinuclear [Re3Cl9], tetra nuclear W4(OR)16, hexa nuclear [Mo6Cl8]4+ and [Nb6Cl12]2-.

Unit-II: Organometallic chemistry of transition metals:

Classification and electron counting rules, hapticity, synthesis, structure and bonding of Olefinic complexes, Acetylene complexes, ferrocene, dibenzene chromium, cyclo heptatriene and tropylium complexes of transition metals. Reactions of organometallic compounds - oxidative addition reductive elimination, insertion and elimination. Applications of organometallic compounds, Catalytic hydrogenation,
Hydroformylation, alkene polymerization.

Unit-III: Reaction mechanism of transition metal complexes:
Kinetics of octahedral substitution, acid hydrolysis, base hydrolysis-conjugate base (CB) mechanism. Direct and indirect evidences in favour of CB mechanism. Anation reactions. Reactions without metal-ligand bond cleavage. Factors affecting the substitution reactions in octahedral complexes. Trans effect on substitution reactions in square planar complexes. Mechanism of redox reactions, outer sphere mechanism, cross reactions and Marcus –Hush equation, inner sphere mechanism.

Unit-IV: Term symbols and Electronic spectra: Term symbols:
Term symbols and their derivation, Microstates, Hunds rules to predict ground terms and ground states. List of ground energy and higher energy terms from d1 to d9 configurations;
Electronic spectra of transition metal complexes:
Spectroscopic terms. Selection rules, Slator–Condon parameters, Racah parameters, Term separation energies for dn configurations, Orgel diagrams. Tanabe-Sugano diagrams for d1 to d9 configurations. Calculations of Dq, B and β parameters. Charge transfer spectra.

Unit-V: Bio-inorganic chemistry and Magnetic properties of complexes:
Storage and transport of dioxygen by Hemoglobin and Myoglobin, Vitamin B12 and its importance.
Magnetic properties of transition metal complexes:
Types of magnetism, factors affecting Para magnetism, anomalous magnetic moments - Orbital and spin contribution, spin-orbit coupling and magnetic moments chiro optical properties, cotton effect and Faraday effect.

Text books/ Reference books:

1. Inorganic Chemistry by Huheey. Harper and Row.
2. Concise inorganic chemistry by J. D. Lee, ELBS.
3. Inorganic chemistry, K.F. Purcell and J.C. Kotz, Holt Saunders international
4. Organometallic chemistry by R.C. Mehrotra and A. Singh. New Age International.
5. Advanced Inorganic Chemistry by Cotton and Wilkinson, Wiley Eastern
6. Inorganic reaction mechanism by Basolo and Pearson, Wiley Eastern
7. Bioinorganic Chemistry by K. Hussan Reddy
8. Biological Aspects of inorganic chemistry by A. W.Addiso, W. R. Cullen, D.Dorphin and G. J. James. WelieyInterscience.
9. Photochemistry of coordination compounds by V. BalzaniandV.Carassiti. Academic Press.
10. Text book of Coordination chemistry by K. Soma Sekhara Rao and K.N.K. Vani, Kalyani Publish

A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
DEPARTMENT OF CHEMISTRY
M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)
II SEMESTER

Paper Code & Title: 22CH2T2: ADVANCED ORGANIC CHEMISTRY

No. of hours per week: 04 **Total credits: 04**
Total marks: 100 **(Internal: 30 M & External: 70M)**

Course: Advanced Organic chemistry (code 22CH2T2)		
S.No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Understand the basic and advanced concepts of stereochemistry, conformational analysis, green chemistry, nanochemistry and named reactions.	2,7
2	Apply the concepts related to stereochemistry, conformational analysis, green and nano chemistry in establishing the mechanism of the reaction.	1,2,3
3	Assess that how far the knowledge gained in stereochemistry, green chemistry and nanochemistry is useful in understanding the nature of product.	1,5,6
4	Evaluate the role of stereochemistry, green principles and nano chemistry in establishing the mechanism of a reaction as well as in other areas of chemistry.	1,4,7

Unit-I: Named reactions:
Aldol condensation, Benzoin condensation, Cannizzaro condensation, claisen condensation, Dieckmann condensation, Perkin condensation, Stobbe condensation, Reformatsky reaction, Mannich reaction, Reimer-Tiemann reaction, Vilsmeier-Haack reaction, Shapiro reaction, McMurray reaction, Michael addition reaction, Wittig reaction, Stork – Enamine reaction, Acyloin condensation, Robinson ring annulation and Simmon-Smith reaction.

Unit-II: Stereo Chemistry-I:
Concept of chirality, Recognition of Symmetry elements. Definition and classification of Stereoisomers, Enantiomer, Diastereomer, Homomer, Epimer, Anomer, Configuration and Conformation, Configurational nomenclature: D,L and R, S nomenclature. Molecular representation of organic molecules: Fischer, Newman and Sawhorse projections and their inter-conversions. Geometrical Isomerism. Cis-trans, E, Z- and Syn and anti nomenclature, Methods of determining configuration of Geometrical isomers using physical, spectral and chemical methods.

Unit-III: Stereo Chemistry-II:

Definition of Conformation, Conformational analysis of acyclic molecules – alkanes and substituted alkanes. Conformational analysis of monocyclic molecules – cyclohexane – chair, boat and twist boat - mono and disubstituted cyclohexanes and conformation around carbon hetero atom bonds having C–O & C–N. Confirmation and intramolecular hydrogen bonding.

Unit-IV: Green chemistry:
Introduction to Green chemistry, Principles and concepts of Green chemistry, Green Catalysis, Biocatalysis, renewable resources, Green Reagents, examples of green reactions-synthesis of Ibuprofen, Clean Fischer-Indole synthesis comparison of the above with conventional methods. Introduction to Microwave organic synthesis: introduction, advantages and disadvantages. Applications: solvents (water and organic solvents), solvent free reactions (Solid state reactions).

Unit-V: Chemistry of Nanomaterials:
Introduction, carbon nanotubes: structure of single and multi-walled carbon nanotubes, synthesis-solid and gaseous carbon source-based production techniques, synthesis with controlled orientation. Growth mechanism of carbon nano tubes-catalyst free growth, catalyst activated growth, general properties and applications.

Reference Text books:

1. Advanced organic chemistry –Reaction, mechanism and structure, Jerry March, John Wiley.
2. A guide book to Mechanism in organic chemistry, Peter Sykes, Longman.
3. Organic chemistry, I.L. Finar, Vol. I & II, Fifth ed. ELBS, 1975.
4. Stereo Chemistry of carbon compounds – E.L. Eliel.
5. Nano, The Essentials: T. Pradeep, The Mc. Graw Hill & Co.
6. Principles of organic synthesis, R.O.C. Norman and J.M. Coxon, Blakie Academic & Professional.
7. Reaction Mechanism in organic chemistry, S.M. Mukherji and S.P. Singh, Macmillan.
8. Green chemistry Theory and Practice by Paul T. Anastas and John C. Warner, Oxford University press.
9. Methods and reagents for Green chemistry, PietroTundo, AlvisePerosa, FulvioZecchini, John Willey& sons Inc.

NOTE: Percentage ofChange - 0%

A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
DEPARTMENT OF CHEMISTRY
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II SEMESTER

Paper Code & Title: 22CH2T3: ADVANCED PHYSICAL CHEMISTRY

No. of hours per week: 04 **Total credits: 04**

Total marks: 100 **(Internal: 30 M & External: 70M)**

Course: Advanced Physical chemistry (code 22CH2T3)		
S.No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Remember the concepts of thermodynamics, polymer chemistry, electro chemistry, chemical kinetics, photo chemistry and Radio chemistry.	1,2,7
2	Understand the concepts of thermodynamics, polymer chemistry, electro chemistry, chemical kinetics, photo chemistry and Radio chemistry.	1,2,7
3	Apply the concepts of thermodynamics, polymer chemistry, electro chemistry, chemical kinetics, photo chemistry and Radio chemistry in research and other allied fields.	1,2,4
4	Analyze the role and significance of concepts of thermodynamics, polymer chemistry, electro chemistry, chemical kinetics, photo chemistry and Radio chemistry.	1,2,7
5	Evaluate the role of concepts of thermodynamics, polymer chemistry, electro chemistry, chemical kinetics, photo chemistry and Radio chemistry in understanding the named concepts in chemistry.	1,2,7

Unit-I: Third law of Thermodynamics and Statistical thermodynamics:
Nernst Heat theorem - Third law of thermodynamics - Its limitations - Determination of absolute entropy -
Thermodynamic probability and most probable distribution, Entropy and probability - Boltzmann-Plank equation. Ensembles, Maxwell-Boltzmann distribution, Fermi-Dirac statistics, Bose Einstein statistics. Partition function - calculation of thermodynamic properties in terms of partition function - Chemical equilibrium and partition function - Translational, rotational and electronic partition function - Entropy of Monoatomic gases (Sackur-Tetrode equation).

Unit-II: Polymer chemistry and Raman Spectroscopy:
Classification of polymers - Free radical, ionic and Zeigler -Natta Polymerization - kinetics of free radical polymerization -Techniques of polymerization -Glass transition temperature - Factors influencing the glass transition temperature. Number average and Weight average, Molecular weights –molecular weights determinations – Membrane Osmometry, Light scattering phenomenon. Classical and quantum theories of Raman effects, pure rotational, vibrational and Vibrational- rotational Raman spectra, selection rules, mutual exclusion principle

Unit-III: Electro Chemistry-II:
Reference electrode - Standard hydrogen electrode. Calomel electrode -Indicator electrodes: Metal-metal ion electrodes - Inert electrodes -Membrane electrodes - theory of glass membrane potential, potentiometric titrations, advantages of potentiometric titrations, Conductometric titrations. Electrode potentials - Double layer at the interface - rate of charge transfer - Decomposition potential - Over potential - Tafel plots - Derivation of Butler- Volmer equation for one electron transfer - electro chemical potential.

Unit-IV: Chemical kinetics and Photo chemistry:
Branching Chain Reactions – Hydrogen oxygen reaction - lower and upper explosion limits - Fast reactions - Study of kinetics by flow methods - Relaxation methods - Flash photolysis. Acid base catalysis –protolytic and prototropic mechanism. Enzyme catalysis - Michelis-Menten kinetics.

Photochemistry:
Quantum yield and its determination, Actinometry, Reactions with low and high quantum yields, Photo sensitization, Exciplexes and Excimers, Photochemical equilibrium, Kinetics of collisional quenching - Stern- Volmer equation.

Unit-V:
Radioactivity and Isotopes: Introduction to radioactivity, properties of alpha rays, beta rays and gamma rays, theory of radioactive disintegration, rate of disintegration, Geiger – Nuttal rule, radioactive equilibrium. Isotopes - radioactive and non-radioactive isotopes, group displacement law. Analysis of isotopes – Aston's mass spectrograph, Dempster's method, Bainbridge's method. Separation methods of isotopes. Applications of Radio isotopes in Industry and medicine.

Course Learning Outcome(S):
After studying this paper, students will acquire the knowledge of Third law of Thermodynamics and Statistical thermodynamics, Polymer chemistry and Raman Spectroscopy, Electro Chemistry, Chemical kinetics and Photo chemistry, Radio activity and isotopes.

Text books/ Reference books:

1. Physical chemistry, G.K. Vemulapalli (Prentice Hall of India).
2. Physical chemistry, P.W. Atkins. ELBS.
3. Chemical kinetics - K.J. Laidler, McGraw Hill Pub.
4. Text book of Physical Chemistry, Samuel Glasstone, Macmillan pub.
5. Statistical Thermodynamics - M.C.Gupta.
6. Polymer Sceince, Gowriker,Viswanadham, Sreedhar.
7. Quantitative Analysis, A.I. Vogel, Addison Wesley Longmann Inc.
8. Physical Chemistry by G.W.Castellan, Narosa Publishing House, Prentice Hall.
9. Physical Chemistry by W.J. Moore, Prentice Hall.
10. Polymer Chemistry by Billmayer.
11. Fundamentals of Physical Chemistry by K K. Rohatgi-Mukherjee. Wiley Eastern Ltd publications.
12. Statistical Thermodynamics by M.Dole.
13. Fundamentals of photochemistry by Rohatgimukherjee, New Age international Publications.

14. Essentials of Nuclear chemistry by H.J.Armikar, New Age international Publications.

NOTE: Percentage ofChange

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II SEMESTER

Paper Code & Title: 22PG201: RESEARCHMETHODOLOGY&INTELLECTUAL PROPERTYRIGHTS(IPR)

No. of hours per week: 04 **Total credits: 03**
Total marks: 100 **(Internal: 30 M & External: 70M)**

Course: Research Methodology & Intellectual Property Rights (IPR) (code 22PG201)		
S.No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Memorize the basic concepts of research and its methodologies.	2,7
2	Understand some basic and advanced concepts of research and its methodologies.	1,4,7
3	Demonstrate the ability to choose methods appropriate to research aims and objectives.	1,3,6
4	Analyze the role of research methodologies in designing the new strategies.	1,4,5

UNITI

FoundationsofResearch

MeaningofResearch–DefinitionsofResearch–MotivationinResearch–GeneralCharacteristicsofResearch–CriteriaofGoodResearch–TypesofResearch–ResearchProcess–ResearchMethodsvs.Methodology–DefiningandFormulatingtheResearchProblem – Review of Literature – Approaches to Critical Literature Review – Importance ofLiterature Review in Identifying Research Gaps and Defining a Problem – Development ofWorkingHypothesis.

UNITII

ResearchDesign,SamplingConcepts,andDataCollectionMethods

Meaning,SignificanceandCharacteristicsofGoodResearchDesign–TypesofResearchDesign: Exploratory, Conclusive Research andExperimental – Sampling Theory:Types ofSampling and Errors in Sampling – Data Collection: Types of Data – Data Collection Methodsand TechniquesforPrimaryand SecondaryData.

UNITIII

Measurement & Scaling Techniques, Hypothesis Formulation and Testing, Overview ofDataAnalysis and Report Writing

Basic measurement scales – Reliability & Validity – Definition and Types of Hypothesis – Hypothesis Formulation and Testing Procedure – Overview of Data Analysis: Methods, Processand Types – Report Writing: Significance of Report Writing, Different Steps in Writing Report,Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing aResearch Report, Precautions for WritingResearchReports– HowtoWriteaResearchProposal, Research Ethics,ConflictofInterestandPlagiarism.

UNITIV

IntellectualPropertyRights(IPR)

DefinitionandNatureandFeaturesofIntellectualPropertyRights(IPR)– TypesofIntellectualPropertyRights – Procedurefor Grantsof Patents–Rights ofaPatent –Scopeof aPatentRights
– LicensingandTransferofTechnology–Whyprotectionofintellectualpropertyisimportant?
– EnforcementofIPR–InfringementofIPR.

UNITV

IndianandInternationalScenarioandNewDevelopmentsinIPR

IPR Developments in India for the past Five Years – Development of IPR Laws in India – International Cooperation onIPR– New DevelopmentsinIPR– Administration of PatentSystem–InternationalPatent protection– CaseStudies inIndianandGlobal Contexts.

REFERENCEBOOKS:

1. Garg,B.L.,Karadia,R.,Agarwal,F.andAgarwal,U.K.,2002,AnintroductiontoResearchMethodology,RBSA Publishers.
2. Cohen,L.Lawrence,M.,&Morrison,K.(2005),ResearchMethodsinEducation(5thedition).Oxford: Oxford UniversityPress.
3. Kothari,C.R.,1990,ResearchMethodology:MethodsandTechniques,NewAgeInternational.
4. Dornyei,Z.(2007).ResearchMethodsinAppliedLinguistics.Oxford:OxfordUniversityPress.
5. Anthony,M.,Graziano,A.M.andRaulin,M.L.,2009,ResearchMethods:AProcessofInquiry,Allynand Bacon.
6. Fink,A.,2009,ConductingResearchLiteratureReviews:FromtheInternettoPaper.SagePublications.
7. Day,R.A., 1992,Howto Writeand Publisha ScientificPaper,CambridgeUniversityPress.
8. Wadehra,B.L.2000,Law relatingtopatents, trade marks,copyright designsandgeographicalindications.UniversalLaw Publishing.
9. Coley,S.M.andScheinberg,C.A.,1990,ProposalWriting,SagePublications.
10. Carlos,C.M.,2000.Intellectualpropertyrights,theWTOanddevelopingcountries:theTRIPSagreement and policyoptions,ZedBooks,New York.
11. Leedy,P.D.andOrmrod,J.E.,2004,PracticalResearch:Planning andDesign,PrenticeHall.
12. Satarkar,S.V., 2000. Intellectual propertyrightsand Copyright.EssEss Publications

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II SEMESTER Paper Code & Title: 22CH2E1: MOLECULAR SPECTROSCOPY

No. of hours per week: 04 **Total credits: 04**
Total marks: 100 **(Internal: 30 M & External: 70M)**

Course: Molecular Spectroscopy (code 22CH2E1)		
S.No	COURSE OUTCOMES	PO`S
	The graduate will be able to	
1	Memorize the basic principles and theory involved in molecular absorption spectroscopy.	2,7
2	Comprehend the advanced concepts of molecular absorption spectroscopy.	1,2,5
3	Apply the knowledge of spectroscopy in calculating the bond length, identifying the functional group present in molecules.	1,5,6
4	Identify the role UV – visible spectroscopy in the determination of absorption maximum and ESR spectroscopy in studying the properties of paramagnetic substances.	1,3,4

UNIT- I

Introduction to Molecular Spectroscopy: Motion of molecules-Degrees of freedom – Energy associated with the degrees of freedom-Type of spectra**.**

Microwave spectroscopy: Classification of molecules, rigid rotator model, effect of isotopic substitution on the transition frequencies, Intensities non-rigid rotator-Microwave spectra of polyatomic molecules.

