Department of Chemistry

SRR & CVR Govt.Degree College (A), Vijayawada

M.Sc., CHEMISTRY (ORGANIC CHEMISTRY) I SEMESTER

Paper Code & Title: 20 OCH 101: GENERAL CHEMISTRY-I

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

Total marks: 100 **(Internal: 40 M & External: 60M)**

Course Learning Objective(S): The main objective of this paper is to give a knowledge for students on Titrimetric Analysis, Treatment of analytical data, Adsorption, Partition, Gas Chromatography and High-Performance Liquid Chromatography.

Unit-I: Titrimetric Analysis: Classification of reactions in titrimetric analysis-Primary and secondary standards- Neutralization Titrations-Theory of neutralization indicators-Mixed indicators .Neutralisation curves .Displacement titrations. Precipitation titrations-Indicators for precipitation titrations-Volhard's method-Mohr's 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

Unit-II: Treatment of analytical data: Accuracy and precision- Classification of errors- Determinate and Indeterminate errors- Minimization of errors-Absolute and Relative errors, propagation of errors-Distribution of indeterminate errors Gaussian distribution- Measures of central tendency-Measures of precision- Standard deviation- Standard error of mean- student's t-test- Confidence intervalof mean.Testing for significance-.Comparision of two means. F-test- Criteria of rejection of an observation- Significant figures.and computataion rules.

Unit-III: Methods of purification: 1. Distillation: Basic principles, Distillation types- continuous distillation, batch distillation, fractional distillation, vacuum distillation and steam distillation.Industrial applications.

2. Drying Techniques: Drying of Hexane, Benzene, Toluene, Xylene, Tetrahydrofuran, DMF, DMSO, Methanol, Ethanol, Diethyl ether and Dioxane;

3. Solvent extraction: Basic principles, Different types of extraction. Selection of solvents. Basic concepts on Soxhlet extraction.Industrial applications.

4. Recrystallization: Basic principles, choice of solvent, seeding, filtration and centrifugation and drying.Industrial applications.Concepts of fractional crystallization.

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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. 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

Methods of preparing TLC plates, Development of TLC plate, Rf value. Application of TLC in monitoring organic reactions.

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 estimation of organic compounds Applications in research field to calculate percentage yield of product.

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 Applications in research field to calculate percentage yield of product.

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of Titrimetric Analysis, Treatment of analytical data, Adsorption, Partition, Gas Chromatography and High-Performance Liquid Chromatography.

Text books/ Reference books:

1. Vogel's text book of quantitative analysis. Addition Wesley Longmann Inc.
2. Quantitative analysis R.A Day and A.L. Underwood. Prentice Hall Pvt. Ltd.
3. Principles of Instrumental Analysis by D. A. Skoog, F. J. Holler and T. A. Nieman, Harcourt College Pub.
4. Separation Techniques by M. N. Sastri, Himalaya Publishing House (HPH), Mumbai.
5. Chromatography, E. Helftnan, Van Nostrand, Reinhold, New York.
6. Chromatography, E. Lederer and M. Lederer, Elsevier, Amsterdam.
7. Thin layer chromatography, E. Stahl, Academic Press, New York.

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SRR & CVR Govt.Degree College(A), Vijayawada

M.Sc., CHEMISTRY (ORGANIC CHEMISTRY) I SEMESTER

Paper Code & Title: 20 OCH 101: GENERAL CHEMISTRY-I

Weightages to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Total no of marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: I M.Sc. Organic chemistry **Semester I**
Paper: General chemistry I **Code: 20 OCH101**
Time: 3 Hrs. **Max.Marks: 60M**

PART-A

I.Answer any 5 questions out of the 10 short answer questions **5x4=20 Marks**

1. Write a note on Neutralisation indicators
2. Explain EDTA titrations
3. Explain T-test and F-test
4. Define Accuracy and precision
5. Write a note on drying agents Benzene and Ethanol
6. Write a note on Filtration and Centrifugation
7. Write a note on advantages and disadvantages of Column chromatography
8. Write applications of Paper chromatography
9. Explain basic principles of Gas chromatography
10. Explain reverse phase HPLC

PART-B

II. Answer any 5 questions out of the 10 internal choice essay questions **5x8=40 Marks**

UNIT-I

11. Explain the Classification reactions in titrimetry?

(OR)

12. Write a note on Mohr's method and Volhard's method?

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UNIT-II

13. Define an error? Explain the classification of errors with suitable examples?

(OR)

14. Write a note on Gaussian distribution curve?

UNIT-III

15. Discuss the basic principle and working of Steam distillation.

(OR)

16. Write a note on continuous distillation?

UNIT-IV

17. Explain types of paper chromatography?

(OR)

18. Explain the applications of TLC?

UNIT-V

19. Explain the basic principles and instrumentation of HPLC?

(OR)

20. Explain the detectors used in GC?

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Department of Chemistry

SRR & CVR Govt.Degree College (A), Vijayawada

M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)

I SEMESTER

Paper Code & Title: 20 OCH 102: ORGANIC CHEMISTRY-I

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

Total marks: 100 (Internal: 40 M & External: 60M)

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for students on Nature of bonding, Aromaticity and organic reaction mechanism.

Unit-I: Nature of bonding and Aromaticity: Nature of bonding:
Aromaticity: The energy, structural and electronic criteria for aromaticity; relationship among energetic, structural and electronic criteria; Huckle`s rule and molecular orbital theory. Frost circles, Aromaticity in benzenoid non-benzenoid compounds, Tropyllium cation, 1,3,5,7- Cyclooctatetraene, aromaticity of Hetero-aromatic Systems, Annulenes:[10] Annulenes- [12], [14],[16] and [18] annulenes, azulenes, fulvenes; fullerenes; ferrocene anti-aromaticity and homo-aromaticity.

Unit-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, Enophiles.

Unit-III: Addition Reactions: Mechanistic and stereochemical aspects of Addition reactions involving electrophiles, nucleophiles and free radicals, regio and chemo selectivity, Hydrogenation of double and triple bonds, hydrogenation of aromatic rings, Hydroboration.

Unit-IV: Elimination Reactions: Type of elimination reactions, mechanisms, Stereochemistry of Hofmann and Saytzeff rules, Syn elimination versus anti-elimination, elimination and substitution, dehydration, dehydrogenation, dehalogenation, decarboxylative eliminations. pyrolytic elimination molecular rearrangement during elimination; fragmentation reactions.

Unit-V: Substitution Reactions: Aliphatic Nucleophilic Substitution Reactions: The S_N2, S_N1, mixed S_N1 and S_N2 reactions and their mechanisms, sigma and pi bonds. SN^i mechanisms, neighbouring group participation

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Aromatic Nucleophilic substitution Reactions: $SN^2(Ar)$ (Addition–Elimination), $S_{N}1(Ar)$ and benzyne mechanisms (Elimination - Addition); Von Richter, Sommelet-Hauser rearrangements. Smiles rearrangement.

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of Nature of bonding, Aromaticity and organic reaction mechanism

Text books / 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, 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.