UNIT – II

Infrared spectroscopy:

Harmonic oscillator, vibrational energies of diatomic molecules, zero point energy, force constant and bond strengths, anhormonicity Morse potential energy diagram. Vibration – rotation spectroscopy. PQR braches, Born – oppenheimer approximation, Break down Born – openheimer approximation, normal modes of vibration group frequencies, overtones, hot bands, application of IR spectra to polyatomic molecules.

UNIT – III

Unit-II: Raman Spectroscopy:

Classical and quantum theories of Raman effects, pure rotational, vibrational and Vibrational-rotational Raman spectra, selection rules, mutual exclusion principle, Resonance Raman spectroscopy, coherent antistrokes Raman Spectroscopy (CARS).

UNIT – IV

UV- Visible Spectroscopy:

Electronic Spectra of diatomic molecules, vibrational structure of an electronic transition, classification of bands, rotational fine structure of electronic vibrational transition. Electronic Spectra of Polyatomic Molecules.

UNIT – V

Electron Spin Resonance Spectroscopy:

Basic Principles, zero field splitting and kranners's degeneracy, factors affecting the 'g' value. Istropic and anisotropic hyperfine coupling constants, spin hamiltenia, spin densities measurement techniques - simple applications like methyl radical, ethyl radical etc.,

Text books/ Reference books:

1. Introduction to Spectroscopy – D. L. Pavia, G.M. Lampman, G. S. Kriz, 3rd Ed. (Harcourt college publishers).
2. Absorption spectroscopy of organic molecules – V. M. Parikh
3. Nuclear Magnetic Resonance – Basic Principles- Atta-Ur-Rehman, Springer-Verlag (1986).
4. Molecular spectroscopy by Kalidas&B.K.Sharma
5. Vibrational Spectroscopy by D.N.Sathyanarayana New Age Int. Pub.
6. Spectroscopy by Aruldas.
7. Symmetry & Spectroscopy of molecules by K.Veerareddy

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II SEMESTER

Paper Code & Title: 22CH2E2: INSTRUMENTALMETHODSOFANALYSIS
No. of hours per week: 04 **Total credits: 04**
Total marks: 100 **(Internal: 30 M & External: 70M)**

Course: Instrumental Methods of Analysis (code 22CH2E2)		
S.No	COURSE OUTCOMES	PO`S
	The graduate will be able to	
1	Memorize the basic principles of the modern methods of analysis.	2,7
2	Understand the basic and advanced concepts of modern methods (i.e Instrumental methods) of analysis.	1,2,7
3	Apply the instrumental methods of analysis in any chosen job role.	1,4,5
4	Interpret the role of these instrumental methods in the quantitative determination of constituents.	1,3,6

UNIT-I: **Spectro-analytical methods of analysis** :**Flamephotometry:**
Theory,instrumentation, combustion flames, detectors and analysis of Na, K, Ca, Mg.
Atomic AbsorptionSpectrometer: theory, instrumentation, flame and non-flame techniques, resonancelinesources,hollowcathodelamp,chemicalandspectral interferences, applications with specialreference to analysis of trace metalsin oils,alloysandtoxic metals in drinking waterandeffluents.
Inductively coupled plasma spectrometer (ICP-AES, ICP-MS):
Principles, instrumentation,plasma ,AESdetectors,quadrupolemassspectrometers,differencebetweenthetwodetectors,applications.

UNIT-II:ThermalmethodsofAnalysis:Thermometry
:Theory,instrumentation,applicationswith specialreference to $CuSO_4.5H_2O$,$CaC_2O_4.2H_2O$, $CaCO_3$, $(COOH)2.2H_2O$
Differential thermal analysis: Principle, instrumentation, difference betweenTGandDTA-applicationswithspecialreferencetotheclaysandminerals,coals(fuels).
Differential scanningcalorimetry : Principle, instrumentation, applications to inorganic materials like chlorates and per chlorates, ammonium nitrate, organic compoundsand drugs.

UNIT-III: Electro analytical Methods-1: Polarographic analysis:
Principle and Instrumentation, Dropping mercury electrode (DME),advantages and disadvantages of DME, qualitative and quantitative analysis of inorganic ions-Cu, Bi,Pb,Cd,Zn,ACpolarography,pulsepolarography.
Anodestrippingvoltametry:Principle,instrumentation,Hanginmercury dropelectrode,applicationintheanalysisofPbandCdinenvironmentalsamples,principle ofcathode strippingvoltametry.

UNIT-IV: **Electro analytical methods -2** Principle,importanttermsin electrogravimetry, decomposition voltage or decomposition potential, over voltageandtheirimportance,instrumentation,electrolysisatconstantcurrent,determinationofCu^{2+} by constant current electrolysis, electrolysis at controlled potentials, determination of Cu, Pb,Sn in brass and bronze by controlled potential electrolysis.

Coulometricanalysis: Principlesof coulometric analysis with constant current and controlled potential, coulometric analysiswithcontrolledpotential,applicationsofcoulometricmethodsforthe analysis of cations-As(III), Fe(II) and I$^-$and S^{2-}by using I_2 liberations and Ce^{4+} liberation in solutions.

UNIT-V: **Electro analytical methods-3 Amperometry:**Introduction, principle, conditionsfor performing amperometric titrations, advantages, titrations with rotating platinum electrode,applications.

Biamperometry: Principle,biamperometrictitrationsanditscurves,applications.

Cyclicvoltametry: Basic principles,applications.

Referencebooks:

1. Instrumentalmethodsof analysis- H.HWillard,MerittJr.andJ.ADean.
2. Principlesofinstrumentalanalysis-SkoogandWest.
3. Vogel's Textbook of Quantitative Inorganic analysis - J. Basset, R.C. Denney, G.H. Jeffereyand J.Madhan.
4. Instrumentalmethodsof analysis-B.KSarma,GoelPublishingHouse,Meerut.
5. Instrumentalmethodsof Analysis-ChatwalandAnand.
6. InstrumentalmethodsofAnalysis-EwingW.Wendtland.
7. ThermalAnalysis,John WileySons, NewYork.

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II SEMESTER

Paper Code & Title: 22CH2E3: ANALYSIS OF DRUGS, FOODS, DAIRY PRODUCTS & BIOCHEMICALANALYSIS

No. of hours per week: 04 **Total credits: 04**
Total marks: 100 **(Internal: 30 M & External: 70M)**

Course: Analysis Of Drugs, Foods, Diary Products &BiochemicalAnalysis (code 22CH2E3)		
S.No	COURSE OUTCOMES	PO`S
	The graduate will be able to	
1	Memorize the basic principles of analysis drugs. Food, dairy products and biological analysis.	2,7
2	Understand the basic and advanced concepts of drugs. Food, dairy products and biological analysis.	1,4,7
3	Apply the analysis of drugs, foods, dairy products and biological analysis in any chosen job role.	1,4,6
4	Interpret the role of the analysis of drugs, foods and biological analysis, quantitatively.	1,3,5

UNITI

Analysisofthefollowingdrugsandpharmaceuticalspreparations:(Knowledgeofmolecularformula, structure and analysis) Analysis of analgesics and antipyretics like aspirin and paracetamolAnalysisof antimalerialslikecholoroquine.Analysisof drugsinthetreatmentofinfectionsandinfestations: Amoxycillin., chloramphenicol, metronidazole, penicillin, tetracycline. Anti tuberculousdrug-isoniazid.

UNITII

Analysisofthefollowingdrugsandpharmaceuticalspreparations:(Knowledgeofmolecularformula,structureandanalysis)Analysisofantihistaminedrugsandsedativeslike:allegra,zyrtec(citirizine),alprazolam,trazodone,lorazepem.

UNITIII

Analysis of anti epileptic and anti convulsant drugs like phenobarbital and phenacemide. Analysis ofdrugsusedincaseofcardiovasculardrugs:atenolol,norvasc(amlodipine),AnalysisofLipitor(atorvastatin)adrugforthepreventinofproductinofcholesterol.
Analysis of diuretics like: furosemide (Lasix), triamterene Analysis of prevacid (lansoprazole) a drugusedforthepreventionofproductionofacidsinstomach.

UNITIV

Analysis of Milk and Milk Products: Acidity, total solids, fat, total nitrogen, protenines, lactose,phosphate activity,casein,chlorideAnalysis offoodmaterials.

Preservatives: Sodium carbonate, sodium benzoate sorbic acid Flavoring agents - Vanilla, diacetyl,isoamyl acetate, limonene, ethylpropionate, allyl hexanoate and Adulterants in rice and wheat, wheatflour,sago,coconutoil,coffeepowder,teapowder,milk.

UNITV

ClinicalAnalysisofBlood: Compositionofblood,clinicalanalysis,traceelementsinthebody.Esti mationofblood cholesterol,glucose,enzymes,RBC &WBC,Bloodgasanalyser.

ReferenceBooks:

1) F.J.Welcher-Standardmethodsofanalysis,
2) A.I.Vogel-AtextbookofquantitativeInorganicanalysis-ELBS,
3) F.D.Snell&F.M.Biffen-Commercialmethodsofanalysis-D.B.Taraporavala&sons,
4) J.J.ElvingandI.M.Kolthoff- Chemicalanalysis-Aseriesofmonographson
5) Analyticalchemistryanditsapplications--InterScience-VolItoVII.,
6) AanalyticalAgricultrualChemistrybyS.L.Chopra&J.S.Kanwar-KalyaniPublishers
7) Quantitativeanalysisofdrugsinpharmaceuticalformulationsby P.D.Sethi,CBSPublishersand Distributors,NewDelhi.
8) G.Ingram-Methodsoforganicelementalmicroanalysis-ChapmanandHall.
9) H.WincciamandBobbles(HenryJ)-Instrumentalmethodsofanalysisoffood additives.,
10) H.Edward-TheChemicalanalysisoffoods;Practicaltreatiseontheexaminationoffoodstuffsandthe detectionofadulterants,
11) Thequantitativeanalysisofdrugs- D.C.Garratt-Chapman&Hall,
12) AtextbookofpharmaceuticalanalysisbyK.A.Connors-Wiley-International,12.Comprehensivemedicinalchemistry-EdCorwinHanschVol5,PergamonPress.

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II SEMESTER
Paper Code & Title: 22CH2L1: ORGANIC CHEMISTRY PRACTICAL-II

No. of hours per week: 06 **Total credits: 03**
Total marks: 100 **(Internal: 30 M & External: 70M)**

Practical – I – Organic Chemistry (22CH2L1)

S.No	COURSE OUTCOMES	PO`S
	After completion of the course, the student will be able to :	
1	To understand the importance of organic compound synthesis and identify various functional groups in the given organic compound by using systematic procedures.	1,5,7
2	To get familiarized with the procedures of different steps involved in the compound synthesis and solubility nature of organic substances of different functional groups.	1,4,6
3	To understand mechanism for synthesis and formation of derivatives of functional groups.	1,3,6
4	To apply the procedure of recrystallisation of organic compounds and preparation of functional group derivatives as and when required.	1,6,3

List of experiments:

1. Preparation of organic compounds: Single stage preparations by reactions involving nitration, halogenation, oxidation, reduction, alkylation, acylation, condensation and rearrangement. (A student is expected to prepare at least 5 different organic compounds by making use of the reactions given above).
2. Preparation of organic compounds: Two stage preparations by reactions involving nitration, halogenation, oxidation, reduction, alkylation, acylation, condensation and rearrangement. (A student is expected to prepare at least 5 different organic compounds by making use of the reactions given above).
3. Systematic qualitative analysis of organic compounds with different functional groups (5 different compounds)

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of
Organic chemistry practical.

Text books/ Reference books:
1. A.I.Vogel, "A Text Book of Practical Organic Chemistry", Longman

2. A.I.Vogel, "Elementary Practical Organic Chemistry", Longman
3. Practical Organic Chemistry, F.G.Mann and B.C.Saunders, Longman.
4. Reaction and Synthesis in Organic Laboratory, B.S.Furniss, A.J.Hannaford, Tatchell, University Science Books Mills valley.
5. Purification of Laboratory chemicals, manual, W.L.F. Armarego EDD Perrin.
6. Reaction and Synthesis in Organic Chemistry Laboratory, Lutz-Friedjan-Tietze, TheophilEicher, University Science Book.

NOTE: Percentage ofChange - 0% (Sem – I & II merged)

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II SEMESTER

Paper Code & Title: 22CH2L2: PHYSICAL CHEMISTRY PRACTIAL

No. of hours per week: 04 **Total credits: 03**
Total marks: 100 **(Internal: 30 M & External: 70M)**

Course: Physical chemistry (code 22CH2L2)		
S.No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Develop skills in problem solving, critical thinking and analytical reasoning in finding the CST of phenol water system and partition coefficient of benzoic acid between benzene and water, potentiometric tritrations of Fe(II) with $K_2Cr_2O_7$.	1,2,5
2	Determine the rate constants of first and second order reactions, P^H and conductance of strong &weak acids and bases.	1,2,5
3	Understand the practical knowledge on Beer's law	3,5
4	Communicate the results of analysis with ethics and responsibility	1,2,4

List of experiments:

1. Relative strengths of acids by studying the hydrolysis of ethyl acetate / methyl acetate.
2. Determination of equilibrium constant of KI3 KI + I2 by partition coefficient.
3. Determination of unknown concentration of potassium iodide by partition coefficient method.
4. Distribution coefficient of Benzoic acid between Benzene and water.
5. Determination of critical solution temperature of phenol-water system.
6. Study of the effect of electrolyte on the miscibility of phenol-water system.
7. Determination of Coordination number of cuprammoniumcation.
8. Potentiometric determination of Fe(II) with Cr (VI).
9. Potentiometric determination of Fe(II) with Ce (IV).
10. pH-metric determination of strong acid with strong base.
11. Conductometric titration of strong acid with strong base.
12. Conductometric titration of strong acid + Weak acid with strong base.
13. Dissociation constant of weak acid (CH3COOH) by conductometric method.
14. Determination of cell constant.
15. Verification of Beers Law using potassium permanganate/Potassium dichromate.

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of
Inorganic and Physical chemistry experiments.

Text books/ Reference books:

1. Experimental Physical chemistry by V.D. Athawale, Paul Mathur, New Age International publishers.
2. Physical chemistry experiments by V. P. Kudesia, Pragati Prakasan publishers.
3. Advanced practical Physical chemistry by J.B. Yadav, Krishna's educational publishers.

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IV SEMESTER

22CH4T1: MOOCS – ANALYTICAL CHEMISTRY

Course:MOOCS - ANALYTICAL CHEMISTRY		
S.No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Memorize basic concepts of analytical chemistry, chemical equilibrium, absorption spectrometry, thermal methods of analysis and potentiometry.	2,7
2	Understand the principle, theory and advanced aspects of analytical chemistry, chemical equilibrium, absorption spectrometry, thermal methods of analysis and potentiometry.	1,3,7
3	Display the knowledge gained in the areas of analytical chemistry, chemical equilibrium, absorption spectrometry, thermal methods of analysis and potentiometry in chosen job role.	1,6,4
4	Analyse the role of analytical chemistry, chemical equilibrium, absorption spectrometry, thermal methods of analysis and potentiometry as and when required.	1,5,7

UNIT – 1

Basic introduction to nature of analytical chemistry Quantitative methods Qualitative methods , Flow diagrams ,Chemistry in toxicology ,Examples for quantitative and qualitative methods, real life examples ROLE : sample preparation basic techniques for analysis physical separation , separation in liquids ,micro analytical balance ,filtration techniques ,wet washing ,dry Ashing , crucibles, filter paper uses of crucibles and filter papers stereo chemical modes are applied [supra +supra] : supra-anta Antra, supra Antra- anta.

UNIT - 2

Chemical equilibria, Chemical equilibria in nature chemical equilibria in analytical chemistry, equilibria between strong and week acids , equilibrium state, different acids, types of equilibria as basis of chemical analysis, equilibria and equilibria constants , importance in analytical chemistry, salt hydrolysis, titration curves , common ion effect , formation constant for complex ions, Introduction from different titrimetric methods, hendersonhesselbalch equation, spectro chemical methods , acid base titrations, acid base titration indicators.

UNIT- 3

Absorption Spectrometry , instruments , beers law, different transitions , chromophores , d-d , f-f, C-T transitions and applications, chromophoric reagents , analysis of mixture , applying beers law to mixtures , applications – photometric titrations, spectro photometric titrations, A) complexing agent B) complex ion in solution , infrared absorption spectroscopy A)theory B) principle C) instrumentation for IR, FTIR techniques A) theory B) principle, instrumentation of FTIR , uses and interterometer.

UNIT – 4

Thermal method of analysis, Introduction ,dynamic measurement, thermo gravimetric analysis, differential thermal analysis , differential scanning calorimerty, thermo balance, thermal

techniques and uses , thermal analysis – solids , Standardisation, geometric estimation, water content, TG-plot , thermo gravimetry – example, mixture of solids in TG, introduction of DTG, samples , furnaces and crucibles, DT, uses of DTG data, food analysis, introduction to DTG, DTA , instruments, uses and applications, DSC, instruments uses and applications, Introduction, electron transfer reactions, electrodes, electrode potential, standard electrode potential, nernest equation, applications of nernest equation, precipitaion /complex ions in nernest equation, electro chemical method of analysis, potentiometry, reference electrode

UNIT 5

Potentiometers, cells, potentiometric titrations, Use of oxidising and reducing agents , redox potential, potentiometric titrations, uses of oxidising and reducing agents, electrode potentials, IR drop In electrochemical cells, ohmic potential electro gravimetric method , controlled potential coulrometry, Its uses in synthesis , colorimetric titrations Applications, electrochemical methods, volumetric methods, analytical method , voltametry, cyclic voltametry – waveforms , CV plot, CV and its application to identity, potential pulses, Differential pulses.

Reference Books:

1. Physical chemistry, G.K. Vemulapalli (Prentice Hall of India).
2. Physical chemistry, P.W. Atkins. ELBS**.**
3. Text book of Physical Chemistry, Samuel Glasstone, Macmillan pub.
4. Quantitative Analysis, A.I.Vogel, Addison Wesley Longmann Inc.
5. Fundamentals of Analytical Chemistry, Skoog & West
6. Quantitative Analysis, Day & Underwood.
7. Instrumental Methods of Analysis, H.H.WAILLARD, Merritt.Jr and J.A.D.Can
8. Instrumental Methods of Analysis, Ewing W.Wend&Pand
9. Instrumental Methods of Analysis, B.K.Sharma
10. Instrumental Methods of Analysis, Chatwel& Anand.
11. Analytical Chemistry, An introduction, D.A.Skoog, D.M.West&F.J.Holler, Sanders college Publishing,
Newyork.

22CH4T2A:HETE RO CYCLIC CHEMISTRY

Course:HETERO CYCLIC CHEMISTRY		
S.No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Memorize the synthetic routes and reactions related to three, four, five, six membered and fused heterocyclic compounds.	2,7
2	Understand the concepts of synthesis and reactions of three, four, five, six membered and fused heterocyclic compounds.	1,7
3	Apply the conceptual knowledge gained in the synthesis and reactions of organic synthesis three, four, five, six membered and fused heterocyclic compounds as and when required.	1,6,4
4	Analyse and categorize the various reactions involved in the synthesis of three, four, five, six membered and fused heterocyclic compounds	1,5,7

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on Heterocyclic Chemistry.

UNIT-I

Definition, Classification and Nomenclature (Hantzsch Widman System) of hetero cycles.
Three membered Heterocyclic Compounds: Synthesis, reactivity, and importance of the following ring systems: Aziridines, Oxiranes, Thiiranes, azirine.

UNIT-II

Four membered Heterocyclic Compounds: Synthesis, reactivity, and importance of the following ring systems :Azitidines, oxetanes, Thietanes.
Fused systems: Synthesis and reactivity of Penicillins G and V.

UNIT-III

Five membered Heterocyclic Compounds with two hetero atoms: Synthesis, reactivity, aromatic character, and importance of the following heterocycles: Pyrazole, Imidazole, Oxazole, Isoxazole, Thiazole.
Fused systems: Synthesis and reactivity of Indoles and Benzimidazoles.

UNIT-IV

Six-membered Heterocyclic Compounds with two hetero atoms: Synthesis, reactivity, aromatic character and importance of the following heterocycles: Pyridazines, Pyrazine, Oxazine, Thiazine.
Fused systems: Acridines and Benzodiazines.

UNIT- V

Larger ring and other Heterocycles: Synthesis and reactivity of Azepines, Oxepines and Thiepines. Synthesis and reactivity of Benzodiazepines.

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of Heterocyclic Chemistry.

Reference books:

1. Some Modem Methods of Organic Synthesis W.Caruthers, Cambridge University Press, Cambridge.
2. Organic Synthesis viz Boranes, HerbetC. BrownGray, W.KramerAlanB.Levy and M.MarkMidland JohnWilly&Sons, NewYork.
3. Heterochemistry, T.L.Gilchrist, Longman science and tech.
4. Anintroduction to the Chemistry of Heterocyclic Compounds, R.M.Acheson, Interscience Publishers, NewYork
5. Principle of Organic Chemistry, RocNorman, J.M.Coxon, Nelson Throms
6. Advanced Organic Chemistry, F.ACarey and R.J.Sundberg. Plenum.
7. Heterocyclic chemistry by Jai JackLie, Springer publications.

22CH4T2 B: GREEN CHEMISTRY

Course:GREEN CHEMISTRY		
S.No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Memorize the principles of green chemistry and concepts related to green organic synthesis.	2,7
2	Understand the role and significance of green organic synthesis.	1,5,7
3	Exercise the basic and advanced knowledge gained in green organic synthesis in chosen job role.	1,4,6
4	Analyse how far green methods are environmentally benign over conventional methods of synthesis.	1,3

Unit-I

Principles of Green Chemistry: Prevention of waste / by-products, atom economy, Hazardous products-Designing of safer chemicals-energy requirements Selection of appropriate solvents and starting materials-Use of protecting groups and catalysis-Designing of biodegradable products. green organic synthesis of paracetamol, catechol, adipic acid, urethane and ibuprofen.

Unit-II

Microwave assisted reactions: Theory ofMicrowave, advantages, disadvantages, applications-water as solvent: Hoffmann elimination, hydrolysis, oxidation of Toluene, oxidation of alcohols, hydrolysis of methyl benzoate to benzoic acid.

Organic solvents: Esterification reactions, Fries rearrangement, Ortho ester Claisen rearrangement, DielsAlder reactions, synthesis of chalcones, decarboxylation.

Solid state reactions (solvent free): De acetylation, deprotection, saponification of esters, synthesis of anhydrides from dicarboxylic acid, synthesis of nitriles from aldehydes.

Unit-III

Phase Transfer Catalysis: Definition, Mechanism, Types, advantages and applications of PTC – C-alkylation, N-alkylation, Darzen's reaction, Wittig reaction, Benzoyl cyanides from benzoyl chloride, alcohols from alkyl halides, Crown ethers – Introduction,synthetic applications: esterfication, saponification, Anhydride formation, $KMnO_4$ oxidation, aromatic substitution, elimination.

Unit-IV

Ultrasound assisted green synthesis: Introduction, instrumentation, types of sono chemical reactions – Homogeneous reactions – Curtius rearrangement of Benzoyl azide to phenyl isocyanate. Heterogeneous Liquid-Liquid reactions - Esterification, saponification, Hydrolysis, substitutions, additions. Heterogeneous Solid – Liquid Reactions–oxidation, reduction, hydroboration, coupling, Bouveault reaction, Strecker reaction.

Unit-V

Ionic liquids: Definition-Types of Ionic Liquids- properties- Application in organic synthesis-alkylation, allylation, oxidation, hydrogenation, hydroformylation, alkoxycarbonylation, carbon-carbon bond forming reactions-suzuki coupling, Heck reaction, stille coupling.

Textbooks/Referencebooks:

1. New Trends in Green Chemistry by V.K.Ahluwalia, M.Kidwai.
2. Green Chemistry: Environment Friendly Alternatives by Rashmi Sanghi, M.M.Srivastava
3. Green Solvents for Organic Synthesis by V.K.Ahluwalia, RajenderS.Varma.
4. Organic synthesis – special Techniques, V.K.Ahluwalia, Renu Aggarwal.
5.Green Chemistry - V.K.Ahluwalia, Ane Books Pvt. Ltd.,

22CH4T3 A: TECHNIQUES FOR MODERN INDUSTRIAL APPLICATIONS

COURSE :TECHNIQUES FOR MODERN INDUSTRIAL APPLICATIONS		
S.No	COURSE OUTCOMES:	PO`S
	The student will be able to	
1	Comprehend the concepts of purification methods and chromatographic methods.	2,7
2	Exercise the knowledge gained in purification and chromatographic techniques in their chosen job role.	1,4,6
3	Assess that how far the purification and chromatographic techniques are useful in assessing the purity of the compound.	1,3,7
4	Evaluate that how far a compound is purified / separated using purification and chromatographic techniques.	1,5,7

UNIT-I

Classical Methods of purification Recrystallization: Basic principle, choice of solvent, seeding, filtration, centrifugation and drying. Concepts of fractional crystallization.
Distillation: Basic principle. Distillation types- continuous distillation, batch distillation, fractional distillation, vacuum distillation and steam distillation.

UNIT-II

Thin Layer chromatography:

Basic Principle, Common stationary phases, Methods of preparing TLC plates, Selection of mobile phase, Development of TLC plates, Rf value. Application of TLC in monitoring organic reactions. identification and quantitative analysis.

UNIT-III

Paper chromatography:

Basic Principle, Ascending and descending types. Selection of mobile phase, Development of chromatograms, One and two dimensional paper chromatography, Applications of paper chromatography.

UNIT-IV

Gas chromatography:

Basic Principle, Different types of GC techniques. Selection of columns and carrier gases. Instrumentation. detectors; Rf values. Applications in the separation, identification and quantitative analysis of organic compounds.

UNIT-V

High Performance liquid chromatography(HPLC):

Basic Principle, Normal and reversed Phases. Selection of column and mobile phase. Instrumentation. Detectors; Rf values. Applications in the separation, identification and quantitative estimation of organic compounds.

REFERENCE BOOKS:

1. Principles of Instrumental Analysis by D. A. Skoog, F. J. Holler and T. A. Nieman, Harcourt College Pub.
2. Separation Techniques by M. N. Sastri, Himalaya Publishing House (HPH), Mumbai.
3. Bio Physical Chemistry by A. Upadhyay, K. Upadhyay and N. Nath,(HPH) , Mumbai.
4. A Hand Book of Instrumental Techniques for Analytical Chemistry- Ed-F. A. Settle, Prearson Edn, Delhi.27
5. Introduction to Organic Laboratory Techniques-D. L. Pavia, G. M. Lampman,G. S. Kriz and R.
   G. Engel, Saunders College Pub (NY).
6. Instrumental methods of Chemical Analysis by B. K. Sharma, Goel Publish House, Meerut.
7. Instrumental methods of Chemical Analysis by H. Kaur, Pragati Prakasan, Meerut.
8. Protein Purification-Principles and practice, III Edn- R. K. Scopes, Narosa Publishing House , Delhi.

22CH4T3 B : NANO CHEMISTRY

Course:NANO CHEMISTRY		
S.No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Memorize the basic concepts of nanochemistry and nano materials.	2,7
2	Understand the basic and advanced concepts of nanochemistry and nano materials	1,5,7
3	Apply the knowledge gained in the field of nanochemistry as and when required.	1,3,6
4	Analyse the role of nanochemistry in various interdisciplinary sciences.	1,5

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on Nano Chemistry.

Unit-I

Introduction to Nano chemistry: Definition of terms-nanoscale, nanomaterials, nanoscience, nanotechnology-scale of materials natural and manmade-nanoscience practiced during ancient and modern periods-contributors to the field of Nanochemistry.

Unit-II

Synthesis of Nanomaterials: Top down and bottom- up approaches-synthesis of carbon nanotubes, quantumdots, gold and silver nanoparticles.

Unit-III

Characterization of Nano materials: Electron microscopy techniques-scanning electron microscopy, transmission electron microscopy and atomic force microscopy.

Unit-IV

Application of Nanomaterials: Solar cells-smart materials-molecular electronics-biosensors-drug delivery and therapy-detection of cancerous cells.

Unit-V

NanochemistryinNature: The science behind the nanotechnology in lotuseffect-self-cleaning property of lotus-gecko foot climbing ability of geckos-water strider-anti wetting property of water striders-spider silk mechanical properties of the spidersilk.

Textbooks/ Referencebooks:

1. Nano: The Essentials: Understanding Nanoscience and Nanotechnology, T.Pradeep, McGraw-Hill Professional Publishing,2008.
2. Introduction to Nanoscience, J.Dutta, H.F.Tibbals and G.L.Hornyak, CRCpress, BocaRaton, 2008.

22CH4T4: ORGANO METALLIC REAGENTS

Course:ORGANO METALLIC REAGENTS		
S.No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Memorize the synthetic roots and applications of organo metallic reagents.	2,7
2	Appreciate the methods of synthesis and reactivity of various organo metallic reagents	1,3,7
3	Investigate the conceptual knowledge in various organo metallic reagents in organic synthesis	1,6,3
4	Assess the role of specific organic reaction reagents in the synthesis	1,6,5

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on Organometallic Reagents.

UNIT-I

Organo Magnesium and Lithium compounds: Preparation of Grignard reagents with alkyl, allyl, and propargyl halides, alkylation reaction with carbonyl compounds, esters, imines and nitriles, epoxides, acids, acid chlorides, carbondioxide, carbondisulfide, sulfurdioxide. Preparation of alkyllithium reagents, Lithium Di isopropyl amide (LDA) and its synthetic applications.

Unit-II

Organo Copper and Nickel compounds: Organo copper reagents - preparation, reactions, organocuprates, lithium organocuprates (Gilmanreagents). Organonickel compounds: π-allylnickel complexes, preparation of 1,5 cyclic dienes, nickelcarbonyl.

Unit-III

Organo Palladium compounds: Preparation of palladium reagents, π-allyl palladium complexes – formations, reactions – prenylation, formation of conjugated dienes, synthesis of macro cyclic nitrogen hetero cyclic. Heck reaction, Stille coupling reaction, Sonogashira coupling reaction, suzuki coupling reaction.

Unit-IV

Organoboranes: Preparation of Organobornaes viz hydroboration with BH_3-THF, dicylohexyl boranes, disiamylborane, thexylborane, 9-BBN and catechol boranes .protonolysis, oxidation, isomerization and cyclization. Free radical reactions of organoboranes, reactions with α-bromoketones, α-bromoesters, carbonylation, the cyanoborate process and the reaction of alkenyl boranes and trialkyltrialkynyl borates.

Unit-V

Organosilanes: Synthetic applications of organo silicon compounds, protection of functional groups, trimethylsilly ethers, sillylenolethers, trimethylsilyliodide, trimethylsilyl triflate, Peterson olefination. Synthetic applications of α-silylcarbanion and β-silylcarbonyl compounds, alkenylsilanes, Allylsilanes, the β-effect - control of rearrangement of carbonium ions by silicon.

Referencebooks:

1. Organometallic in Synthesis AManualbyMSchlosser, L.Hegedus, B.Lipshutzetal, JohnWily&sons.
2. Modern methods of organic synthesis by W.Carruthers (Cambridge).
3. Organic synthesis by H.O.House.
4. Organo metallics: Aconcise introduction, ChristophElschenbroich, 3rdedition,Willey-VCH.
5. Advanced Organic Chemistry, F.ACarey and R.J.Sundberg.Plenum.
6. Transition metals in the synthesis of complex organic molecules, Hegedus, L.S,secondedition, University Science, Book ,CA,1999.
7. Organo metallic Chemistry and Catalysis, Astruc, D,Springer Verlag, 2007.
8. Organo transition metal chemistry: Applications to organic synthesis, Davies, S.G,Pergamon Press, NewYork, 1986.

22CH4L1: ORGANIC ESTIMATIONS

Course: ORGANIC ESTIMATIONS (22CH4L1)		
S.No	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Memorize the basic principles involved in organic quantitative analysis.	2,7
2	Understand the importance of organic quantitative analysis and their use on research and industry.	1,3,4
3	Exercise the procedure of quantitative analysis in chosen job roles.	1,6,3
4	Evaluate how far these methods are accurate in quantitative determinations.	1,5

Expt. 1: Estimation of phenol (bromination method)
Expt. 2: Estimation of aniline (Bromination method)
Expt.3: Estimation of sugars –glucose and sucrose by using Fehlings solution
Expt. 4: Determination of iodine value of oil or fat
Expt. 5: Determination of saponification value of oil or fat
Expt. 6: Estimation of vitamin 'C' in lime juice.
Expt. 7: Estimation of Nitro group
Expt. 8: Estimation of formaldehyde
Expt. 9: Isolation of caffeine from tea/coffee sample.

22CH4L2: PROJECT WORK

Project: PROJECT WORK (code 22CH4L2)		
S.No.	COURSE OUTCOMES	PO`S
	The student will be able to	
1	Acquire required skills to implement theoretical knowledge gained.	1,3,4,7
2	Assimilate the required knowledge for future research through practical knowledge gained in the project work.	1,2,7
3	Gain the required ability to start up own industry.	1,4,5,6
4	Comprehend the ability to draft and communicate the practical work.	1,2,7

The project will be assigned in the final semester. The project will be performed at the established industry (or) in the department under the supervision of the faculty or research institutes. It may involve experimental and/or theoretical work as well as critical review of the literature. Each of the students has to carry out original research in a topic in accordance with the work chosen under the guidance and supervision of a teacher in the concerned Department of the college.