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SRR & CVR Govt.Degree College(A), Vijayawada

M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)

I SEMESTER

Paper Code & Title: 20 OCH 102: ORGANIC CHEMISTRY-I

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: I M.Sc. Organic chemistry **Semester I**
Paper: Organic chemistry I **Code: 20 OCH102**
Time: 3 Hrs. **Max.Marks: 60M**

PART-A

I. Answer any 5 questions out of the 10 short answer questions **5x4=20 Marks**

1. Write a note on azulenes
2. Explain the aromaticity of annulenes
3. Write the generation and reactivity of carbenes
4. Explain generation and reactivity of Arynes
5. Write a note on homogeneous catalytic hydrogenation of alkenes.
6. Explain hydroboration reaction with mechanism
7. Write a note on syn elimination versus anti elimination
8. Explain Hofmann elimination with suitable examples.
9. Write a note on Sommelet-Hauser rearrangement
10. Write a short note on Vonrichter rearrangement

PART-B

II. Answer any 5 questions out of the 10 internal choice essay questions **5x8=40 Marks**

UNIT-I

11. Explain the aromaticity of non benzenoid compounds

(OR)

12. Write a note on anti-aromaticity and homo aromaticity

UNIT-II

13. Explain generation, structure, stability, detection and reactivity of carbocations

(OR)

14. Write the generation and reactivity of carbanions

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UNIT-III

15. Write a note on hydro halogenation of alkenes

(OR)

16. Discuss halogenation of alkenes.

UNIT-IV

17 .Explain the mechanism of E1 and E2 eliminations.

(OR)

18. Explain Hoffmann eliminations with suitable examples.

UNIT-V

19. Explain benzyne mechanism

(OR)

20. Explain S_N1, S_N2 reactions with mechanisms

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Department of Chemistry

SRR & CVR Govt.Degree College(A), Vijayawada

M.Sc., CHEMISTRY (ORGANIC CHEMISTRY) I SEMESTER

Paper Code & Title: 20 OCH 103:
INORGANIC CHEMISTRY-I

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

Total marks: 100 Internal: 40 M & External: 60M

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for students on Introduction to Exact Quantum Mechanical Results, Chemistry of non- transition elements, Structure & Bonding, Metal–ligand bonding, and Metal – ligand Equilibria in solutions.

Unit-I: Introduction to Exact Quantum Mechanical Results: Schrodinger equation, importance of wave function, Operators, Eigen values and Eigen functions, 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. Application of variation method to the Hydrogen atom.

Unit-II: Chemistry of non- transition elements: Inter halogen compounds, Halogen oxides 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. Bonding in cyclic compounds. Intercalation compounds.

Metal π- complexes: preparation, structure and bonding in Nitrosyl, Dinitrogen and Dioxygen complexes.

Unit-III: Structure and Bonding: pπ-dπ bonding, Bent's rule,. Molecular Orbital theory, Symmetry of Molecular orbitals, Molecular orbitals in triatomic (BeH_2) molecules and ions (NO_2^-) MO energy level diagrams for hetero diatomic molecules.Walsh diagrams for linear (BeH_2) and bent (H_2O) molecules.

Unit-IV: Metal–ligand bonding: Crystal Field Theory of bonding in transition metal complexes- Splitting of d-orbitals in octahedral, tetrahedral, square planar and Trigonal bipyramidal and Square pyramidal fields. Spectrochemical series, CFSE calculations in tetrahedral and octahedral complexes. Tetragonal distortions - Jahn-Teller effect. Applications and limitations of CFT. Molecular Orbital Theory of bonding for Octahedral, tetrahedral and square planar complexes.

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Unit-V: Metal – ligand Equilibria in solutions: Step wise and over all formation constants. Determination of formation constants by Spectrophotometric method (Job's method) and pH metric method (Bjerrum's).). Determination of composition of complex by mole ratio method. Stability correlations - Irwing -William's series. Hard and soft acids and bases (HSAB),Acid-basestrengths.

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of Introduction to Exact Quantum Mechanical Results, Chemistry of non- transition elements, Structure & Bonding, Metal–ligand bonding, and Metal – ligand Equilibria in solutions.

Text books/ 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. Text book of Coordination chemistry, K. Somasekhara Rao and K.N.K. Vani, Kalyani Publishers.

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SRR & CVR Govt.Degree College(A), Vijayawada
M.Sc., CHEMISTRY (ORGANIC CHEMISTRY) I SEMESTER
Paper Code & Title: 20 OCH 103: INORGANIC CHEMISTRY-I

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: I M.Sc. Organic chemistry
Paper: Inorganic chemistry I
Time: 3 Hrs.

Semester I
Code:20 OCH103
Max.Marks: 60M

PART-A

I. Answer any 5 questions out of the 10 short answer questions **5x4=20 Marks**

1. Explain the importance of wave function.
2. Write a short note on Eigen values and Eigen functions.
3. Write a shot notes on interhalogen compounds
4. Explain the properties and structure of S-N complexes.
5. Explain molecular orbital diagram for NO_2^- ion.
6. Explain pπ-dπ bonding
7. Write the splitting of d-orbitals in trigonal bipyramidal cpomplexes.
8. Explain molecular orbital theory.
9. Explain step wise and overall formation constants.
10. Explain Irving William series.

PART-B

II.Answer any 5 questions out of the 10 internal choice essay questions **5x8=40 Marks**

UNIT-I

11. Derive Schrödinger wave equation.

(OR)

12 Explain variation theorem,Applicatio of variation method to H-atom

UNIT-II

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13. Write a note on dioxygen complexes.

(OR)

14. Describe the spectral and magnetic properties of Lanthanides and Actinides

UNIT-III

15. What are Walsh diagram? Predict the shape of H_2O molecule using relevant Walsh diagrams?

(OR)

16. Write an account on Bent's rule, energetics of hybridisation

UNIT-IV

17. Explain Jahn-Teller effect with suitable examples.

(OR)

18. Explain molecular orbital theory of bonding in octahedral complexes

UNIT-V

19. Determine the formation concept by spectroscopic method.

(OR)

20. Explain Hard and Soft Acid base theory.

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Department of Chemistry

SRR & CVR Govt.Degree College (A), Vijayawada

M.Sc., CHEMISTRY (ORGANIC CHEMISTRY) I SEMESTER

Paper Code & Title: 20 OCH 104: PHYSICAL CHEMISTRY-I

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

Total marks: 100 Internal: 40 M & External: 60M

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for students on Thermodynamics, Surface phenomena and phase equilibria, Electrochemistry, Chemical kinetics and Microwave Spectroscopy and Rotational Vibrational Spectroscopy.

Unit-I: Thermodynamics–I: Classical thermodynamics - Brief review of first and second laws of thermodynamics - Entropy change in reversible and irreversible processes - Entropy and disorder – Free energy functions - Gibbs-Helmholtz equation - Maxwell partial relations. spontaneity and equilibria Free energy changes in chemical reactions, Van't Hoff reaction isotherm - Van't Hoff equation – Classiuss - Clapeyron equation - partial molar quantities - Chemical potential - Gibbs- Duhem equation - partial molar volume - determination of partial molar quantities - Fugacity - Thermodynamic derivation of Raoult's law. Thermodynamics of ideal and non-ideal gases, and solutions.

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 - Auger electron spectroscopy. Surface active agents - classification of surface-active agents - Micellization – critical Micelle concentration (CMC) - factors affecting the CMC of surfactants, Micro emulsions - Reverse micelles.

Unit-III: Electrochemistry-1:Electrochemical cells - Measurement of EMF - Nernst equation – Equilibrium constant from EMF Data - pH and EMF data - Determination of solubility product from EMF measurements. Concentration cells with and without transference – Liquid junction potential and its determination - Activity and activity coefficients - Debye Huckel limiting law and its verification. - Anomalous behavior of strong electrolytes. Debye Huckel-Onsagar equation - verification and limitations Kohlrausch's law and its applications.

Unit-IV: Chemical kinetics: Methods of deriving rate laws - complex reactions - Theories of reaction rates -collision theory - Steric factor - Activated complex theory - Thermodynamic aspects – Unimolecular reactions - Lindemann's theory - Lindemann-Hinshelwood theory. Primary and secondary

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salt effects. Elementary account of linear free energy relationships equation - Chain reactions - Rate laws of H_2-Br_2, photochemical reaction of H_2 - Cl_2. Decomposition of acetaldehyde and ethane

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, non-rigid rot- Bond length determination from rotational spectra**.** Atomic-Microwave spectra of polyatomic molecules. **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. Fermi resonance.