Dissertation must be submitted at the end of the semester which will be assessed by the external examiners. Dissertation must be prepared with introduction, Review of the literature, Experimental Session, Results and Discussion, Conclusion and References.

The final dissertation should have at least 40 – 60 pages typed in Times New Roman 12 font except Headings and side headings with 1.5 line spacing.

AG & SG SIDDHARTHA DEGREE COLLEGE OF ARTS &SCIENCE
(AUTONOMOUS) VUYYURU- 521165

Re-Accredited by NAAC with 'A' Grade

2022-2023

PG Department of Chemistry

Minutes of the meeting of Board of Studies

15-11-2022

Members Present:-

S.No	NAME		Signature
1	**Dr. V.Sreeram** Head, Dept. ofChemistry(P.G) AG & SG S College,Vuyyuru.	Chairman	
2	**Prof.C.Suresh Reddy** Department ofChemistry S.V. University,Tirupati.	University Nominee	
3	**Prof. Koya Prabakar Rao** Department of Chemistry Vignan University, Guntur.	Subject Expert	
4	**Dr.M.Sivanath** Associate prof. Dept. of Chemistry A.N.R.College, Gudivada.	Subject Expert	
5	**Dr.G.Raja** Manager(Q.A) Biophore India pharamaceuticals. Hyderbad.	Representative from Industry	
6	**Abdul Raheem**	One Post Graduate Meritorious Aluminous nominated by the Principal	
7	**N.V.Srinivasa Rao** Department of Mathematics AG & SG S College, Vuyyuru.	Representative Science Faculty Other Dept.	
8	**V.N.V.Kishore** Dept. of Chemistry(P.G) AG & SG S College, Vuyyuru	Member	
9	**Dilshad Begum** Dept. of Chemistry(P.G) AG & SG S College, Vuyyuru	Member	
10	**M.Rekha** Dept. of Chemistry(P.G) AG & SG S College, Vuyyuru	Member	

A.G. & S.G. Siddhartha Degree College of Arts &Science, Vuyyuru – 521165.
(An Autonomous College in the jurisdiction of Krishna University)

DEPARTMENT OF CHEMISTRY(P.G)

Board of Studies for the academic Year 2022-23 (Odd Semesters)

1. Agenda

Proposed agenda for Board of studies in **Chemistry** on 15/11/2022 through online mode at 04:00P.M.

1. Approval of programme structure for the batch of students admitted in the year 2022-2023onwards and if required necessary modifications can be made in the course titles of III & IV semester in later course.
2. Approval of syllabus for I semester for the batch of students admitted in the year
   2022 – 2023 as per revised guidelines / curriculum of Krishna University and with
   no revision of syllabus of III semester for the batch of students admitted in the year 2021-2022.
3. Approval of the syllabus of semester – I & III with course out comes drafted inline with levels of blooms taxonomy.
4. Approval of modified model question papers for I semester&unmodified model question papers for III semester inline with Bloom's taxonomy.
5. Any other with the permission of the chairman.

A.G.& S.G.SIDDHARTHADEGREE COLLEGE OF ARTS & SCIENCE
DEPARTMENT OF CHEMISTRY

PROPOSED COURSE STRUCTURE FOR PG PROGRAMS (SCIENCE SRTREAM)

UNDER CHOICE BASED CREDIT SYSTEM (CBCS)

W.E.F 2022-23 (R22 Regulations)

I SEMESTER

Course Code	Course Name	Teaching Hours/ week			CORE / IDC/DSE/ SEC/OEC/ MOOCS	Internal Marks	External Marks	No. of Credits
		Lecture	Practical	Tutorial				
22CH1T1	General Chemistry	4	0	0	Core	30	70	4
22CH1T2	Inorganic Chemistry	4	0	0	Core	30	70	4
22CH1T3	Organic Chemistry	4	0	0	Core	30	70	4
22CH1T4	Physical Chemistry	4	0	0	Core	30	70	4
COMPULSORY 22PG101	**Personality Development through Life Enlightenment Skills**	3	1	0	Core	30	70	3
22CH1L1	Inorganic chemistry Practical	0	6	0	Core	30	70	3
22CH1L2	Organic chemistry Practical -I	0	6	0	Core	30	70	3
TOTAL FOR FIRST SEMESTER						**210**	**490**	**25**

II SEMESTER

Course Code	Course Name	Teaching Hours/ week			CORE / IDC/DSE / SEC/OEC/MOOCS	Internal Marks	External Marks	No. of Credits
		Lecture	Practical	Tutorial				
22CH2T1	Advanced Inorganic Chemistry	4	0	0	Core	30	70	4
22CH2T2	Advanced Organicchemistry	4	0	0	Core	30	70	4
22CH2T3	Advanced Physical Chemistry	4	0	0	Core	30	70	4
COMPULSORY 22PG201	**Research Methodology & IPR**	3	1	0	SEC	30	70	3
DOMAIN SPECIFIC ELECTIVE COURSES (CHOOSE ANY ONE)								
22CH2E1	Molecular Spectroscopy	4	0	0	DSE	30	70	4
22CH2E2	Instrumental methods of Analysis	4	0	0	DSE	30	70	4
22CH2E3	Analysis of foods & Drugs	4	0	0	DSE	30	70	4
LAB PRACTICALS								
22CH2L1	Physical chemistry Practical	0	6	0	Core	30	70	3
22CH2L2	Organic chemistry Practical-II	0	6	0	Core	30	70	3
TOTAL FOR SECOND SEMESTER						**210**	**490**	**25**

At the end of 2nd semester, every student must undergo summer Internship/ Apprenticeship/Project work/Industrial training/Research based Project work for Six weeks and must prepare a report concerned as per approved project guidelines, and submit the same to the University 14 days before the commencement of third semester end examinations.

III SEMESTER

Course	Course Name	Teaching Hours/ week	CORE /	Intern	Extern	No. of

Code		Lecture	Practical	Tutorial	IDC/DSE / SEC/OEC/MOOCS	al Marks	al Marks	Credits
22CH3T1	Organic Spectroscopy	4	0	0	Core	30	70	4
DOMAIN SPE22CH3E1CIFIC ELECTIVE COURSES (CHOOSE ANY THREE)								
22CH3E1	Organic Reaction mechanism	4	0	0	DSE	30	70	4
22CH3E2	Organic Synthesis	4	0	0	DSE	30	70	4
22CH3E3	Natural Products	4	0	0	DSE	30	70	4
22CH3E4	Separation Techniques & Electro analytical techniques	4	0	0	DSE	30	70	4
22CH3E5	Marine Chemistry or Chemistry of Drugs	4	0	0	DSE	30	70	4
22CH3E6	Antibiotics, Drugs, Vitamins & Steroid harmones	4	0	0	DSE	30	70	4
LAB PRACTICALS								
22CH3L1	Organic Preparations	0	6	0	Core	30	70	3
22CH3L2	Organic Binary mixture Analysis.	0	6	0	Core	30	70	3
OPEN ELECTIVE (INTERDISCIPLINARY/MULTIDISCIPLINARY) COURSES (CHOOSE ANY ONE)								
22OE301	Polymer Chemistry	3	0	0	OEC	30	70	3
22OE302	Basic Bio Chemistry	3	0	0	OEC	30	70	3
22OE303	Basic Analytical Chemistry	3	0	0	OEC	30	70	3
		3	0	0	OEC	30	70	3
		3	0	0	OEC	30	70	3
TOTAL FOR III SEMESTER						**210**	**490**	**25**

IV SEMESTER

Course Code	Course Name	Teaching Hours/ week			CORE / IDC/DSE/ SEC/OEC/MOOCS	Internal Marks	External Marks	No. of Credits
		Lecture	Practical	Tutorial				
22CH4T1	Advanced Organic Spectroscopy	4	0	0	Core	30	70	4
DOMAIN SPECIFIC ELECTIVE COURSES (CHOOSE ANY THREE)								
22CH4E1	Green Chemistry	4	0	0	DSE	30	70	4
22CH4E2	Techniques for Modern Industrial applications	4	0	0	DSE	30	70	4
22CH4E3	Nano Chemistry	4	0	0	DSE	30	70	4
22CH4E5	Bio-organic chemistry	4	0	0	DSE	30	70	4
22CH4E6	Bio-Inorganic Chemistry	4	0	0	DSE	30	70	4
22CH4E7	Environmental chemistry	4	0	0	DSE	30	70	4
LAB PRACTICALS								
22CH4L1	Organic Estimations	0	6	0	Core	30	70	3
ENTREPRENURAL & INNOVATION/IT SKILL RELATED TO DOMAIN SPECIFIC ELECTIVE COURSES (CHOOSE ANY ONE)								
22CH4E8	Asymmetric Synthesis	3	0	0	SEC	30	70	3
22CH4E4	Organo metallic Chemistry	3	0	0	SEC	30	70	3
22CH4E9	Heterocyclic chemistry	3	0	0	SEC	30	70	3
*** CHOOSE MOOCs FROM SWAYAM/NPTEL SOURCES**								
MOOCS	22CH4M1							4
PROJECT WORK EVALUATION AND VIVA-VOCE -22CH4P1							100	4

TOTAL FOR IV SEMESTER	180	520	30

Note: Students may be allowed to register and appear for MOOCS from the third semester itself. However, students are to complete the MOOCS successfully and submit pass certificate of the same to the University through the Principal of the College concerned for approval and endorsement of the same on grade cards and PCs and ODs as per the regulations of the University.

Resolutions/ Recommendations

Resolution –I

1. It is resolved and recommended to implement the course structure as per R 22 regulations of KRU with necessary modifications as required.

Resolution –II

2. a)Resolved and recommended to implement the syllabus of course code 22CH1T1 of semester – I with 40% revision.

b)It is resolved and recommended to continue with the same syllabus for the course code 22CH1T2. However here after the course title will be referred as Inorganic chemistry instead of Inorganic chemistry – I.

c) It is resolved and recommended to continue with the same syllabus for the course code 22CH1T3. However Here after the course title will be referred as Introductory organic chemistry instead of Organic chemistry – I.

d) It is resolved and recommended to continue with the same syllabus for the course code 22CH1T4. However here after the course title will be referred as Physical chemistry instead of Physical chemistry – I.

e) It is resolved and recommended to implement the modified semester syllabus and model question papers for all the papers of first semester.

Resolution –III

3. Resolved and recommended to introduce the course outcomes in line with the guidelines of OBE following Bloom's Taxonomy for all the courses (both theory and practical) in semester – I of M.Sc (Chemistry) for the students admitted in the academic year 2022-23 and onwards.

4. Resolved to implement the revised syllabus for both theory and practicals with revision for Semester-III students admitted in the year 2021-22. The courses of semester III are listed below.

Semester – III:

Paper	Title of the Paper	Code
Paper-I	Advanced Organic Spectroscopy	20CH3T1
Paper-II	Organic Reactions& Mechanisms	20CH3T2
Paper-III	Organic Synthesis	20CH3T3A
Paper-III	Asymmetric Synthesis, Phosporus& Sulphur Reagents, Synthetic Polymers, Biomolecules & Bio organic Chemistry	20CH3T3B

Paper-IV	Environmental Chemistry and Analysis	20CH3T4A
Paper-IV	Chemistry of Natural Products	20CH3T4B
Pract-I	Organic Preparations	20CH3L1
Pract-II	Mixture Analysis	20CH3L2
Open Elective - II	Polymer Chemistry	20OECH- 2

A.G.& S.G.SIDDHARTHADEGREE COLLEGE OF ARTS & SCIENCE

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

I SEMESTER

W.E.F 2022-23 (R22 Regulations)

Title of thePaper:GENERAL CHEMISTRY

Course Code	**22CH1T1**	Course Delivery Method	Class Room / Blended Mode -
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2017- 18	Year of Offering: 2022– 23	Year of Revision:2022-23	Percentage of Revision:40 %

S.No	COURSE OUTCOMES	PO`S
	After completion of the course, the student will be able to :	
1	Recollect the concepts of titrimetric analysis, statistical rules, visible spectrophotmetryand group theory in chemistry	2
2	Identify the role of titrimetric analysis, specific statistical rules, microwave spectroscopy, Rotational vibrational spectroscopy and group theory in chemistry.	1,7
3	**D**emonstrate knowledge of titrometric analysis microwave spectroscope, rotational vibrational	1,4
4	Test the conceptual knowledge gained in titrimetric analysis, statistical rules / principles, Microwave spectroscopy, rotational vibrational spectroscopy and group theory in chemistry	1,6

Syllabus

Course Details:-

Unit	Learning Units	Lecture Hours
I	**Treatment of analytical data** : Classification of errors – Determinate and indeterminate errors –Minimisation of errors – Accuracy and precision – Distribution of random errors – Gaussian distribution – Measures of central tendency – Measures of precision – Standard deviation – Standard error of mean – student's t test – Confidence interval of mean – Testing for significance – Comparison of two means – F – test – Criteria of rejection of an observation – propagation of errors – Significant figures and computation rules – Control charts – Regression analysis – Linear least squares analysis.	12
II	**Titrimetric Analysis:**Classification of reactions in titrimetric analysis- Primary and secondary standards-Neutralisation titrations-Theory of Neutralization indicators-Mixed indicators-Neutralisation curves-Displacement titrations-Precipitation titrations-Indicators for precipitation titrations-Volhard method-Mohr method- Theory of adsorption indicators-Oxidation reduction titrations-Change of electrode potentials during titration of Fe(II)	12

	with Ce(IV)- Detection of end point in redox titrations- Complexometric titrations- Metal ion indicators-Applications of EDTA titrations-Titration of cyanide with silver ion.	
III	**Visible spectro photometry** – Theory of spectrophotometry and colorimetry, Beer-Lambert's law - Deviations from Beers law. Classification of methods of colour measurement or comparison (standard series method, Duplication method, Dilution method, photoelectric-photometer method, spectrophotometer method)- Instrumentation – Applications-determination of phosphates, chlorides, Iron, Manganese, chromium - Photometric titrations- Spectrophotometric determination of pK value of an indicator.	12
IV	**Symmetry and Group theory in Chemistry I** Symmetry elements [Rotational axis of symmetry (C n), Plane of Symmetry(σ) amd Classification ofplanes of symmetry i.e., Vertical plane(σ v) Dihedral Plane(σ d) and Horizontal Plane(σ h), Improperrotational axis of symmetry(S n), Inversion centre or Centre of symmetry(i) and Identityelement(E)]. Identification of possible symmetry elements in the molecules H_2O, NH_3 , BF_3 , CH_4 ,$[PtCl_4]^{-2}$, C_6H_6 , symmetry operation, Axioms of group theory- definition of group, sub group(Trivial and non-trivial sub groups), GMT tables- construction of GMT table Abelian(C_{2v}) and non abelian groups(C_{3v}), relation between order of a finite group and its sub group. Point symmetry group. Schoenflies symbols, Group generating elements, Classification of molecules- MLS, MHS,& MSS. Procedure to Find out Point group of a molecule (yes or no Method),	12
V	**Symmetry and Group theory in Chemistry II** Representation of groups by Matrices (representation for the Cn, C_{nv}, C_{nh}, Dn etc. groups to be worked out explicitly). Definition of Class and importance of similarity transformation in identifying symmetry class with c_{3v} as example, Character of a representation. Reducible and Irreducible representations - Mulliken notations for Irreducible representations The great orthogonality theorem (without proof) and its importance. Character tables and their use.Construction of Character table (C_{2v} and C_{3v} only). Application of group theory in IR and Raman spectroscopy taking H_2O, NH_3, BF_3 examples. Mutual Exclusion principle with special reference to cis N_2F_2 and trans N_2F_2.	12

Reference Books:

1. Vogel's text book of quantitative analysis. (3rdedition)Addition Wesley Longmann Inc.
2. Quantitative analysis R.A Day and A.L.Underwood. Prentice Hall Pvt.Ltd.
3. Fundamentals of Analytical Chemistry – Skoog and West
4. Instrumental Methods of analysis – B K Sharma.

Course Focus: Employability.