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of Thermodynamics, Surface phenomena and phase equilibria, Electrochemistry, Chemical kinetics and Microwave Spectroscopy and Rotational Vibrational Spectroscopy.

Text books / Reference books:

1. Physical Chemistry P.W. Atkins, ELBS.
2. Chemical Kinetics - K.J. Laidler, McGraw Hill Pub.
3. Text Book of Physical Chemistry. Samuel Glasstone, Mcmillan Pub.
4. Physical Chemistry, G.W. Castellan. Narosa Publishing House
5. Thermodynamic for Chemists. Samuel Glasstone.
6. Electrochemistry, Samuel Glasstone, Affiliated East West
7. Physical Chemistry, W.J. Moore, Prentice Hall
8. Atomic structure and chemical bond. Manaschanda. Tata McGraw Hill Company Limited.
9. Fundamentals of Molecular spectroscopy: by C.N. Banwell
10. Molecular spectroscopy by B.K. Sharma
11. Vibrational Spectroscopy by D.N. Satyanarayana New Age Int. Pub.
12. Spectroscopy by Aruldas.

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SRR & CVR Govt.Degree College (A), Vijayawada

M.Sc., CHEMISTRY (ORGANIC CHEMISTRY) I SEMESTER

Paper Code & Title: 20 OCH 104: PHYSICAL CHEMISTRY-I

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: I M.Sc. Organic chemistry — Semester I

Paper: Physical chemistry I — Code: 20 OCH104

Time: 3 Hrs. — Max.Marks: 60M

PART-A

I.Answer any 5 questions out of the 10 short answer questions **5x4=20 Marks**

1 Explain Entropy change in reversible process.

2. Discuss first and Second law thermodynamics

3. Derive young laplace equation.

4. Define Critical Micelle Concentration and explain the factors affecting CMC

5. Derive Nernst equation.

6. Explain liquid junction potential and its determination.

7. Derive rate law for the thermal decomposition of Acetaldehyde

8. Explain rate laws of photochemical reaction of $H_2 - Cl_2$.

9. Write a note on classification of molecules.

10. Write a note on overtone and hot bands.

PART-B

II. Answer any 5 questions out of the 10 internal choice essay questions **5x8=40 Marks**

UNIT-I

11. Derive Van't Hoff's equation

(OR)

12. Derive the Gibbs Duhem Equation

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UNIT-II

13. Derive BET equation.

(OR)

14. Explain the classification of surface-active agents

UNIT-III

15. What is concentration cells and calculate the potential of concentration cells with transference.

(OR)

16. Write a note on Debye Huckle Onsagar Equation, its verification and its limitations

UNIT-IV

17. Explain Lindemann theory of Uni molecular reaction rate

(OR)

18. Explain primary and secondary salt effects

UNIT-V

19. Describe the rotational spectra of a diatomic molecule as rigid rotor.

(OR)

20. Explain the vibrational spectra of harmonic oscillator

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SRR & CVR Govt.Degree College (A), Vijayawada

M.Sc., CHEMISTRY (ORGANIC CHEMISTRY) I SEMESTER

Paper Code & Title: 20 OCH 105: ORGANIC CHEMISTRY PRACTICAL-I

No. of hours per week: 06 **Total credits: 03**

Total marks: 100 (Internal: 40 M & External: 60M)

List of experiments:

1. Separation of Binary mixtures of Carboxylic acid + Neutral organic compounds (Solvent extraction method).
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 extraction method).
4. Preparation of Phthalimide from Phthalic anhydride – High Temperature.
5. Preparation of p-nitro acetanilide – Low temperature.
6. Preparation of Iodoform – Room temperature.
7. Column chromatography - separate the given mixture of o-and p-nitro aniline.
8. Paper chromatography - separate the given mixture of sugars or amino acids.
9. Thin layer chromatography - separate the given mixture of phenols or 2,4-DNP derivatives of carbonyls compounds.
10. Preparation of Sodium wire - to make Sodium Wire for solvent drying.
11. Preparation of Sodium Granules.
12. Preparation of Sodium t-butoxide.
13. Preparation of Grignard Reagent and its usage one reaction.
14. Preparation of Wittig reagent.
15. Preparation of Butyl Lithium.

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

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SRR & CVR Govt. Degree College (A), Vijayawada

M.Sc., CHEMISTRY (ORGANIC CHEMISTRY) I SEMESTER

Paper Code & Title: 20 OCH 106: INORGANIC CHEMISTRY PRACTICAL-I

No. of hours per week: 06
Total marks: 100

Total credits: 03
(Internal: 40 M & External: 60M)

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

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 chromium (III).
4. Preparation of Hexa ammine cobalt (III) chloride.
5. Determination of Zn^{2+} with potassium Ferro cyanide.
6. Determination of Mg^{2+} using EDTA.
7. Determination of Ni^{2+}using EDTA.
8. Determination of hardness of water using EDTA.
9. Gravimetric determination of nickel using dimethyl glyoxime.
10. Gravimetric determination of Copper using ammonium thio cyanate.
11. Gravimetric determination of Zn using diammonium hydrogen phosphate.
12. Semi micro qualitative analysis of six radical mixtures
(One interfering anion and one less familiar cation for each mixture) (minimum three mixtures).

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

5th group: Ca^{+2}, Ba^{+2}, Sr^{+2}.
6th group: Mg^{+2}, K^+, Li^+.

Course Learning Outcomes: After studying this paper, students will acquire the practical knowledge of Inorganic experiments.

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. Prentice Hall.
3. Practical Inorganic Chemistry by G. Pass and H. Sutcliffe Chapman and Hall.
4. Practical Inorganic Chemistry by. K. Somasekhara Rao and K.N.K. Vani. Kalyani publishers.

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II semester Syllabus

Department of Chemistry

SRR & CVR Govt. Degree College (A), Vijayawada

M.Sc. – CHEMISTRY (ORGANIC CHEMISTRY) II SEMESTER

Paper Code & Title: 20 OCH 201: ORGANIC SPECTROSCOPY

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

Total marks: 100 (Internal: 40 M & External: 60M)

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on UV-Visible spectroscopy, Infrared spectroscopy, ^{1}HNMR Spectroscopy and Mass spectrometry.

Unit-I: UV-Visible spectroscopy: Beer-Lambert's law-Deviations from Beers law- Instrumentation- Energy transitions– Simple chromophores- Auxochrome, Absorption shifts (Bathochromic, Hypsochromic, Hyper chromic and Hypo chromic shifts) UV absorption of Alkenes-Polyenes unsaturated cyclic systems. UV absorption of carbonyl compounds: α, β-unsaturated carbonyl systems-UV absorption of aromatic systems-solvent effects- geometrical isomerism-acid and base effects-typical examples-calculation of λmax values using Woodward-Fieser rules, applications.

Unit-II: Infrared spectroscopy: Mechanics of measurement-Fundamental modes of vibrations- stretching and bending vibrations-Factors effecting Vibrational frequency-hydrogen bonding. Finger print region and its importance overtones, combination bands and Fermi resonance, typical group frequencies for –CH, -OH, - NH, - CC, -CO and aromatic systems- Application in structural determination–Examples-simple problems.

Unit-III: ^{1}H-NMR Spectroscopy-I: Introduction: Basic principle of NMR, Shielding and deshielding of magnetic nuclei, chemical shift and its measurements, factors influencing chemical shift, spin-spin interactions, factors influencing – coupling constant J and factors effecting J value. Chemical exchange, analysis of AB, AMX and ABX systems. Karplus curve variation of coupling constant with dihedral angle, virtual coupling, chemical exchange, effect of deuteration, hindered rotation

Unit-IV: Mass spectrometry: Introduction, Ion production-EI, CI, ES, MALDI and FAB- determination of Molecular weight and formulae-Behavior of organic compounds in mass spectrometer- factors affecting fragmentation. Mass spectral fragmentation of organic compounds, Common functional

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groups, molecular ion peak, meta stable peak isotopic peak, Mc Lafferty rearrangement, Nitrogen rule. Structural determination of organic compounds using mass spectra.

Unit-V: Structural elucidation of following simple organic compounds using UV-Visble, IR, PMR and Mass spectrometry. Mesitylene, Phenylacetaldehyde, Isobutyronitrile, N-methyl acetamide, 4-methylbenzoate, Ethanol, Acetaldehyde, Acetophenone, Benzyl alcohol, P- Nitro phenol, cresols and Xylenes.

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of UV-Visible spectroscopy, Infrared spectroscopy, H^1-NMR Spectroscopy, ^{13}C- NMR Spectroscopy, and Mass spectrometry.

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. Organic structure Analysis- Phillip Crews, Rodriguez, Jaspars, Oxford University Press (1998).
6. Organic structural Spectroscopy- Joseph B. Lambert, Shurvell, Lightner, Cooks, Prentice-Hall (1998).
7. Organic structures from spectra –Field L.D., Kalman J.R. and Sternhell S. 4th Ed. John Wiley and sons Ltd.

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Department of Chemistry

SRR & CVR Govt. Degree College (A), Vijayawada

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY) II SEMESTER

Paper Code & Title: 20 OCH 201: ORGANIC SPECTROSCOPY

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: II M.Sc. Organic chemistry — Semester I

Paper: Organic spectroscopy — Code:20 OCH201

Time: 3 Hrs — Max.Marks: 60M

PART-A

I.Answer any 5 questions out of the 10 short answer questions **5x4=20 Marks**

1. Explain types of electronic transitions
2. Write a note on auxochromes and chromophores
3. Write about solvent effect on IR spectroscopy
4. Write a short note on the finger print region.
5. Explain basic principle of NMR.
6. Explain shielding and deshielding of magnetic nuclei.
7. Explain the complex PMR spectra of ABX and AMX systems.
8. Explain Nuclear overhauser Effect (NOE).
9. Explain the Struture of N-methyl acetamide by NMR and IR.
10. Explain the mass fragmentation pattern in Aldehydes

PART-B

II. Answer any 5 questions out of the 10 internal choice essay questions **5x8=40 Marks**

UNIT-I

11. Write Wood-Ward Fieser rules for carbonyl compounds

(OR)

12. Write aboutTypes of absorption shifts

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UNIT-II

13. How would you distinguish the following sets of compounds using IR spectra.
    a) Primary, secondary and tertiary amines
    b) Cis and Trans cinnamic acid

(OR)

14 Write a note on fundamental modes of vibration.

UNIT-III

15. Define chemical shift and explain factors effecting chemical shift?

(OR)

16. Define coupling constant and explain factors effecting coupling constants

UNIT-IV

19. Write briefly about the ionization techniques EI and CI in mass spectroscopy

(OR)

20. Explain MC Lafferty rearrangement with an example.

UNIT-V

19. An organic compound C_9H_{12} gave the following spectral data:

UV: Amax268 nm, Ernax 480.

IR: Singificant absorption bands at 3065-2910, 1608 and 1473 cm-1.

PMR: 8 2.26 (9H, s) and 6.79 (3H, s).

^{13}C NMR (Off-resonance decoupled): One quartet, one doublet and one singlet.

Explaining the spectral data, derive the structure of the compound.

OR

20. A compound with molecular weight 130 gave a negative iodoform test.It absorbs at 292 nm, Emax 16 in the UV spectrum. It shows significant bands at 3042,2941,2862,2740, 1722, 1605, 1575 and 1462 cm-1 in its IR spectrum. In the PMR spectrum, three signals are present at r 2.73 (multiplet), 7.2 (doublet) and 0.22 (triplet) in the intensity ratio 5: 2:1, respectively. Determine the structural formula of the compound.

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M.Sc. – CHEMISTRY (ORGANIC CHEMISTRY) II SEMESTER

Paper Code & Title: 20 OCH 202: ORGANIC CHEMISTRY -II

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

Total marks: 100 (Internal: 40 M & External: 60M)

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on Named reactions, Stereo Chemistry, Green chemistry & Phase transfer catalysis and Chemistry of Nanomaterials.

Unit-I: Named reactions: Definition, mechanism of Aldol condensation, Shapiro reaction, McMurray reaction. Robinson ring annulation reaction and Simmon-Smith reaction. Dieckmann condensation, Darzens condensation, Michael addition, Chichibabin reaction

Unit-II: Stereo Chemistry-I: 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, Cis-trans inter conversion. Criteria for Chirality. Axially chiral allenes, spiranes, alkylidene cycloalkanes, chiral biaryls, Atropisomerism

Unit-III: Stereo Chemistry-II: Definition of Conformation and factors influencing on stability of Conformations; Conformational analysis and energy profile diagram of acyclic molecules; Conformational analysis of cyclic molecules - cyclobutane, cyclopentane, cyclohexane - mono and disubstituted cyclohaxanes and carbon hetero atom bonds having C–O & C–N.

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 Clean Fischer-Indole synthesis. Introduction to Microwave organic synthesis- introduction, advantages and disadvantages, solvents (water and organic solvents), solvent free reactions.

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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, Growth mechanism of carbon nano tubes-catalyst free growth, catalyst activated growth, properties-general, adsorption, electronic and optical, Mechanical and reactivity.Applications

Course Learning Outcomes: After studying this paper, students will acquire the knowledge of Named eactions, Stereo Chemistry, Green chemistry & Phase transfer catalysis and Chemistry of Nanomaterials.

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.

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Department of Chemistry

SRR & CVR Govt. Degree College (A), Vijayawada

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY) II SEMESTER

Paper Code & Title: 20 OCH 202: ORGANIC CHEMISTRY -II

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: II M.Sc. Organic chemistry — Semester II

Paper: Organic chemistry II — Code:20OCH202

Time: 3 Hrs — Max.Marks: 60M

PART-A

I.Answer any 5 questions out of the 10 short answer questions — 5x4=20 Marks

1. Write the mechanism and applications of Aldol condensation.
2. Explain mechanism of Micheal Addition
3. Explain DL Nomenclature with suitable examples.
4. Define Homomer, Epimer.
5. Explain the conformational analysis of n-butane.
6. Explain any 4 factors influencing the stability of conformations.
7. Write a note on green reagents
8. Write a note on Microwave assisted organic synthesis
9. Write a brief note on catalyst activated growth with suitable examples
10. Discuss catalyst free growth and catalyst activated growth

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PART-B

II. Answer any 5 questions out of the 10 internal choice essay questions

5x8=40 Marks

UNIT-I

11. Write the mechanism of Simon smith and McMurray reactions

(OR)

12. 12. Explain the following reactions with mechanism.

a) Shapiro reaction b) Chichibabin reaction

UNIT-II

13. Write a note on enantiomers and diastereomers.

(OR)

14. What are geometrical isomers and explain the methods used for the determination of

Configuration of geometrical isomers.

UNIT-III

15. Explain the factors influencing the stability of conformation.

(OR)

16. Explain the conformational analysis of mono and di substituted cyclohexanes

UNIT-IV

17 .Write 12 principles of green chemistry.