A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

I SEMESTER

W.E.F 2022-23 (R22 Regulations)

Title of the Paper: INORGANIC CHEMISTRY

Course Code	22CH1T2	Course Delivery Method	Class Room / Blended Mode
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2017-18	Year of Offering: 2022 - 23	Year of Revision: ----	Percentage of Revision: 0%

S.No	COURSE OUTCOMES	PO`S
	After completion of the course, the student will be able to :	
1	Memorize the basic concepts of quantum chemistry, co-ordination chemistry and chemical Bonding.	2
2	Comprehend the role of basic and advanced concepts of quantum chemistry, co-ordination chemistry and chemical bonding.	1,7
3	Execute the conceptual knowledge gained in the concepts of quantum chemistry, co-ordination chemistry and chemical bonding in chosen job role.	1,4
4	Investigate the role and importance of concepts of quantum chemistry, co-ordination chemistry and chemical bonding in various allied fields of chemistry.	1,7

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Introduction to Exact Quantum Mechanical Results:** Schrodinger equation, importance of wave function, Operators, Eigen values and Eigen functions, derivation of wave equation using operator concept. Discussion of solutions of Schrodinger's equation to some model systems viz. particle in one dimensional box (applications), three-dimensional box, Rigid rotator system and the Hydrogen atom. Variation theorem, linear variation principle, perturbation theory (first order and non-degenerate), Application of variation method to the Hydrogen atom.	12
II	**Chemistry of non- transition elements:** Halogen oxides and oxyfluorides, Spectral and Magnetic properties of Lanthanides and Actinides. Analytical applications of Lanthanides and Actinides. Synthesis, properties and structure of B-N, S-N, P-N cyclic compounds. Intercalation compounds. **Metal π- complexes:** preparation, structure and bonding in Nitrosyl, Dinitrogen and Dioxygencomplexes.	12
III	**Structure and Bonding:** pπ-dπ bonding, Bent's rule, Non-valence cohesive forces, VSEPR theory. Molecular Orbital theory, Molecular orbitals in triatomic (BeH_2) molecules and ions (NO_2^-) and energy level diagrams. Walsh diagrams for linear (BeH_2) and bent (H_2O) molecules.	12

IV	**Metal–ligand bonding:** Crystal Field Theory of bonding in transition metal complexes-Splitting of d-orbitals in octahedral, tetrahedral, square planar, Trigonal bipyramidal and Square pyramidal fields. Tetragonal distortions - Jahn-Teller effect. Applications and limitations of CFT. Experimental evidences for covalence in complexes. Molecular Orbital Theory of bonding for Octahedral, tetrahedral and square planar complexes. π-bonding and MOT - Effect of π - donor and π -acceptor ligands on Δo. Experimental evidence for π - bonding in complexes.	12
V	**Metal – ligand Equilibria in solutions:** Step wise and over all formation constants. Trends in stepwise formation constants (statistical effect and statistical ratio). Determination of formation constants by Spectrophotometric method (Job's method) and pH metric method (Bjerrum's). Stability correlations - Irwing -William's series. Hard and soft acids and bases (HSAB).	12

Reference Books:

1. Inorganic Chemistry Huheey, Harper and Row.
2. Physical methods in inorganic chemistry, R.S. Drago. Affliated East-West Pvt. Ltd.
3. Concise inorganic chemistry, J. D. Lee, ELBS.
4. Modern Inorganic Chemistry, W. L. Jolly, McGrawHill.
5. Inorganic Chemistry , K. F. Purcell and J. C. Kotz Holt Saunders international.
6. Concepts and methods of inorganic chemistry, B. E. Douglas and D.H.M.C.
7. Daniel, oxford Press.
8. Introductory quantum mechanics , A. K. Chandra
9. Quantum Chemistry,R. K. Prasad.
10. Inorganic Chemistry ,Atkins, ELBS
11. Advanced Inorganic Chemistry ,Cotton and Wilkinson, Wiley Eastern
12. Quantum Chemistry, Levine.
13. Text book of Coordination chemistry ,K.SomaSekharrao and K.N.K. Vani, Kalyani Publishers.
14. Theoretical Inorganic Chemistry by G.S.Manku, Tata Mc GrawHill, 2000, reprint.
15. Concise co-ordination chemistry, R.Gopal, Ramalingam, Vikas Publishing, House, 2014.
16. Inorganic Chemistry – Huheey, A.Keiter, L.Keiter, 4th edition, Pearson education, Asia.

Course Focus: Employability.

A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

I SEMESTER

W.E.F 2022-23 (R22 Regulations)

Title of the Paper: ORGANIC CHEMISTRY

Course Code	22CH1T3	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100

S.No	COURSE OUTCOMES	PO`S
	After completion of the course, the student will be able to :	
1	Recollect the basic concepts of aromaticity, reactive intermediates, addition, elimination and Substitution reactions.	2
2	Explain the basic and advanced concepts of aromaticity, reactive intermediates, addition, elimination and substitution reactions.	2,7
3	Solve high level concepts in organic chemistry with conceptual knowledge gained in aromaticity, reactive intermediates, addition, elimination and substitution reactions.	1,7
4	Exercise the knowledge about aromaticity, reactive intermediates, addition, elimination and substitution reactions in understanding the properties of organic compounds.	1,5

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Nature of bonding:** Localised and Delocalized, Delocalised chemical bonding conjugation, cross conjugation, hyper conjugation, Tautomerism. **Aromaticity**: Concept of Aromaticity, Aromaticity of five membered, six membered rings - Non benzonoid aromatic compounds:- cyclopropenylcation, Cyclobutadienyldication, cyclopentadienyl anion-tropyllium cation and cyclooctatetraenyl dianion. Homoaromaticity, Anti aromaticity	12
II	**Reactive intermediates & Reactive Species:** **Reactive intermediates:**Generation, Structure, Stability, Detection and Reactivity of Carbocations, Carbanions, Free radicals, Carbenes, Nitrenes and Arynes. **Reactive Species:** Generation and reactivity of Electrophiles, Nucleophiles, Dienophiles, Ylids.	12
III	**Addition Reactions:** Additions: Addition to carbon – carbon multiple bonds, HX, X2, HOX, stereo chemistry of addition, formation and reaction of epoxides, syn and anti hydroxylation, hydrogenation(catalytic and Non catalytic), synthetic reactions of CO and CN and Cram's rule.	12

IV	**Eliminations Reactions**:Types of elimination (E1, E1cB, E2) reactions, mechanisms, stereochemistry and orientation, Hofmann and Saytzeff's rules, Syn elimination versus anti elimination. Competitions between elimination and substitution.Dehydration, dehydrogenation, dehalogenation, decarboxylative elimination, pyrolytic eliminations.	12
V	**Substitution Reactions:** **Aliphatic Nucleophilic substitutions:**The SN^2, SN^1, mixed SN^1 and SN^2 and SNireactions : Mechanism, effect of structure, nucleophile, leaving group on substitutions. The neighbouring group mechanism, participation by σand πbonds, anchimeric assistance. **Aromatic Nucleophilic substitution:**The SN^{Ar} (Addition – Elimination), SN^1(Ar)mechanisms and benzyne mechanism (Elimination – Addition). Reactivity- effect of substrate structure, leaving group and attacking nucleophile. The Von-Richter, Sommelet – Hauser and Smiles rearrangements.	12

Reference Books:

1. Advanced organic chemistry- Reaction, mechanism and structure, Jerry March, John Wiley.
2. Advanced organic chemistry, F.A. Carey and R.J. Sundberg, Springer, New York.
3. A guide book to Mechanism in organic chemistry, Peter Sykes, Longman.
4. Organic chemistry, I.L. Finar, Vol. I & II, Fifth ed. ELBS.
5. Organic chemistry, Hendrickson, Cram and Hammond (McGraw – Hill).
6. Modern organic Reactions, H.O. House, Benjamin.
7. Structure and mechanism in organic chemistry, C.K. Ingold, Cornell University Press.
8. Principles of organic synthesis, R.O.C. Norman and J.M. Coxon, Blakie Academic & Professional.
9. Reaction Mechanism in Organic Chemistry, S.M. Mukherji and S.P. Singh, Macmillan.
10. Basic Principles of Organic Chemistry by J. B. Roberts and M. Caserio.

Course Focus: Employability &**E**ntrepreneurship

A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

I SEMESTER

W.E.F 2022-23 (R22 Regulations)

Title of the Paper: PHYSICAL CHEMISTRY

Course Code	22CH1T4	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam	70
Total Number of Lecture	60	Total Marks	100

S.No	COURSE OUTCOMES	PO`S
	After the completion of the course, Students will be able to	
1	Recall the basic concepts of thermodynamics, surface chemistry, electrochemistry, chemical Kinetics and potentiometry in detail.	2
2	Apply the spontaneous and non spontaneous reaction and derive various thermodynamic and Chemical kinetic derivations.	1,7
3	Describe the physical significance of thermodynamics, chemical kinetics and electrochemistry in Explaining the chemical properties and reactivity of molecules.	1,6
4	Analyse the important techniques of surfaces with the help of ESCA, Auger electron spectroscopy and potentiometric techniques of complexometric, neutralization, oxidation and reduction Titrations.	1,7

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Thermodynamics – I** Classical thermodynamics - Brief review of first and second laws of thermodynamics - Entropy change in reversible and irreversible processes - Entropy of mixing of ideal gases - Entropy and disorder – Free energy functions - Gibbs-Helmholtz equation - Maxwell partial relations - Conditions of equilibrium and spontaneity - Free energy changes in chemical reactions: Van't Hoff reaction isotherm - Van't Hoff equation - Clausius Clapeyron equation - partial molar quantities - Chemical potential - Gibbs- Duhem equation - partial molar volume - determination of partial molar quantities - Fugacity - Determination of fugacity - Thermodynamic derivation of Raoult's law.	12
II	**Surface phenomena and phase equilibria** - Surface tension - capillary action - pressure difference - across curved surface (young - Laplace equation) - Vapour pressure of small droplets (Kelvin equation) - Gibbs-Adsorption equation - BET equation - Estimation of surface area - catalytic activity of surfaces – ESCA , X- ray fluorescence and Auger electron spectroscopy. **Surface active agents** - classification of surface active agents - Micellization - critical Micelle concentration (CMC) - factors affecting the CMC of surfactants, microemulsions - reverse micelles - Hydrophobic interaction.	12

III	**Electrochemistry – I -** Electrochemical cells - Measurement of EMF - Nernst equation – Equilibrium constant from EMF Data - pH and EMF data - concentration cells with and without transference – Liquid junction potential and its determination - Activity and activity coefficients - Determination by EMF Method - Determination of solubility product from EMF measurements. Debye Huckel limiting law and its verification.Effect of dilution on equivalent conductance of electrolytes - Anomalous behaviour of strong electrolytes. Debye Huckel-Onsagar equation - verification and limitations, conductometric titrations.	12
IV	**Chemical kinetics-** Methods of deriving rate laws - complex reactions - Rate expressions for opposing, parallel and consecutive reactions involving unimolecular steps. Theories of reaction rates - collision theory - Steric factor - Activated complex theory - Thermodynamic aspects – Unimolecular reactions - Lindemann's theory - Lindemann-Hinshelwood theory. Reactions in solutions - Influence of solvent - Primary and secondary salt effects - Elementary account of linear free energy relationships - Hammet - Taft equation - Chain reactions - Rate laws of H_2-Br_2, photochemical reaction of H_2 - Cl_2, Decomposition of acetaldehyde and ethane - Rice-Herzfeld mechanism.	12
V	**Potentiometry:** Advantages of potentiometric methods - Reference electrode - Standard hydrogen electrode .Acid- alkali or Neutralisation titration, Oxidation – reduction titrations, Precipitation titrations, complexometric titrations, Methods of end point location (Graphical, Differentiation method, Pinkhof- Treadwell method). Calomel electrode -Indicator electrodes: Metal-metal ion electrodes - Inert electrodes -Membrane electrodes - theory of glass membrane potential - Direct potentiometry, potentiometric titrations - Applications.	12

Reference Books:

1. Physical chemistry, G.K.Vemulapalli (Prentice Hall of India).
2. Physical chemistry, P.W.Atkins. ELBS
3. Chemical kinetics - K.J.Laidler, McGraw Hill Pub.
4. Text book of Physical Chemistry, Samuel Glasstone, Macmillan pub.
5. Polymer Sceince, Gowriker,Viswanadham, Sreedhar
7. Elements of Nuclear Science, H.J.Arniker, Wiley Eastern Limited.
8. Quantitative Analysis, A.I. Vogel, Addison Wesley Longmann Inc.
9. Physical Chemistry-G.W.Castellan, Narosa Publishing House, Prentice Hall
10. Physical Chemistry, W.J.Moore, Prentice Hall
11. Polymer Chemistry – Billmayer

Course Focus: Employability.

A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

I SEMESTER

W.E.F 2022-23 (R22 Regulations)

Title of the Paper: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

Course Code	22PG101	Course Delivery Method	Class Room / Blended Mode -
Credits	3	CIA Marks	30
No. of Lecture Hours / Practical Hours Week	3/1	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100

The Course will introduce the students to

1) Learn to achieve the highest goalhappily.
2) Become a person with stable mind, pleasing personality anddetermination.
3) Learn to build positive attitude, self-motivation, enhancing self-esteem and emotional intelligence
4) Learn to develop coping mechanism to mange stress through Yoga and meditation techniques
5) Awaken wisdom amongthem.

Course Learning Outcomes:

At the end of this course the students should be able to:

- Develop their personality and achieve their highest goals oflife.
- Lead the nation and mankind to peace and prosperity
- Practice emotional selfregulation.
- Develop a positive approach to work andduties
- Develop a versatilepersonality

Syllabus

Course Details:-

Unit	Learning Units	Lecture Hours
I	**Introduction to Personality Development:-**The concept of personality - Dimensions of Personality – Theories of Personality development (Freud & Erickson) – The concept of Success and Failure – Factors responsible for Success – Hurdles in achieving Success and Overcoming Hurdles — Causes of failure – Conducting SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis.	12

II	**Attitude, Motivation and Self-esteem**:-Conceptual overview of Attitude – Types of Attitudes – Attitude Formation – Advantages/Disadvantages of Positive/Negative Attitude - Ways to Develop Positive Attitude. **Concept of motivation:** Definition and Nature of Motivation/Motive – Internal and external motives – Theories of Motivation – Importance of self- motivation- Factors leading to de- motivation. **Self-esteem**: - Definition and Nature of self-esteem – Do's and Don"ts to develop positive self- esteem – Low self esteem - Personality having low self esteem - Positive and negative self esteem.	12
III	**Other Aspects of Personality Development:-** Body language - Problem-solving - Conflict Management and Negation skills - Decision-making skills - Leadership and qualities of a successful leader – Character building -Team-work – Time management - Work ethics – Good manners and etiquette – Emotional Ability/Intelligence – Dimensions of Emotional Intelligence – Building Emotional Intelligence.	12
IV	**Neetisatakam-Holistic Development of Personality:** Verses- 19,20,21,22 (wisdom) – Verses- 29,31,32 (pride and heroism) – Verses- 26,28,63,65 (virtue) **Personality of Role Model – Shrimad Bhagwadgeeta** Chapter2-Verses 17 – Chapter 3-Verses 36,37,42 – Chapter 4-Verses 18, 38,39 – Chapter18 – Verses 37,38,63.	12
V	**Yoga & Stress Management :**Meaning and definition of Yoga - Historical Perspective of Yoga - Principles of Astanga Yoga by Patanjali – Meaning and Definition of Stress - Types of Stress - Eustress and Distress –Stress Management – Pranayama-Pranayama: Anulom and Vilom Pranayama - Nadishudhi Pranayama - Kapalabhati-Pranayama - Bhramari Pranayama - Nadanusandhana Pranayama – Meditation techniques: Om Meditation - Cyclic meditation : Instant Relaxation technique (QRT), Quick Relaxation Technique (QRT), Deep Relaxation Technique (DRT) (Theory & Practical).	12

PRACTICAL COMPONENTS:

- Students should identify different types of personality to know their own personality. Students are to describe the characteristics of their personalities and submit the same for assessment.
- Students are to form in groups (a group consists of 4-6 students) to identify and write a brief note on famous personalities of India andWorld.
- Students are required to identify different types of attitudes and give any five examples ofeach.
- Students are expected to check their attitudes and develop ways to improve their attitudes at work place andhome.
- Students are required to identify keys to self-motivation to achieve theirgoals.
- Students are expected to identify at least seven types of body language and conduct

activities with thefollowing:

S. No.	Pose	Possible Interpretations
1	Standing with your hands on your hips	Aggressive, disgusted
2	Standing upright	Confidence
3	Arms crossed on your chest	Defensive
4	Resting your hand on your cheek	Thinking
5	Touching or rubbing your nose	Doubt, lying
6	Resting your head in your hands	Boredom, tired
7	Tapping your fingers	Impatience
8	Biting your nails	Nervous, insecure
9	Playing with your hair	Insecure
10	Rubbing your eyes	Disbelief, doubt

- **Conduct the following exercise to develop communication skills – Negotiation Skills andEmpathy**

Exercise: Card Pieces

In this activity, team members trade pieces of playing cards to put together complete cards.

Uses -This exercise is useful for showing team members others' perspectives. It builds communication and negotiation skills**, and helps people to develop** empathy**.**

People and Materials

- Enough people for at least three teams oftwo.
- Playing cards – use between four and six for each person.
- A privateroom.

Time -
15minutes.
Instructions:

1. Cut each playing card into half diagonally, then in half diagonally again, so youhave four triangular pieces for eachcard.
2. Mix all the pieces together and put equal numbers of cards into as many envelopes as you haveteams.
3. Divide people up into teams of three or four. You need at least three teams. Ifyou're short of people, teams of two will work just aswell.
4. Give each team an envelope of playing cardpieces.
5. Each team has three minutes to sort its pieces, determine which ones it needsto make complete cards, and develop a bargainingstrategy.
6. After three minutes, allow the teams to start bartering for pieces. People can barter on their own or collectively with their team. Give the teams eight minutes tobarter.
7. When the time is up, count each team's completed cards. Whichever team hasthe most cards wins theround.