(OR)

18. Discuss clean Fischer Indole synthesis

UNIT-V

19. Write a note on structure of single and Multi-walled carbon nanotubes

(OR)

20. Discuss the properties of carbon nanotubes?

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Department of Chemistry

SRR & CVR Govt. Degree College (A), Vijayawada

M.Sc., CHEMISTRY (ORGANIC CHEMISTRY) II SEMESTER

Paper Code & Title: 20 OCH 203: INORGANIC CHEMISTRY-II

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

Total marks: 100 (Internal: 40 M & External: 60M)

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on Non-metal cages and metal clusters, organometallic chemistry of transition metals, Reaction mechanism of transition metal complexes, Term symbols and Electronic spectra and Bio-inorganic chemistry and Magnetic properties of complexes.

Unit-I: Non-metal cages and metal clusters: Structure and bonding in phosphorous-oxygen, phosphorous-Sulphur cages; structure and bonding in higher boranes .Carboranes,metallocarboranes. Classification- LNCs and HNCs, Isoelectronic and Isolobal relationships, electron counting rules: Wade's and Lauher's rules. Preparation, structure and bonding in dinuclear $[Re_2Cl_8]^{2-}$ ion, trinuclear $[Re_3Cl_9]$, tetra nuclear $W_4(OR)_{16}$, hexa nuclear $[Mo_6Cl_8]^{4+}$ and $[Nb_6Cl_{12}]^{2-}$ Metal Carboxylate Clusters.

Unit-II: Organometallic chemistry of transition metals: Classification and electron counting rules, hapticity, synthesis, structure and bonding of Olefinic complexes, Acetylene complexes, ferrocene, cyclo heptatriene and tropylium complexes of transition metals. Reactions of organometallic compounds - oxidative addition reductive elimination, insertion and elimination.Catalytic hydrogenation, Hydroformylation. Wacker's process, Monsanto acetic acid synthesis

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. Factors affecting the substitution reactions in octahedral complexes. Trans effect on substitution reactions in square planar complexes. Theories of trans effect. Applications of trans effect in synthesis of square planar complexes. Mechanism of redox reactions, outer sphere mechanism, cross reactions and inner sphere mechanism.

Unit-IV: Term symbols and Electronic spectra: Term symbols: Term symbols , Hund's rules to predict ground terms and ground states. Electronic spectra of transition metal complexes Spectroscopic terms. Selection rules, Slater–Condon parameters, Term separation energies for d^n configurations Correlation diagrams and Orgel diagrams. Tanabe-Sugano diagrams for d1 to d^9 configurations. Quantitative determination of crystal filed splitting energy.

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Racha parameters. Calculation percentage of ionic nature in metal ligand bond. of Nephelauxetic effect. Charge Transfer spectra.

Unit-V: Bio-inorganic chemistry and Magnetic properties of complexes: Storage and transport of dioxygen by Hemoglobin and Myoglobin, Chlorophyll, Vitamin B_{12} and its importance. Hemocyanine, Hemoerythrine, Cytochromes.

Magnetic properties of transition metal complexes: magnetic moments. Orbital Quenching Spin-only formula.

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of Non-metal cages and metal clusters, Organ metallic chemistry of transition metals, Reaction mechanism of transition metal complexes, Term symbols and Electronic spectra and Bio-inorganic chemistry and Magnetic properties of complexes.

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 Easter
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.

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Department of Chemistry
SRR & CVR Govt. Degree College (A), Vijayawada

M.Sc., CHEMISTRY (ORGANIC CHEMISTRY) II SEMESTER

Paper Code & Title: 20 OCH 203: INORGANIC CHEMISTRY-II

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: II M.Sc. Organic chemistry — Semester II

Paper: Inorganic chemistry II — Code:20 OCH203

Time: 3 Hrs — Max.Marks: 60M

PART-A

I.Answer any 5 questions out of the 10 short answer questions **5x4=20 Marks**

1. Describe the structure and bonding in higher boranes
2. What are Wades and Lauherrule? How are they helpful in counting electrons in metal clusters.
3. Explain reactions of organometallic compounds.
4. Define hapticity and write the classification of organometallic compounds
5. Explain cross reactions
6. Write the mechanism of inner sphere reactions.
7. Explain Slater Condon parameters.
8. Discuss selection rules
9. Write a note on myoglobin
10. Explain anomalous magnetic moments.

PART-B

II.Answer any 5 questions out of the 10 internal choice essay questions **5x8=40 Marks**

UNIT-I

11. Discuss the preparation, structure, bonding and magnetic property of Re2Cl8-2ion.

(OR)

12. Explain structure and bonding in carboranes

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UNIT-II

13. Write a note on catalytic hydrogenation and hydroformylation.

(OR)

14. Explain structure and bonding in Olefin complexes

UNIT-III

15. Explain acid hydrolysis and base hydrolysis.

(OR)

16. Explain Complementary and non- complementary reactions.

UNIT-IV

17. Explain Correlation diagrams and orgel diagrams.

(OR)

18. Draw T.S. diagram for d5 configuration

UNIT-V

19. What is paramagnetism and what are the factors affecting paramagnetism

(OR)

20. Write the structure and function of vitamin B12

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Department of Chemistry
SRR & CVR Govt. Degree College (A), Vijayawada
M.Sc., CHEMISTRY (ORGANIC CHEMISTRY) II SEMESTER

Paper Code & Title: 20 OCH 204: PHYSICAL CHEMISTRY-II

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

Total marks: 100 (Internal: 40 M & External: 60M)

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on Third law of Thermodynamics and Statistical thermodynamics, Polymer chemistry and Raman Spectroscopy, Electro Chemistry, Chemical kinetics and Photo chemistry, Symmetry and Group theory in chemistry.

Unit-I: Third law of Thermodynamics and Statistical thermodynamics: Nernst Heat theorem - Third law of thermodynamics - Its limitations - Determination of absolute entropy - most probable distribution, Entropy and probability - Boltzmann- Plank equation. Maxwell-Boltzmann distribution, Fermi-Dirac 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 Light scattering phenomenon. **Solid state:** Crystal structures; Bragg's law and applications; band structure of solids. Classical and quantum theories of Raman effects, pure rotational, vibrational and Vibrational-rotational Raman spectra, selection rules.

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. Variation of equivalent conductance with dilution. Derivation of Butler- Volmer equation for one electron transfer - electro chemical potential. Kohlrausch's Law and its applications.

Unit-IV: Chemical kinetics and Photo chemistry: Enzyme catalysis - Michelis-Menten kinetics. Fast reactions and Chain reactions, Parallel

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reactions. Flash photolysis. Acid base catalysis – protolytic and prototropic mechanism. Actinometry, Reactions with low and high quantum yields, Photo sensitization, Exciplexes and Excimers, Photochemical equilibrium,Stern-Volmer equation.

Unit-V: Symmetry and Group theory in chemistry: Symmetry elements, symmetry operation, definition of group, sub group, GMT tables Abelian and non-abelian groups. Point group. 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. Construction of Character tables.

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, Symmetry and Group theory in chemistry.

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. Introductory Group Theory for Chemists by George Davidson.
14. Group theory for chemistry by A.K. Bhattacharya.
15. Fundamentals of Molecular spectroscopy by C.N.Banwell.
16. Molecular spectroscopy by B.K.Sharma.
17. Vibrational Spectroscopy by D.N.Sathyanarayana New Age Int. Pub.
18. Spectroscopy by Aruldas.