Advice for the Teacher/Facilitator

After the activity, ask your team members to think about the strategies they used. Discuss these questions:

1) Which negotiation strategies worked? Whichdidn't?
2) What could they have donebetter?
3) What other skills, such as **active listening**or**empathy**, did they need touse?

- **Conduct following Time management activity - Ribbon ofLife**

  Take a colored ribbon length of approximately 1 meter/100 cm. and scissors. Start with the followingquestions:

  1. If the life span of an individual is say, 100 years. Consider that each cm represents one year. The response will be that few live that long. Assuming a life of 75 to 90 years, cut 10 to 25 cm off the ribbon,accordingly.
  2. What is the average age of the participants sitting here, the response would be 25 to 30 depending on the group, in that case, cut another 25 cms of the ribbon and say that is gone you cannot do anything.
  3. What is left is 50 years? People will say, "Yes," but the answer isNO.
  4. Every year we have 52 weeks, that is 52 Sundays. If we multiply that by 50 years, it comes to 7.14 years. Reduce the ribbon by another 7.14cm.
  5. We also usually have Saturdays off, so reduce another 7.cms.
  6. Public/National holidays are 10 multiple with 50 years. That comes to another 1.5 years. Reduce ribbon by another 1.5cms.
  7. Your casual leave, sick leave, and annual holidays approx. 40 days a year, multiplied by 50. Cut off another 5 cms. Now you are left with about 29.5 years. But, the calculation is not overyet.
  8. You sleep an average of 8 hours daily; multiply that by 365 days and again by 50 years (i.e. 122 days X 50 = almost 17 years). Cut off another 17cm.
  9. You spend time eating lunch, breakfast, snacks, and dinner total 2 hours daily (i.e. 30 days a year X 50 years= 4 years or so). Cut off another 4cm.
  10. Last, let"s figure we spend about 1 hour a day travelling from place to place for activitiesandsuch.(that"sabout2moreyears).We"redownto6(SIX)yearsoflife to make it or breakit.

Exercise Decision making skills - Create YourOwn

In this exercise, teams must create their own, brand new, problem-solving activity.

Uses

This game encourages participants to think about the problem-solving process. It builds skills such as creativity, negotiation and decision making, as well as communication and time management. After the activity, teams should be better equipped to work together, and to think on their feet.

What You'llNeed

- Ideally four or five people in eachteam.
- A large, privateroom.

  Paper, pens and flipcharts

Time -Around one hour.

Instructions:

1. As the participants arrive, you announce that, rather than spending an hour on a problem-solving team building activity, they must design an original one of their own.
2. Divide participants into teams and tell them that they have to create a new problem- solving team building activity that will work well in their organization. The activity must not be one that they have already participated in or heardof.
3. After an hour, each team must present their new activity to everyone else, and outline its keybenefits.
4. **Advice for theTeacher/Facilitator**:

   There are four basic steps in problem solving: defining the problem, generating solutions, evaluating and selecting solutions, and implementing solutions. Help your team to think

creativelyat each stage by getting them to consider a wide range of options. If ideas run dry, introduce an alternative brainstorming technique, such as brainwriting . This allows your people to develop one others' ideas, while everyone has an equal chance tocontribute.
After the presentations, encourage teams to discuss the different decision-makingprocesses they followed. You might ask them how they communicated and managedtheir time . Another question could be about how they kept their discussion focused. And to round up, you might ask them whether they would have changed their approach after hearing the other teams' presentations.
Studentsareaskedtoreciteverses:26,28,63,65(virtue)ofNeetisatakam-Holisticdevelopment of personality.

Students are asked to identify personality of role Mmodels from Shrimad Bhagwadgee ta and portray the roles of thesame.
Students are asked to practice Yoga and meditationtechniques

REFERENCE BOOKS:

1. Hurlock, E.B. Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill, 2006.
2. Gopinath,Rashtriya Sanskrit Sansthanam P, Bhartrihari"sThreeSatakam, Niti-sringar-vairagya, New Delhi,2010
3. Swami Swarupananda, Srimad Bhagavad Gita, AdvaitaAshram,Publication Department, Kolkata, 2016.
4. Lucas, Stephen. Art of Public Speaking. New Delhi. Tata - Mc-Graw Hill.2001
5. Mile, D.J Power of positive thinking. Delhi. Rohan Book Company,(2004).
6. Pravesh Kumar. All about Self- Motivation. New Delhi. Goodwill Publishing House. 2005.
7. Smith, B. Body Language. Delhi: Rohan Book Company.2004
8. Yogic Asanas for Group Training - Part-I: Janardhan Swami Yogabhyasi Mandal, Nagpur.
9. Rajayoga or Conquering the Internal Nature by Swami Vivekananda, Advaita Ashrama (Publication Department),Kolkata.
10. Nagendra H.R nadNagaratna R, Yoga Perspective in Stress Management, Bangalore, Swami Vivekananda YogaPrakashan.

Online Resources:

1. https://onlinecourses.nptel.ac.in/noc16_ge04/preview
2. https://freevideolectures.com/course/3539/indian-philosophy/11

A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

I SEMESTER

W.E.F 2022-23 (R22 Regulations)

Title of the Paper: Practical – I – Inorganic Chemistry Practical

(22CH1L1)

S.No	COURSE OUTCOMES	PO`S
	After completion of the course, the student will be able to :	
1	Memorize the basic principles involved in quantitative and qualitative inorganic analysis.	1,7
2	Understand the importance of inorganic qualitative and quantitative analysis and their use in research and industry.	2,6
3	Apply the procedures of quantitative analysis and tests for identification of cations and anions in chosen field.	1,5
4	Evaluate how far these methods are accurate in quantitative determination.	1,4

List of experiments:

1. Preparation of Potassium trisoxalato ferrate (III). (CO – 3, L - 3)
2. Preparation of Tris thiourea copper (1) sulphate. (CO – 4, L - 4)
3. Preparation of Cis and trans potassium diaquodioxalato chromate (III). (CO – 3, L - 3)
4. Preparation of Hexa ammine cobalt (III) chloride. (CO – 4, L - 4)
5. Determination of $Zn^{2+}$with potassium ferro cyanide. (CO – 3, L - 3)
6. Determination of Mg^{2+} using EDTA. (CO – 4, L - 4)
7. Determination of Ni^{2+} using EDTA. (CO – 3, L - 3)
8. Determination of hardness of water using EDTA. (CO – 4, L - 4)
9. Gravimetric determination of nickel using dimethyl glyoxime. (CO – 3, L - 3)
10. Gravimetric determination of Zn using diammonium hydrogen phosphate. (CO – 4, L - 4)
11. Semi micro qualitative analysis of six radical mixtures (CO – 4, L - 4)
    (One interfering anion and one less familiar cation for each mixture)
    (minimum three mixtures).

Anions: S^{2-} , SO_3^{2-} , Cl^-, Br^-, I^- , NO_3^- , SO_4^{2-}, CH_3COO^-, $C_2O_4^{-2}$, $C_4H_4O_6^{-2}$, PO_4^{3-}, CrO_4^{2-},BO_3^{3-}

Cations: Ammonium (NH_4^+)

1st group: Ag^+, Pb^{+2}, W^{+6}

2nd group: Pb^{+2}, Bi^{+3}, Cu^{+2}, Cd^{+2}, Sn^{+2}, Sn^{+4} , Mo^{+6}.

3rd group: Fe^{+2}, Fe^{+3}, Al^{+3}, Cr^{+3}, Ce^{+4}, Th^{+4}, Zr^{+4}, VO^{+2}, Be^{+2}.

4th group: Zn^{+2}, Mn^{+2}, Co^{+2}, Ni^{+2}.

5th group: Ca^{+2}, Ba^{+2}, Sr^{+2}.

6th group: Mg^{+2}, K^+, Li^+.

Text books/ Reference books:

1. Vogel's, "Quantitative chemical Analysis"J.Mendham, R.C.Denney, B.Sivasankar. 6th Edition.
2. Experimental Inorganic Chemistry, Dr.M.K.Shah.
3. Practical Inorganic Chemistry, Shikha Gulati, J.L.Sharma, ShagunManocha.
4. Vogel's, "Text book of macro and semimicro Qualitative inorganic Analysis"G.Svehla, 5th Edition.
5. Vogel's, "Text book of Quantitative Chemical Analysis" G.H.Jefery, 5th Edition.

A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

I SEMESTER

W.E.F 2022-23 (R22 Regulations)

Title of the Paper:Organic Practical-I (22CH1L2)

S.No	COURSE OUTCOMES	PO`S
	After completion of the course, the student will be able to :	
1	Understand the importance of organic compound synthesis and separation and their role in research and industry.	2,5,6
2	Understand the mechanisms for the synthesis of organic compounds in different steps.	1,7
3	Apply the procedure of synthesis and separation of organic compounds in required field.	1,5,7
4	Interpret the role of separation of organic compounds and synthesis in the core areas of research.	1,5,6

List of experiments:

1. Separation of Binary mixtures of Carboxylic acid + Neutral organic compounds (Solvent extraction method). (CO – 3, L - 3)
2. Separation of Binary mixtures of Basic nature + Neutral organic compounds (Solvent Extraction method). (CO – 3, L - 3)
3. Separation of Binary mixtures of Phenolic compounds + Neutral organic compounds (Solvent extraction method). (CO – 3, L - 3)
4. Preparation of Phthalimide from Phthalic anhydride – High Temperature. (CO – 3, L - 3)
5. Preparation of p-nitro acetanilide – Low temperature. (CO – 3, L - 3)
6. Preparation of Iodoform – Room temperature. (CO – 3, L - 3)
7. Paper chromatography - separate the given mixture of sugars. (CO – 4, L - 4)
8. Paper chromatography - separate the given mixture of amino acids. (CO – 4, L - 4)
9. Thin layer chromatography - separate the given mixture of phenols (CO – 4, L - 4)
10. Thin layer chromatography - separate the given mixture of 2,4-DNP derivatives of carbonyls compounds. (CO – 4, L - 4)

Text books/ Reference books:

1. A.I. Vogel, "A Text Book of Practical Organic Chemistry", Longman
2. A.I. Vogel, "Elementary Practical Organic Chemistry", Longman
3. F.G. Mann and B.C. Saunders, "Practical Organic Chemistry", Longman
4. Reaction and Synthesis in Organic Laboratory, B.S. Furniss, A.J. Hannaford, Tatchell, University Science Books mills valley.

5. Purification of Laboratory chemicals, manual, W.L.F. Armarego EDD Perrin
6. Reaction and Synthesis in Organic Chemistry Laboratory, Lutz-Friedjan- Tietze, Theophil Eicher,University Science Book.

A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

I SEMESTER

CIA Practicals

Total Marks – 30 M

We are assessing 10 marks for each practical. The scheme is as follows

Experiment – 6M

Observation– 2M

Result - 2M

We have no practical internal examination at the end of the each semester. However we consider 10 marks for each practical of total 10 practicalsi.e (10 x 10M = 100M), then we reduce to 30M as internal practical marks.

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M.Sc. DEGREE EXAMINATION

External Practical Model Paper

Time: 6 hours **Maximum Marks: 70**

1. To write the principle and procedure / mechanism related to practical as listed in the practical syllabus – 5 M
2. Record – 10 M
3. Experiment (Procedure / Tabulation / calculation etc.,) – 50 M
4. Result / Graphs / Yield / Report – 5

M.Sc. DEGREE EXAMINATION
FIRST SEMESTER

Paper-I :: General Chemistry

Time: 3 hours **Maximum Marks: 70**

SECTION – A

Answer all the questions. Each question carries 4 marks. (5x4M=20M)

1. (a) Discuss the role of control charts in large scale production. (CO-2, L - 2)

(Or)

(b) Elaborate the measures of accuracy? (CO-2, L - 2)

2. (a) Explain the terms primary & secondary standards in titrimetric analysis. (CO-2, L - 2)

(Or)

(b) Enumerate the significance of mixed indicators. (CO-2, L- 2)

3. (a) Give an account on classification of molecules in microwave spectroscopy. (CO-2, L-2)

(Or)

(b) Write a short note on degrees of freedom. (CO-2, L - 2)

4. (a) What are hot bands? (CO-2, L - 2)

(Or)

(b) Construct the group multiplication of C_{2v} point group (CO-2, L - 2)

5. (a) List out the possible symmetry elements and write the point group of the molecule HCHO. (CO-2, L –2)

(Or)

(b) Define a class. Explain with an example. (CO-2, L - 2)

SECTION – B **(10x5=50M)**

UNIT - I

6. (a) Write notes on determinate errors. (CO-2, L - 2) **(Or)**

(b)(i) What are the criteria for rejection of an observation? (CO-2, L - 2)

(ii) Write notes on significant figures and computational rules. (CO-2, L - 2)

UNIT – II

7. (a) Explain the theory of neutralization indicators. (CO-2, L -

(Or)

(b)Describe the Volhard & Mohr method in precipitation titrations. (CO-2, L -

UNIT – III

8. (a) Explain the spectrophotometric determination of Pk value of an indicator. (CO-3, L - 3)

(Or)

(b) Discuss the procedure involved in the determination of phosphate ion and manganese. (CO-3, L - 3)

UNIT - IV

9. (a) Elaborate in detail the symmetry elements & symmetry operations with suitable examples and necessary theory.(CO-4, L - 4)

(Or)

(b)(i) Identify the possible symmetry elements in CH_4& C_6H_6 molecules and analyze the point group.(CO-4, L- 4)

(ii) Analyze the classification of molecules basing on possible symmetry elements into MLS, MHS & MOS with examples. (CO-4, L-4)

UNIT - V

10 (a) Enumerate the role of group theory in IR & Raman spectroscopy. (CO-3, L-3)

(Or)

(b) Explain the construction of C_{2v} character table. . (CO-3, L- 3)

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M.Sc. DEGREE EXAMINATION
FIRST SEMESTER

Paper-II :: Inorganic Chemistry

Time: 3 hours **MaximumMarks: 70**

SECTION – A

Answer all the questions. Each question carries 4 marks. (5x4M=20M)

1. (a) Explain the significance of approximation methods. (CO-2, L - 2)

(Or)

(b) Define operator. Explain the significance of operators in quantum mechanics. (CO-2, L - 2)

2. (a) Discuss about Intercalation compounds. (CO-2, L - 2)

(Or)

(b) Enumerate the significance of natural oxygen carriers. (CO-2, L- 2)

3. (a) Explain the role of VSEPR theory in predicting the geometry of molecule. (CO-2, L - 2)

(Or)

(b) Give an account on important features of MO theory. (CO-2, L - 2)

4. (a)Explain the splitting of d-orbitals in square pyramidal crystal field. (CO-2, L - 2)

(Or)

(b) Discuss about crystal field stabilization energy. (CO-2, L - 2)

5. (a) Derive a relation between stepwise and overall formation constants. (CO-2, L – 2)

(Or)

(b) What is chelate effect? Explain with an example.(CO-2, L - 2)

SECTION – B **(10x5=50M)**

UNIT – I

6.(a)Write down the wave equation for rigid rotor and solve it to get eigen functions. (CO-3, L - 3)

(Or)

(b)Arrive at the expression for first order non degenerate eigen values of perturbation method. (CO-3, L - 3)

UNIT – II

7.(a) Write an account on phosphorus-nitrogen cyclic compounds. (CO-2, L

(Or)

(b)Explain the structure and bonding in nitrosyl complexes. (CO-2, L

UNIT – III

8. (a) Draw and explain the molecular orbital energy level diagram of BeH_2 molecule. (CO-3, L

(Or)

(b)Explain the evidences for pπ – dπ bonding in non-transition metal compounds. (CO-3, L - 3)

UNIT - IV

9. (a) Justify the reason for tetragonal distortion in an octahedral complex with a suitable theory. (CO-4, L - 4)

(Or)

(b)Why CN^- and CO cause greater crystal field splitting and I^- and Br^- cause lesser crystal field splitting? Explain with necessary theory.(CO-L-4)

UNIT - V

10. (a) Describe the spectrophotometric method for the determination of stability Constant. (CO-2, L- 2)

(Or)

(b)Give a detailed account on HSAB theory. (CO-2, L- 2)

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M.Sc. DEGREE EXAMINATION
FIRST SEMESTER
Paper-III : Organic Chemistry

Time: 3 hours **Maximum Marks: 70**

SECTION – A

Answer all the questions. Each question carries 4 marks. (5x4M=20M)

1. (a) Explain anti aromaticity with example. (CO-2, L - 2)

(Or)

(b) Explain cross conjugation with example. (CO-2, L - 2)

2. (a) Explain the structure of nitrenes. (CO-2, L - 2)

(Or)

(b) Discuss the structure of carbenes. (CO-2, L - 2)

3.(a) Discuss cram's rule with suitable examples. (CO-2, L - 2)

(Or)

(b) Write notes on epoxidation. (CO-2, L - 2)

4. (a) Define Hoffmann's rule. Give suitable examples. (CO-2, L - 2)

(Or)

(b) Discuss syn elimination versus anti elimination. (CO-2, L - 2)

5. (a) Give mechanism of Von-Richter rearrangement. (CO-2, L - 2)

(Or)

(b) Write noters on SNi mechanism. (CO-2, L - 2)

SECTION – B **(10x5=50M)**

UNIT - I

6. a) Define delocalized chemical bonding. What are different types of delocalized chemical bonding. (CO – 2, L - 2)

(Or)

b) Explain the following terms (i) Cross Conjugation (ii)Hyper Conjugation.(CO – 2,L - 2)

UNIT - II

7. a) Discuss the generation, stability and reactivity of carbocations. (CO –2, L - 2)

(Or)

b) Explain synthesis and few reactions of the following
(i) Free radicals (ii) Carbanions (CO – 2, L - 2)

UNIT - III

8. a) Give an account of the addition of the following to carbon carbon multiple bonds
(i) HX (ii) HOX (CO – 2, L - 2)

(Or)

b) Discuss in detail about the following
(i) Syn and Anti hydroxylation (ii) Hydrogenation (CO –2, L - 2)

UNIT – IV

9. a) Discuss pyrolytic eliminations and its orientation. (CO –2, L - 2)

(Or)

b) Write a detailed account of E1CB mechanism. (CO –2, L - 2)

UNIT – V

10.a) What is anchimeric assistance. Discuss neighboring group participation by σ and π bonds with suitable examples. (CO –4, L - 4)

(Or)

b) Explain the following (i) Benzene mechanism (ii) SN^{Ar} mechanism with applications.