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M.Sc., CHEMISTRY (ORGANIC CHEMISTRY) II SEMESTER

Paper Code & Title: 20 OCH 204: PHYSICAL CHEMISTRY-II

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: II M.Sc. Organic chemistry — Semester II

Paper: Physical chemistry II — Code: 20 OCH204

Time: 3 Hrs — Max.Marks: 60M

PART-A

I.Answer any 5 questions out of the 10 short answer questions **5x4=20 Marks**

1. Explain 3rd law of thermodynamics in determining the absolute entropy of solids.
2. Derive Sackur Tetrode equation
3. Write a note on number average and weight average molecular weights.
4. Write a note on factors affecting glass transistiontempreature
5. Write a note on standard hydrogen electrode.
6. Write note on Tafel plots.
7. Explain Michaelis-Menten kinetics
8. Write a note on flash photolysis
9. Write the group multiplication table for C_{2v} point group
10. Discuss Abelian and Non-abelian groups

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PART-B

II. Answer any 5 questions out of the 10 internal choice essay questions 5x8=40 Marks

UNIT-I

11. Derive Maxwell Boltzmann distribution

(OR)

12. Explain Fermi-dirac statistics

UNIT-II

13. Write a note on Ziegler Natta Polymerisation

(OR)

14. Explain the classical theory of Raman effect.

UNIT-III

15. Explain various types of potentiometric titrations

(OR)

16. Derive Butler Volmer equation for one electron transfer.

UNIT-IV

17 .Write the kinetics of Hydrogen and oxygen reaction

(OR)

18. Derive Stern Volmer equation.

UNIT-V

19. Discuss character tables and construction of character tables

(OR)

20. Explain Great Orthogonality theorem and its importance.

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SRR & CVR Govt. Degree College (A), Vijayawada

M.Sc., CHEMISTRY (ORGANIC CHEMISTRY) II SEMESTER

Paper Code & Title: 20 OCH 205: ORGANIC CHEMISTRY PRACTICAL-II

No. of hours per week: 06 **Total credits: 03**

Total marks: 100 (Internal: 40 M & External: 60M)

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, 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.

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Department of Chemistry

SRR & CVR Govt. Degree College (A), Vijayawada

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY) II SEMESTER

Paper Code & Title: 20 OCH 206: PHYSICAL CHEMISTRY PRACTIAL -II

No. of hours per week: 06 **Total credits: 03**

Total marks: 100 (Internal: 40 M & External: 60M)

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 $\longrightarrow KI_3$ $KI + I_2$ 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. P^H-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 (CH_3COOH) 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.

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Department of Chemistry

SRR & CVR Govt. Degree College (A), Vijayawada

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY) II SEMESTER

Paper Code & Title: 20 OE OCH 207: (OPEN ELECTIVE-I)

CHEMISTRY IN DAILY LIFE

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

Total marks: 100 (Internal: 40 M & External: 60M)

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 Non- renewable energy resources, Methods to convert temporary hard water into soft water, DO, COD, BOD, Toxicity of lead, mercury, arsenic and Cadmium.

Unit-III: Bioinorganic Chemistry: Essential elements, and trace elements in biological systems. biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn and Cl. Bio chemistry of non-metals

Unit-IV: Biological functions of Hormones: Introduction, mechanism of action of Adrenaline, melatonin, noradrenaline, dopamine, prostacyclin, adrenocarticotropic hormone, antidiuretic hormone, Insulin.

Unit-V: Medicinal Chemistry: Disease -medicinal molecule-mode of action of the following diseases Malaria-Artesunate, Dengue-Acetaminophen, Asthma-Albuterol, Diabetes (type-II) (iiddm)
– metformin, Diabetes(type-I)(iddm) – Insulin, Arthritis-methotrexate, Glaucoma- brimonidine, Chickenpox-acyclovir, Anxiety – citalopram, Thyroid-Levithyroxine(lt4), Insomnia- estazolam, peptic ulcer, GERD(acid reflux) – Omeprazole, pantoprazole. Covid-19 –drugs and vaccination, anticancer drugs.

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Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of Chemistry Laboratory safety symbols – Meaning, Environmental Chemistry, Bioinorganic Chemistry, Biological functions of Hormones and Medicinal Chemistry.

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. Trip

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Department of Chemistry

SRR & CVR Govt. Degree College(A), Vijayawada

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY) II SEMESTER

Paper Code & Title: 20 OE OCH 207: (OPEN ELECTIVE-I)

CHEMISTRY IN DAILY LIFE

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: I M.Sc. Organic chemistry — Semester II

Paper: Chemistry in everyday life — Code: 20 OE OCH 207

Time: 3 Hrs. — Max.Marks: 60M

PART-A

I. Answer any 5 questions out of the 10 short answer questions **5x4=20 Marks**

1. Write a short note on acid rain

2Discuss Bhopal gas tragedy

3. Explain chemistry laboratory safety methods

4. Define the terms i) harmful ii) corrosive

5. Write a short note on bioinorganic chemistry

6What are essential elements

7Write a short note on biological functions of hormones

8. Write a short note on insulin

9. Explain the molecule mode of action in malaria

10. Explain the molecule mode of asthama

PART-B

II.Answer any 5 questions out of the 10 internal choice essay questions **5x8=40 Marks**

UNIT-I

11. Explain general laboratory safety precautions in laboratory

(OR)

12. Explain narcotic and lachrymatory in chemistry laboratory symbols

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UNIT-II

13. Explain vishakapatnam polymers industry tragedy in environment chemistry

(OR)

14. Explain methods to convert temporary hardness into softwaterin environment chemistry

UNIT-III

15. Explain the biological significance of Na K Mg Cu Zn in bioinorganic chemistry

(OR)

16. Explain biochemistry of non-metals

UNIT-IV

17 .Explain mechanism of adrenaline and dopamine

(OR)

18. Explain the mechanism of prostacyclin and melatonin

UNIT-V

19. Discuss about omeprazole in medicinal chemistry

(OR)

20Discuss about covid -19 drug and vaccination in medicinal chemistry

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Department of Chemistry

SRR & CVR Govt. Degree College (A), Vijayawada

M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)II SEMESTER

PAPER CODE & TITLE: 20 OEOCH 207.2: (OPEN ELECTIVE-I)

ENVIRONMENTAL CHEMISTRY

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

Total marks: 100 **(Internal: 40 M & External: 60M)**

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

Unit-I: Water Pollution: Types of water pollution, ground water and surface water pollution - Sources and harmful effects-sources and effects of major water pollutants-Inorganic pollutants and toxic metals-Oxygen demanding wastes-Organic Pollutants-Plant nutrients-detergents-suspended matter-radioactive wastes-Sediments-Thermal pollutants - oil spills - oil spill removal methods- disease causing agents.

Unit-II: Air Pollution: Atmosphere-structure-functions and photochemical reactions-sources of air pollution- Natural and manmade-classification and effects of air pollutants - CO, CO2, SO2, SO3,NO and NO2- hydrocarbon as pollutant- reactions of hydrocarbons and effects - particulate pollutants- sources and effects of organic and Inorganic particulates - Greenhouse effect-impact on global climate-control measures-role of CFC's - ozone holes- effects of ozone depletion-smog- components of photochemical smog-effects of photochemical smog.

Unit-III: Metal Toxicology and Nuclear Pollution: Effects of metals and metallic compounds-sources, toxicology and health risks of iron, arsenic, cadmium, chromium, lead, mercury and nickel. Nuclear pollution-sources-effects of ionizing and non-ionizing radiation

- genetic and somatic effects-effects of Cesium-137, Krypton-85 Iodine-131 and Strontium-

90 - Storage of nuclear wastes-disposal of nuclear wastes-nuclear disasters and their management-some major nuclear accidents.

Unit-IV: Pesticides and Soil Pollution: Pesticides-classification, mode of action-toxic effects of chlorinated hydrocarbons, organophosphorus compounds and carbamates - alternatives to chemical pesticides- (pheromones, Juvenile harmones, chemosterilization). Soil pollutants-sources and effects of industrial wastes-urban wastes- radioactive pollutants-agricultural wastes-solid waste management in cities, soil pollution control measures.