(CO –4, L - 4

M.Sc. DEGREE EXAMINATION
FIRST SEMESTER

Paper-IV: Physical Chemistry

Time: 3 hours **Maximum Marks: 70**

SECTION – A

Answer all the questions. Each question carries 4 marks.
(5x4M=20M)

1. (a) Explain the second law of thermodynamics. (CO-2, L - 2)

(Or)

(b) Write the Gibbs Duham equation and describe all the terms present. (CO-2, L - 2)

2. (a) Discuss briefly the surface active agents. (CO-2, L - 2)

(Or)

(b)Explain the micro emulsions in brief. (CO-2, L - 2)

3. (a)Write the Nernst equation and describe all the terms present in it. (CO-2, L - 2)

(Or)

(c) Explain the principle in conductometric titrations. (CO-2, L - 2)

4. (a) Write the mechanism in Lindemann's theory of unimolecular reactions.(CO-2, L - 2)

(Or)

(b) Describe the mechanism in decomposition of Acetaldehyde. (CO-2, L - 2)

5. (a) Describe the advantages of potentiometric methods over classical methods. (CO-2, L - 2)

(Or)

(b) Explain the calomel electrode in short. (CO-2, L - 2)

SECTION – B **(10x5=50M)**

UNIT - I

6. (a) Derive the Maxwell's thermodynamic relations. (CO-2, L - 2) **(Or)**

(b) What is fugacity? Give its physical significance. Describe the different methods of determination of fugacity. (CO-2, L - 2)

UNIT - II

7. (a) Discuss the theory involved in ESCA. How are this techniques used in the analysis of surfaces? (CO-2, L - 2)

(Or)

(b) What is CMC?How is it determined? What are the factors effecting CMC?(CO-2, L - 2)

UNIT - III

8. (a)What is activity? How is activity coefficient determined from EMF? (CO-2, L - 2)

(Or)

(b)What is the effect of dilution on equivalent conductance of electrolytes?(CO-2, L - 2)

UNIT – IV

9. (A) Discuss and analyze the kinetics of consecutive reactions. (CO-4, L - 4)

(Or)

(b)Discuss and analyze the kinetics of $H_2 - Br_2$ reaction in detail. (CO-4, L - 4)

UNIT – V

10. (a) Explain the theory of precipitation titrations in detail(CO-2, L - 2)

(Or)

(b) Discuss the potentiometric titrations in detail. (CO-2, L - 2)

A.G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

Vuyyuru- 521165.

NAAC reaccredited at 'A'level

Autonomous -ISO 9001 – 2015Certified

Title of the Paper: ADVANCED ORGANIC SPECTROSCOPY

Semester: III

Course Code	**20CH3T1**	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2020-21	Year of Offering: 2021 - 22	Year of Revision: ----	Percentage of Revision: 0%

CourseObjective: Themainobjectiveofthispaperistogiveabasicandupdatedknowledgeforthe studentsonProton&13CNMRSpectroscopy,StructuralElucidationofOrganiccompoundsUsing UV, IR,1H-NMR,13C-NMR, 2D NMR spectroscopy and Optical Rotatory Dispersion (ORD) & CD spectroscopy.

Course Outcomes:-

CO1: Summarizetheprinciple,theoryandadvancedaspectsof^{1}HNMR,^{13}CNMR,2DNMR, ORD&CDspectroscopictechniques.

CO2: Displaytheknowledgegainedintheareasof^{1}HNMR,^{13}CNMR,2DNMR,ORD&CD Spectroscopictechniquesinchosenjobrole.

CO3: Interpretthespectraldataof^{1}HNMR,^{13}CNMR,2DNMR,ORD&CDinelucidatingthe Structure of themolecule.

CO4: Assessthathowfarthespectraldataof^{1}HNMR,^{13}CNMR,2DNMR,ORD&CDareuseful inestablishingthestructureofthemolecule.

Syllabus

Course Details:-

Unit	Learning Units	Lecture Hours
I	**Proton NMR Spectrscopy**: Determination of structure of organic compounds using PMR data. Spin system, Nomenclature of spin system, spin system of simple and complex PMR spectrum (Study of AB – A2 – AB2. ABX – ABC – AMX interactions) Simplification of complex spectra- nuclear magnetic double resonance, chemical shift reagents, solvent effects on PMR Spectrum . Nuclear Overhauser Effect (NOE).	12
II	**13C-NMR spectroscopy:** Similarities and Difference between PMR and CMR-CMR recording techniques -BBC-BBD-SFORD-Gate pulse CMR spectrum. General considerations, chemical shift (aliphatic, olefinic, alkyne, aromatic, heteroaromatic and carbonylcarbon), coupling constants.Typical examples of CMR spectroscopy – simple problems.	12
III	**ORD& CD Curves:** Optical rotatory dispersion : Theory of optical rotatory dispersion – Cotton effect –CD curves-types of ORD and CD curves-similarities and difference between ORD and CD curves. α- Halo keto rule, Octant rule – application in structural studies.	12
IV	**2D NMR spectroscopy:** Definitions and importance of COSY, DEPT, HOMCOR, HETCOR,INADEQUATE, INDOR, INEPT, NOESY, HOM2DJ, HET2DJ. Study of COSY ,DEPT, HOMCOR, HETCOR, INADEQUATE INDOR INEPT ,NOESY HOM2DJ, HET2DJ, taking simple organic compounds as examples.	12
V	Structural Elucidation of Organic compounds Using UV, IR, 1H-NMR, 13C-NMR and Mass spectroscopy.	12

Reference Books:

1. Introduction to Spectroscopy – D. L. Pavia, G.M. Lampman, G. S. Kriz, 3rdEd. (Harcourt College publishers).
2. Spectrometric identification of organic compounds R. M. Silverstein, F. X. Webster, 6th Ed.John Wiley andSons.
3. Spectroscopic methods in organic chemistry - D. H. Williams and I Flemming McGraw Hill, 4thedition.
4. Absorption spectroscopy of organic molecules – V. M.Parikh
5. Organic structural Spectroscopy- Joseph B.Lambert, Shurvell, Lightner,Cooks, Prentice-Hall (1998).
6. Organic structures from spectra –Field L.D., Kalman J.R. and Sternhell S. 4thEd. John Wiley and sonsLtd.
7. Organic spectroscopy – Principle & Applications – Jag Mohan, Narosa, 2ndedition, Publishinghouse.

Course Focus: Employability &**E**ntrepreneurship.

A.G.& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

Vuyyuru-521165.

NAAC reaccredited at 'A' level

Autonomous -ISO 9001 – 2015 Certified

Title of the Paper: ORGANIC REACTIONS & MECHANISMS
Semester: III

Course Code	**20CH3T2**	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2020-21	Year of Offering: 2021 - 22	Year of Revision: -----	Percentage of Revision: 0

CourseObjective: Themainobjectiveofthispaperistogiveabasicandupdatedknowledgeforthe studentsonOxidations,Reductions,MolecularRearrangements,PericyclicReactionsandOrganic PhotoChemistry.

Course Outcomes:-

CO1 : Acquire sound knowledge of oxidations, reductions, molecularrearrangements, pericyclic reactions and photochemistry.
CO2 : Understand the concepts involved in oxidations, reductions, molecularrearrangements, pericyclic reactions and photochemistry.
CO3 : Apply the conceptual knowledge gained in oxidations, reductions, molecular rearrangements, pericyclic reactions and photo chemistry in chosen fields.
CO4 : Analyse and categorise the various types oxidations, reductions, molecular rearrangements, pericyclic reactions and photo chemistry in a given reactions.

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Oxidations** Definition and types of Oxidations, oxidations with ruthenium tetroxide, NBS, iodobenzenediacetate, Tl(III) nitrate, Chromium (VI) oxidants, Lead tetra acetate, SeO_2, MnO_2, Ag_2CO_3, Oppenauer oxidation, perhydroxylation using $KMnO_4$, OsO_4, HIO_4, oxidation with iodine silver carboxylate (Woodward and Prevostconditions), Definition & mechanism of epoxidation by peracids.	12

II	**Reductions** Definition and types of reductions, reduction by dissolving metals - Reduction with metal and liquid ammonia (Birch Reduction of aromatic compounds), Reduction with metal acid - Clemensons reduction, Reduction by hydride transfer reagents, Aluminiumalkoxide - MeerweinPondorfVerley Reduction, $LiAlH_4$, $NaBH_4$, Diisobutylaluminiumhydride(DIBAL), Sodium cyanoborohydride, trialkyl borohydrides, Reduction with diimide,. Wolff-Kishnerreduction.	12
III	**Molecular Rearrangements** Migration to electron deficient carbon atom. Pinacole-Pinacolone rearrangement, Wagner-Meerwein rearrangement, Dienone-Phenol rearrangement, Benzil-Benzilic acid rearrangement, Favorski rearrangement, ARNDT Eistert rearrangement,Sommelet – Hauser rearrangement. Migration to electron deficient hetero atom:.Wolf, Hofmann, Curtius, Lossen, Schmidt, Beckmann rearrangement, Baeyer-Villiger rearrangement, Stevens, Neber rearrangements. Fries, Fischer-Hepp,Orton,Bamberger,Dakin,CumeneHydroperoxide rearrangement.	12
IV	**Pericyclic Reactions – I:** Definition, classification of pericyclic reactions, Molecular Orbital energy level diagrams, electronic configuration in ground and first excited states of Ethylene, 1,3-Butadiene, 1,3,5 – Hexatriene, allyl system, stereo chemical notations – suprafacial, antarafacial, conrotatory and disrotatory modes, Woodward and Hoffmann selection rules. **Electrocyclic reactions**: Mechanism, Stereochemistry of (4n) and (4n+2) π systems. PMO, FMO and correlation methods. **Cyclo additions**: Mechanism, stereochemistry of (2+2) and (4+2) π systems, PMO, FMO and correlation methods. **Sigmatropic rearrangements**: Classification, mechanism for FMO and PMO approach under thermal and photo chemical conditions. (Detailed treatment of Claisen, Cope rearrangements fluxional molecules, aza-cope rearrangements).	12
V	**Photochemistry:** Photochemical processes: Energy transfer, sensitization and quenching. Singlet and triplet states and their reactivity. Photochemistry of olefins – conjugated olefins, Aromatic compounds–isomerisation–additions. Photochemistry of carbonyl compounds – Norrish type I and II reactions –Paterno – Buchi Reaction. Photoreduction, Photochemical rearrangements–Photo Fries rearrangement, Di-π-methane rearrangement, Barton reaction.	12

Reference Books:

1. Molecular reactions and Photochemistry by Charles Dupey and O. Chapman, PrenticeHall.
2. Reaction mechanism in organic chemistry. 3rd edition, S.M.Mukherji&singh.
3. Advanced Organic Chemistry-Reactions, Mechanisms and Structure, Jerry March, John Wiley and sons, 6thedition.
4. Advanced Organic Chemistry, F.A. Carey and R.J Sundberg,Plenum.
5. Modern methods of organic synthesis, Cambridge University press, 3rd edition,W.Carruthers.
6. Organic Reaction Mechanisms, V.K.Ahluwalia, 4th edition,Narosa.
7. Reactions, rearrangements and reagents.S.N.Sanyal,4thedition.
8. Organic Photo chemistry and Pericyclic reactions' M.G.AroraAnmol Publications Pvt.Ltd.
9. Fundamentals of Photochemistry by K.K.Rohatgi–Mukherjee New Age internationalpublishers.

Course Focus: Employability &**E**ntrepreneurship.

A.G. & S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

Vuyyuru-521165.

NAAC reaccredited at 'A' level

Autonomous -ISO 9001 – 2015Certified

Title of the Paper: ORGANIC SYNTHESIS
Semester: III

Course Code	**20CH3T3A**	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2020-21	Year of Offering: 2021 - 22	Year of Revision: -----	Percentage of Revision: 0%

CourseObjective: Themainobjectiveofthispaperistogiveabasicandupdatedknowledgeforthe studentsonFormationofC-Csingle&doublebonds,Diels–Aiderandrelatedreactions,Retro SyntheticAnalysisandProtectingGroups.

Course Outcomes:

CO1 : Memorize the concepts, principles and theories related to formation of C – C single bond, C – C double bond, Diel's Alder related reactions. Protecting groups and disconnection approach in organic synthesis.

CO2 : Understand the role and significance of formation of C – C single bond, C – C double bond, Diel's Alder related reactions. Protecting groups and disconnection approach in organic synthesis.

CO3 : Apply the conceptual knowledge gained in formation of C – C single bond, C – C double bond, Diel's Alder related reactions. Protecting groups and disconnection approach in organic synthesis as and when required.

CO4 : Analyze the role of various reagents in carrying out the organic reactions like formation of C – C single bond,C – C double bond, Diel's Alder related reactions. Protecting groups and disconnection approach in organic synthesis.

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Formation of carbon-carbon single bonds:** Alkylation of relatively acidic methylene groups, alkylation of ketones, enamine and related reactions, umplong (dipole inversion). Allylic alkylation of alkenes, alkylation of α-thiocarbanions-α- selenocarbanions, formation of carbon carbon single bonds by the addition of free radicals to alkenes, synthetic applications of carbenes and carbenoids.	12

II	**Formation of carbon-carbon double bonds** Pyrolytic syn elimination reactions sulphoxide-sulphonate rearrangement, synthesis of allyl alcohols, the witting reaction, alkenes from sulphones, decarboxylation of β-lactones, alkenes from aryl sulphonyl hydrazones. Stereo selective synthesis of tri and tetra substituted alkenes, oxidative decarboxylation of carboxylic acids, stereospecific synthesis from 1,2-diols, reductive dimerization of carbonyl compounds.	12
III	**Diels–Aider and related reactions**: The dienophile, heterodienophile, oxygen as dienophile, The diene, acyclic dienes, heterodienes, 1,2-dimethylene cycloalkanes, vinyl cycloalkenes, and vinyl arenes, cyclic dienes and furans. Intra molecular Diels –Alder reactions, stereochemistry and mechanism of Diels – Alder reaction, retro Diels – Alder reaction, catalysis by lewis acids, photosensitized Diels- Alder reactions and 1,3-dipolar cycloaddition reactions, the ene reaction.	12
IV	**Disconnection approach** Introduction to Retro-synthetic analysis, Disconnection approach with suitable examples, Definitions: FGI, Disconnection, synthons, synthetic equivalent, reagent, target molecule, General strategy: choosing a disconnection, greatest simplification, symmetry, high yielding steps, recognizable startingmaterials. Chemo, regio and stereo selectivity with examples. One group C-C disconnections-Alcohols, carbonyl compounds, alkene synthesis, two group disconnections: 1,3 – dicarbonyl compounds, α,β – unsaturated carbonyl compounds.	12
V	**Protecting groups:** Theory and importance of functional group protection and deprotection in organic synthesis:-Protecting agents for the protection of functional groups: Hydroxyl group, Amino group, Carbonyl group and Carboxylic acid group carbon-carbon multiple bonds; chemo- and regioselective protection and deprotection. Illustration of protection and deprotection in organic synthesis.	12

Reference Books:

1. Modern methods of Organic synthesis ,W. Carruthers Cambridge Press (3rdedition)
2. Principles of Organic synthesis by, ROC Norman, 3rd edition, CRCpress.
3. Modern Method of Organic Synthesis ,Carruthers and ColdhamSachinkumar Ghosh, Canbridge New Central Book Agency,1stedition.
4. Advances in Organic Reaction mechanism and structure, J. March, 6th edition, McGrewHill
5. Organic Synthesis: Ratnakumarkar, vol – II, NCBAPublications.