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Unit-V: Analysis and Control: Sampling of polluted water- preservation-main quality characteristics of water- alkalinity, hardness, total solids- TDS - DO, BOD, COD, TOC, fluoride and chloride. Defluoridation techniques-Iron removal-sampling of gaseous pollutants and particulates –adsorption - absorption - scrubbing – cold trapping – filtration - cyclone separator - gravity settling - electrostatic precipitators - thermal precipitators - analysis of CO by gas chromatography, NO by chemiluminescence and SO2 by spectrophotometer.

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

Text books/ Reference books:

1. Environmental Chemistry, A.K. De, Wiley Eastern Ltd, 3rd Edn., 1994.
2. Environmental Chemistry, B.K. Sharma, Goel Publishers, 2001.
3. Environmental Chemistry, M.S. Sethi, Sri Sai Printographers, 1994.
4. Text book of Environmental Chemistry, C.D. Tyagi and M.Mehra, AnmolPublishers, 1996.
5. Fundamentals of Environmental Pollution, K. Kannan, S. Chand & Co., 1997.

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Department of Chemistry

SRR & CVR Govt. Degree College(A), Vijayawada

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY) II SEMESTER

PAPER CODE & TITLE: 20 OEOCH 207.2: (OPEN ELECTIVE-I)

ENVIRONMENTAL CHEMISTRY

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: I M.Sc. Organic chemistry — Semester II

Paper: Environmental chemistry — Code: **20 OE OCH 207.2**

Time: 3 Hrs. — Max.Marks: 60M

PART-A

I. Answer any 5 questions out of the 10 short answer questions **5x4=20 Marks**

1. Discuss about ground water and surface water pollution
2. Explain the oil spills
3. Write a short notes on airpollution
4. Explain the ozone holes and effects of ozozne depletion
5. Discuss about arsenic and cadmium
6. Explain nuclear disasters and management
7. Explain short notes on classififcation of pesticides
8. Discuss mode of action of pesticides
9. Discuss short notes on sampling of polluted water
10. Explain preservation and main quality charaterstics of water

PART-B

II. Answer any 5 questions out of the 10 internal choice essay questions **5x8=40 Marks**

UNIT-I

11. Explain the oil spill removal methods in water pollution

(OR)

12. Discuss different types of water pollution

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UNIT-II

13. Discuss natural and manmade classification and effects of air pollution

(OR)

14. Discuss i) greenhouse effect ii) Impact on global climate

UNIT-III

15. Discuss about ionizing and non-ionizing radiation

(OR)

16. Discuss a) cesium-137, b) krypton-85, iodine -131

UNIT-IV

17 .Discuss about i) pesticides b) soil pollutants

(OR)

18Discuss a) radioactive pollutants b) agriculture waste

UNIT-V

19. Discuss deflourination techniques

(OR)

20Discuss TOS, TOC, BOD

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Department of Chemistry
SRR & CVR Govt. Degree College (A), Vijayawada
M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)II SEMESTER
PAPER CODE & TITLE: 20 OEOCH 207.3: (OPEN ELECTIVE-I)SCIENTIFIC RESEARCH METHODOLOGY

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

Total marks: 100 **(Internal: 40 M & External: 60M)**

Course Learning Objective(S): The main objective of this paper is to give a basic andupdated knowledge for the students on Scientific Research Methodology.

Unit-I: Literature survey-types of literature- Primary, secondary and tertiary- examples. Journals published by the ACS and RSC- CA and its importance - Indian Journals - Reviews, monographs data books and indexes. Literature survey: Methods of searching the literature, methods of compilation and preservation and retrieval of collected literature. Research experiments: Planning and conducting experiments, methodology of collecting scientific data (with three types of project titles as examples).

Unit-II: Project report writing: The general format, chapter format, page format. Procedure for presenting tables, graphs and figures; foot-notes, bibliography, appendices. Abbreviations, symbols, SI units, nomenclature, Scientific exactness and proper language, editing.

Unit-III: Entrepreneurship: Steps in establishing a chemical factory. Methodology of market survey for chemicals and chemical-based products. Principles of designing bench-scale production and scaling up for a chemical production computer-aided analysis and computer programming. Computer hardwares and software, implementation, software vs hardware, data representation, computerized instrumentation systems, microcomputer interfacing, computer-controlled laboratory automation systems.

Unit-IV: Simple programs in the C language- formulation of algorithm, flowcharts, constants and variables, data types, operations and symbols, arithmetic expressions, common mathematical functions, input and output, making decisions, program looping arrays, functions, structures, character strings, pointers.

Unit-V: Statistical Calculation: Presentation of data, measures of central tendency, mean, standard deviation, measures of variability, simple sampling techniques, errors in chemical analysis, linear regression and correlation, method of least squares

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of Scientific Research Methodology.

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References:

1. Thesis and assignment writing Anderson, Durtson and Poole
2. Handbook for authors in the Journal of the American Chemical Society Publications.
3. Chemical publications - Their nature and uses M.G.Mellon
4. Organic chemistry Jerry March, 4th edition., McGraw-Hill
5. Textbook of practical organic chemistry Vogel
1. 6. Textbook of practical inorganic chemistry Vogel

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Department of Chemistry

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M.Sc.,CHEMISTRY(ORGANICCHEMISTRY)IISEMESTER

PAPER CODE & TITLE: 20 OEOCH 207.3:

(OPEN ELECTIVE- I)SCIENTIFICRESEARCHMETHODOLOGY

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: I M.Sc. Organic chemistry — Semester II

Paper: Scientific research methodology — Code: **20 OE OCH 207.3**

Time: 3 Hrs. — Max.Marks: 60M

PART-A

I. Answer any 5 questions out of the 10 short answer questions **5x4=20 Marks**

1. Explain the literature survey of journals published by ACS
2. Explain the importance in RSC-CA in literature survey
3. Explain about own word to write project report writing
4. Explain computer hardware in entrepreneurship
5. Explain the microcomputer interfacing in entrepreneur ship
6. Explain the formulation of algorithm and flowchart
7. Explain the input amd output in the C-language
8. Explain the simple sampling techniques in statistical calculation
9. Explain the presentation of data in statistical calculation
10. Explain the page format in project report writing

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PART-B

II.Answer any 5 questions out of the 10 internal choice essay questions 5x8=40 Marks

UNIT-I

11. Discuss about literature survey of primary secondary and teritiary with examples

(OR)

12. Discuss research experiments of planning and conducting experiments

UNIT-II

13. Explain the project report writing in bibliography and foot notes

(OR)

14. Discuss about the scientific exactness and proper language in projevt report writing

UNIT-III

15. Explain the computerized instrumentation systems in entreprenuership

(OR)

16. Explain the methodology of market survey for chemicals and chemical based products

UNIT-IV

17 .Discuss about the simple programs in the C language

(OR)

18. Explain the formulation of algorithm in C language

UNIT-V

19. Discuss about measures of central tendency in statistical calculation

(OR)

20Explain the statistical calculation of errors in chemical analysis and linear regression and correlation

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III SEMESTER SYLLABUS
Department of Chemistry
SRR & CVR Govt. Degree College (A), Vijayawada
M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)III SEMESTER

PAPER CODE & TITLE: 20 OCH 301: ADVANCED ORGANIC SPECTROSCOPY

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

Total marks: 100 **(Internal: 40 M & External: 60M)**

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on ^{13}C NMR Spectroscopy, Structural Elucidation of Organic compounds Using UV, IR, ^{1}H-NMR,^{13}C-NMR, 2D NMR spectroscopy, Electron Spin Resonance Spectroscopy and Optical Rotatory Dispersion (ORD) and CD spectroscopy.

Unit-I: ^{13}C NMR Spectroscopy: Similarities and Differences between PMR and CMR, general considerations, chemical shift (aliphatic, olefinic, alkyne, aromatic, hetero aromatic and carbonyl carbon), off resonance and broadband decoupling, coupling constants, typical examples of CMR spectroscopy-simple systems.