Course Focus: Employability &**E**ntrepreneurshi

A.G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

Vuyyuru-521165.

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Title of the Paper: CHEMISTRY OF NATURAL PRODUCTS

Semester: III

Course Code	**20CH3T4B**	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2020-2021	Year of Offering: 2021 - 22	Year of Revision: ------	Percentage of Revision: 0%

Course Objective: The main objective of this paper is to give a basic and updated knowledge for the students on Alkaloids, Terpenoids, Steroids, Flavonoids, Isoflavonoids and Plant pigments.

Course Outcomes:-

CO1 : Memorize the concepts related to Alkaloids, Terpenoids, Steroids, Flavonoids and Isoflavonoids andPigments.

CO2 : Understand the chemical role of Alkaloids, Terpenoids, Steroids, Flavonoids and Isoflavonoids andPigments.

CO3 : Execute the conceptual knowledge gained in the areas of Alkaloids, Terpenoids, Steroids, Flavonoids and Isoflavonoids and Pigments.

CO4 : Analyze the role of methods involved in structure elucidation of Alkaloids, Terpenoids, Steroids, Flavonoids and Isoflavonoids and Pigments.

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Alkaloids:** Introduction, Definition, occurrence, role of alkaloids in plants, classification, isolation and general methods for structural elucidation of alkaloids. Structure elucidation of Morphine, Quinine.	12
II	**Terpenoids**:Introduction,Definition,nomenclature,classification, isolation, isoprene rule and general methods for structural elucidation of Terpenoids. Structure elucidationof Zingiberene, , farnesol.	12
III	**Steroids:** Introduction, Definition, nomenclature, classification. Occurrence, isolation, physiological action, structure elucidation of Androsterone, Progesterone.	12
IV	**Flavonoids and Isoflavonoids:** Introduction, Definition, classification, isolation, physiological action, structure elucidation of Kaempferol and Quercetin.	12
V	**Pigments:** Introduction, classification of natural pigments, introduction and classification of carotenoids, functions of carotenoids in plants and animals, structure and synthesis of α – carotene and β – carotene.	12

Reference Books:

1. Organic Chemistry, Vol:2, I.L.Finar, 5thEdition.
2. Chemistry of Natural Products,K.W.Bentley, oxford AT the clarendon press, 1stedition.
3. ChemistryofNaturalproductsbyP.S.KalsiKalyaniPublishers.1983, low cost university edition.
4. Chemistry and physiology ofalkaloids by ManskeVol.I&II,VII, Academic press Inc., publishers Newyork, 1stedition.

Course Focus: Employability & Entrepreneurship.

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Title of the Paper: POLYMER CHEMISTRY
Semester: III

Course Code	**20OECH**	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2021 - 22	Year of Offering: 2021 - 22	Year of Revision: ----	Percentage of Revision: ----

CourseObjective: Themainobjectiveofthispaperistogiveabasicandupdatedknowledgeforthe students on Polymerchemistry.

Course Outcomes:

CO1 : Memorize the concepts related to polymer chemistry

CO2 : Understand the concepts of polymer chemistry

CO3 : Apply the knowledge gained in polymer chemistry in chosen job role.

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	Introduction, Classification of polymers, Polymerization, chain polymerization, step polymerization, Co polymerization, Free radical chain polymerization, cationic polymerization, anionic polymerization, Polymerization Techniques, Graft and Block Copolymers.	12
II	Polymer Synthesis,Isolation and Purification of polymers, Polymer Fractionation, Molecular weight determination,Molecular weight determination curve, Processing Techniques.	12
III	Polymer Reactions–Introduction, Hydrolysis, Acidolysis, Aminolysis, Hydrogenation, Addition and Substitution Reactions, Cyclisation reactions, Cross-linking Reactions.	12

IV	Polymer Degradation – Definition, Types of Degradation, Thermal Degradation, Mechanical Degradation, Degradation by Ultrasonic Waves, Photodegradation, Degradation by High-Energy Radiation, Oxidative Degradation, Hydrolytic Degradation.	12
V	Plastics, Fibres, Elastomers-Polyethylene, Polystyrene, PolyEsters, PolyAcrylonitrile, Polyurethanes, Polyvinyl Chloride, Polyisoprenes. Resins–Phenol Formaldehyde Resin, Urea Formaldehyde and Melamine–Formaldehyde Resins,Epoxy Polymers, Silicon Polymers.	12

Reference Books:

1. Textbook of Polymer Science byFrod,W.Billmayer,

2. An Introduction to Polymer Chemistry byMoore.

3. Polymer Chemistry-An Introduction byM.P.Stevens.

4. Polymer Science –VRGowariker, NVViswanathan,JayadevSreedhar.

Course Focus : Employability .

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Title of the Paper: ORGANIC PREPARATIONS

Semester: III

Course Code	**20CH3L1**	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2020-21	Year of Offering: 2021 - 22	Year of Revision: -----	Percentage of Revision:0%

Course Objective: The main objective of this paper is to give a basic and updated knowledge for the students on organic chemistry practical.

Course Outcomes:-

CO1: Memorize the principle involved in various organic preparations.

CO2: Understand the mechanism involved in organic preparation.

CO3: Apply the knowledge of organic preparations in their chosen field.

Syllabus

Course Details:-

1. Preparation of organic compounds: Three stage preparations by reactions involving nitration, halogenation, oxidation, reduction, alkylation, acylation, condensation and rearrangement. (A student is expected to prepare at least five different organic compounds by making use of the reactions given above).

2. Green Procedures for organic compound preparations (atleast 5preparations).

Course Focus: Skill Development & Employability

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Title of the Paper: Mixture Analysis

Semester: III

Course Code	**20CH3L2**	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2020-21	Year of Offering: 2021 - 22	Year of Revision: -----	Percentage of Revision: 0 %

Course Objective: The main objective of this paper is to give a basic and updated knowledge for the students on Analysis of organic binary mixtures.

Course Outcomes:-

CO1 : Get familiarized with the tests involved to identification of various functional groups.

CO2 : Understand the theory involved in identification and separation of the given organic mixture based on the solubility

CO3 : Apply the knowledge to identify various functional groups present in the given organic compound by using a systematic procedure.

Syllabus

Course Details:-

Analysis of organic binary mixtures: Separation and identification of organic binary mixtures (The students must be given training in at least 10 mixtures with different functional groups).

Note: For semester end examinations the student has to submit at least two solid derivatives for each individual component.

Course Focus: Skill Development & Employability

M.Sc. DEGREE EXAMINATION
THIRD SEMESTER
Paper-I:: ADVANCED ORGANIC SPECTROSCOPY

Time:3hours **Maximum Marks:70**

SECTION – A

Answer all the questions. Each question carries2marks. (10x2M=20M)

1. a) Explain the importance ofDoubleirradiation. (CO-1)
   b) Write a short note on nomenclature ofspinsystems. (CO-1)
   c) Explain the α, β &γ effects in 13 C NMR withsuitableexamples. (CO-1)
   d) Discuss the importance of off resonance decouplingCMRspectrum. (CO-1)
   e) What isCottoneffect? (CO-1)
   f) Predict the sign of cotton effect in 3-methyl cyclohaxanone when substituent is in equatorial position. (CO-1)
   g) What information is possible from theCOSYexperiment? (CO-2)
   h) Discuss about various periods involved in2D NMR. (CO-1)
   i) Discuss briefly the IR signals for the compound C6H5 – CH2 – O – CO –CH3. (CO-2)
   j) Predict the possible number of ^{1}H NMR signals for the compound CH3 – (CO) – CH2 – CH3.(CO-2)

SECTION–B **(10x5=50M)**

UNIT - I

2. a) Explain the effect of solvent onPMR spectrum. (CO-2)

(Or)

   b) Differentiate between first order and non firstorder PMR spectrumswithexamples. (CO-2)

UNIT – II

3. a) Discuss the importance of BBD & SFORD techniques in 13CNMRspectroscopy. (CO-2)

(Or)

   b) A compound of MF C4H10 in its CMR Spectrum show 17.1(q) 67.4(T). Determine the structure of compound by usingCMRdata. (CO-2)

UNIT – III

4. a) Explain the following i) Axial halo ketone rule ii) Types of optical rotatory dispersioncurves. (CO-1)

(Or)

   b) Explain the applications ofOctantrule. (CO-2)

UNIT – IV

5 a) What information about a compound can be obtained from the 2D INADEQUATEexperiment? (CO–2)

   b) Discuss the importance ofNOESY technique withsuitableexample. (CO–2)

UNIT – V

6 a) Deduce the structure of the compound consistent with the following data elemental analysis: C=32.14%H 5.35% and Cl 62.5% UV: No absorption above 210 nm, IR (CCl4) 2941,2265 and 1460cm-1PMR δ 2.72(septet,J=6.7,1H),1.33(doublet,J=6.7,6H) (CO–3)

(Or)

   b) Deduce the structure of the compound consistent with the following data elemental analysis: C=32.14%H 5.35% and Cl 62.5% UV: No absorption above 210 nm IR (CCl4) 2940,1265 and 690cm-1 and PMR δ3.5(2H,D),3.3(1H,m)and1.25(3H,d) (CO-3)

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M.Sc. DEGREE EXAMINATION
THIRD SEMESTER
Paper-II:: ORGANIC REACTIONS & MECHANISMS

Time:3hours **Maximum Marks:70**

SECTION – A

Answer all the questions. Each question carries2marks. (10x2M=20M)

1. a) Discuss oxidationswithHIO4. (CO-2)
   b) Define oxidation and discuss the various typesofoxidations. (CO-1)
   c) Write notes on reductionwithdiimide. (CO-1)
   d) Give the definition and mechanism ofclemmenson'sreduction. (CO-2)
   e) Discuss Dienonephenolrearrangement. (CO-1)
   f) Write an account ofWolfrearrangement. (CO-2)
   g) What are pericyclic reactions? Givetheclassification. (CO-1)
   h) Write the molecular orbital energy level diagram for 1,3–Butadiene. (CO-2)
   i) Write notes onenergytransfer. (CO-1)
   j) ExplainBartonreaction. (CO-2)

SECTION–B **(5x10M=50M)**

UNIT - I

2. a) Explain oxidations withi)RuO_4 ii)SeO_2 (CO-3)

(Or)

b) Explain oxidations with i) $KMnO_4$ ii)MnO_2 (CO-3)

UNIT – II

3. a) Discuss Birch reduction ofaromatic compounds. (CO-2)

(Or)

b) Discuss the reductionswith$LiAlH_4$. (CO-2)

UNIT – III

4 a) Explain the following
   i) Wagner Meerweinrearrangement ii) Benzil – Benzilicacidrearrangement. (CO-2)

(Or)

   i) Baeyer Villigerrearrangement ii) Cumenehydroperoxiderearrangement. (CO-2)

UNIT - IV

5. a) Apply correlation method to $4n\pi$ electrocyclic reaction for thermal and photochemical conditions. (CO-3)

(Or)

   b) Apply FMO method to 1,5 sigmatropic shift and write Woodward and Hoffmann rules byPMOmethod. (CO-3)

UNIT - V

6 a) Discuss Norish type – I and type –IIreactions. (CO-2)

(Or)

b) Explain the following i) photochemistry of olefins ii) Di – π – methane rearrangement.(CO-2)

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M.Sc. DEGREE EXAMINATION
THIRD SEMESTER
Paper-III:: ORGANIC SYNTHESIS

Time:3hours **Maximum Marks:70**

SECTION – A

Answer all the questions. Each question carries2marks. (10x2M=20M)

1. a) What are acidicmethylene groups? (CO-2)
   b) Explainaboutcarbenes. (CO-1)
   c) Discuss in short aboutsynelimination. (CO-1)
   d) Elaborate Wittig reaction withanexample. (CO-2)
   e) Describe dienophile withanexample. (CO-1)
   f) What are lewis acids? Explain withan example. (CO-2)
   g) Enumerate the significance of Disconnection approach inorganicsynthesis. (CO-2)
   h) Write a short noteonsynthon. (CO-1)
   i) Discuss the role of functional group protection & deprotection in organic synthesis.(CO-2)
   j) Explain the importance ofregioselectiveprotection. (CO-2)

SECTION–B **(5x10M=50M)**

UNIT - I

2. a) Explain enamine andrelatedreactions. (CO-2)

(Or)

b) Discuss in detail the synthetic applications of carbenes and carbenoids with examples. (CO-2)

UNIT – II

3. a) Write an account of reductive dimerisationof carbonyl compoundswithexamples. (CO-2)

(Or)

b) Discuss any three methods for the stereoselective synthesis of tri and tetra substituted alkenes. (CO-2)

UNIT – III

4. a) What is Diels Alder reaction? Discuss the mechanismandstereochemistry. (CO-2)

(Or)

b) Write note on 1,3 – dipolarcycloaddition reactions. (CO-2)

UNIT - IV

5. a) Discuss the various methods of disconnectionofalcohols. (CO-3)

(Or)

b) Give an account of disconnections of 1,3 –dicarbonylcompounds. (CO-2)

UNIT – V

6. a) Discuss about the protecting agents to protect the following functionalgroups
   (i) AMINOgroup (ii)carboxylicacid. (CO-3)

(Or)

b) List out the reagents and apply them for the protection and deprotection of hydroxyl and carbonyl groups. (CO-3)

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M.Sc. DEGREE EXAMINATION
THIRD SEMESTER
Paper–IV:: CHEMISTRY OF NATURAL PRODUCTS

Time:3hours **Maximum Marks:70**

SECTION – A

Answer all the questions. Each question carries2marks. (10x2M=20M)

1. a) What arealkaloids?Explain. (CO-2)
   b) Discuss the general classificationofalkaloids. (CO-1)
   c) DiscussIsoprenerule. (CO-1)
   d) Write the structureofZingiberine. (CO-2)
   e) Write the synthesisoffarnesol. (CO-2)
   f) Discuss the nomenclatureof steroids. (CO-1)
   g) Give a short notes on classificationofflavonoids? (CO-1)
   h) Discuss the isolation of flavonoidsandisoflavonoids. (CO-2)
   i) Discuss the classification ofnaturalpigments. (CO-1)
   j) Discuss the functions of carotenoidsinplants. (CO-2)

SECTION–B **(10x5=50M)**

UNIT - I

2. a) Outline the synthesisof Morphine. (CO-2)

(Or)

b) Discuss the structure elucidationofQuinine. (CO-3)

UNIT – II

3. a) Explain the structure elucidationof santonin. (CO-2)

(Or)

b) Write notes on structure elucidation ofabieticacid. (CO-2)

UNIT – III

4. a) Establish the structure of nucleus and size of the rings A,B,C and D incholesterol. (CO-3)

(Or)

b) Establish the structure of progesterone and write any one method of synthesis. (CO-3)

UNIT - IV

5. a) Write structure elucidationofkaempferol. (CO-3)

(Or)

b) Write structure elucidationofQuercetin. (CO-3)

UNIT - V

6. a) Discuss the structure elucidation of α–carotene. (CO-3)

(Or)

b) Discuss the structure elucidation of β-carotene (CO-3)

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M.Sc.
DEGREEEXAMINATION
THIRD SEMESTER
POLYMERCHEMISTRY

Time:3hours **Maximum Marks:70**

SECTION – A

Answer all the questions. Each question carries2marks. (10x2M=20M)

1. a) Discuss about classification ofpolymers. (CO-1)
   b) Explain one polymerization reaction which involves free radical mechanism. (CO-2)
   c) Give a short account on isolation of polymers. (CO-1)
   d) Describe the purification method of polymers. (CO-1)
   e) What is hydrolysis? Explain with an example. (CO-2)
   f) What is cross – linking reaction? Explain its impact. (CO-2)
   g) List out the types of degradation methods. (CO-1)
   h) Explain ultrasonic waves degradation with an example. (CO-2)
   i) What are elastomers? Explain in brief. (CO-2)
   j) Discuss the method for the synthesis of polystyrene. (CO-2)

SECTION–B **(10x5=50M)**

UNIT - I

2. a) Explain in detail about cationic polymerization withsuitableexamples. (CO-2)

(Or)

   b) Give a detailed account on Graft andBlockcopolymers. (CO-2)

UNIT – II

3. a) Discuss in detail about molecularweightdetermination. (CO-2)

(Or)

   b) Explain elaborately about variousprocessingtechniques. (CO-2)

UNIT – III

4. a) Illustrate the following with suitable examples (i) Aminolysis (ii)Cyclisationreactions. (CO-2)

(Or)

   b) Write an account on addition & substitution reactions withsuitableexamples. (CO-2)

UNIT – IV

5 a) Describe the following degradation methods with suitableexamples
   (i) Thermaldegradation (ii)Photodegradation (CO–2)
   b) Discuss the significance of oxidative degradation andhydrolytic degradation. (CO–2)

UNIT – V

6 a) Give an account on the following (i) Polyacrylonitrile(ii)Polyurethanes (CO–2)

(Or)

   b) Elaborate the following in detail (i) Epoxy polymers (ii)Siliconpolymers (CO-2)

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