Unit-II: Structural Elucidation of Organic compounds: Structural Elucidation of Organic compounds Using UV, IR, ^{1}H-NMR,^{13}C-NMR and mass spectrometry.

Unit-III: 2D NMR Spectroscopy: Definitions and importance of COSY, DEPT, HOMCOR,HETCOR, INDOR, INEPT, NOESY, COSY of menthol DEPT of ethanol – the study of simple organic compounds.

Unit-IV: Electron Spin Resonance Spectroscopy: Introduction, Basic Principle and Instrumentation; Relaxation process and line widths; definition and examples of Zero field splitting, Fine splitting, Hyper fine splitting, Super Hyper fine splitting and Kramer"s degeneracy; Factors affecting the "g" value. Isotropic and anisotropic hyperfine coupling constants, Hamiltonian and spin densities.

Unit-V: Optical Rotatory Dispersion (ORD) and CD spectroscopy: Phenomena of Optical Rotation, Circular birefringence, Circular dichroism and Cotton effect. Plane curves and Anomalous curves. The Octant rule. Application of the octant rule to the study of absolute configuration and confirmations of organic molecules.

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of ^{13}C NMR Spectroscopy, Structural Elucidation of Organic compounds Using UV, IR, 1H-NMR,^{13}C-NMR, 2D NMR spectroscopy, Electron Spin Resonance Spectroscopy and Optical Rotatory Dispersion (ORD) and CD spectroscopy

P. Nallya Reddy

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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, 6thEd. John Wiley and Sons.
3. Spectroscopic methods in organic chemistry - D. H. Williams and I. Flemming McGrawHill.
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.

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M.Sc., CHEMISTRY(ORGANICCHEMISTRY) IIISEMESTER
PAPERCODE&TITLE:20OCH301:ADVANCED ORGANIC SPECTROSCOPY

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: II M.Sc. Organic chemistry — Semester III

Paper: Advanced spectroscopy — Code:20OCH301

Time: 3 Hrs — Max.Marks: 60M

PART-A

I. Answer any 5 questions out of the 10 short answer questions **5x4=20 Marks**

1. Write a short note on coupling constants
2. Explain chemical shifts
3. Predict C13 NMRR signals for CH_3-CH_2-CH_2-CH_2-CH=CH_2
4. Explain Mass spectroscopy with suitable example
5. Define i) HETCOR ii) DEPT
6. Define i) COSY ii) INEPT
7. Explain basic principles of ESR spectroscopy
8. Explain Kramers degeneracy
9. Explain cicular bifringence and circular dichromism
10. Explain cotton effect

PART-B

II. Answer any 5 questions out of the 10 internal choice essay questions **5x8=40 Marks**

UNIT-I

11. Write the similarities and difference between PMR &CMR Spectroscopy

(OR)

12. Explain a)offresonance decoupling b)Broad band decoupling

M. Mo — dno — P. Nallapa Reddy — 11.3.2022

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UNIT-II

13. Determine the structure of an organic compound having following spectral data:
MF:C_4H_7N
UV nm :200
IRcm^{-1}:2500-3000,1715
^{1}HNMR :1.27(t);3.66(q)4.13;10.95(s)

(OR)

14. Determine the structure of an organic compound having following spectral data:
MF:$C_3H_6Cl_2$
UV nm :210
IRcm^{-1}:2940(m);1265(w);690(s)
^{1}HNMR :3.5(2H,d);3.3(1H,m);1.25(3H,d)

UNIT-III

15. Explain the use of NOESY in 2D-NMR spectroscopy with suitable example

(OR)

16. Explain the importance of HOMCOR & INDOR with suitable examples

UNIT-IV

17 .Explain a)Super hyperfine splitting b)Hyperfine splitting

(OR)

18. Explain a)Factors affecting g value b)Spin densities

UNIT-V

19. Write about ORD & CD curves by giving each one example

(OR)

20. Explain Octant rule and Application of the octant rule to the study of absolute configuration of organic molecules.

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Department of Chemistry
SRR & CVR Govt. Degree College (A), Vijayawada
M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)III SEMESTER

PAPER CODE & TITLE: 20 OCH 302: ORGANIC REACTIONS & MECHANISMS

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

Total marks: 100 **(Internal: 40 M & External: 60M)**

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on Oxidations, Reductions, Molecular Rearrangements, Pericyclic Reactions and Organic Photo Chemistry.

Unit-I: Oxidations: Definition and types of oxidations by using the following oxidants DDQ, SeO_2, NBS, Ruthenium tetroxide, Tl(III) nitrate, Chromium (VI) oxidants, MnO_2, , DMSO Ag_2CO_3, $Pb(OAc)_4$, $KMnO_4$, OsO_4, HIO_4, Prevost di-hydroxylation and Wood-wards modified di- hydroxylation. Epoxidation by Per-acids and opening of epoxides.

Unit-II: Reductions: Definition and types of reductions, preparation reduction by using following reagents $LiAlH_4$, $LiAlH(OR)_3$, $LiBH_4$, Red-Al, DIBAL, $NaBH_4$, $NaCNBH_3$, , Allanes, Boranes trialkyl borohydrides, Birch reduction, wolf-kishner and clemenson reduction Reduction with di-imide. Catalytic hydrogenation.

Unit-III: Molecular Rearrangements: Definition and classification of molecular rearrangements; mechanism, migratory aptitude, stereochemistry and synthetic applications of Pinacol-pinacolone, Wagner-Meerwein, Tiffeneau – Demjanov, Arndt-Eistert synthesis, Beckmann, Hofmann, Curtius, Schmidt, Lossen; Baeyer- villiger, Hydro peroxide, Dakin, Benzil-Benzilic acid and Favorskii rearrangements.

Unit-IV: Pericyclic Reactions: Introduction; classification – Cycloadditions, Electrocyclic, Sigmatropic, Ene and chelotropic reactions; Molecular orbital energy level diagram - ethylene, 1,3 Butadiene, 1,3,5- Hexatriene, allyl system and pentadiene system. Stereochemical notations – suprafacial, antarafacial, Conrotatory and disrotatory m o d e s . Woodward- Hoffman selection rules. Analysis by Correlation diagram method, FMO approach and perturbation of molecular (PMO) approach . (3, 3) and (5, 5) sigmatropic rearrangements detailed treatment of Claisen and Cope rearrangements, aza-Cope rearrangement.

Unit-V: Organic Photo Chemistry: Photochemical processes. Energy transfer, sensitization and quenching. Singlet and triple states and their reactivity. Photoreactions of carbonyl compounds, enes, dienes, and arenes– Aromatic compounds–isomerization–additions. Photochemistry of carbonyl compounds – Norrish type I and II reactions –

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Paterno – Buchi Reaction. Photoreduction, Photochemical rearrangement – Photo Fries rearrangements, Di-π-methane rearrangement. Phtochemistry of aromatic compounds and conjugated carbonyl compounds Reactions at unactivated C- H bonds: The Hoffmann-Loeffler-Freytag reaction, Cyclisation reactions of nitrenes, The Barton reaction, photolysis of hypohalites, photolysis of N-nitrosoamides.

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of Oxidations, Reductions, Molecular Rearrangements, Pericyclic Reactions and Organic Photo Chemistry.

Text books:

1. Organic chemistry-Clayden J. (Oxford)
2. Organic Chemistry, Paula Yurkanis Bruice, 4th Ed. (Printice Hall)
3. Advanced Organic Chemistry-Reactions, Mechanism and structure, Jerry March, 6th Ed.
4. Francis A. Carey and Richard J. Sundberg (Part-A: Structure andMechanisms) University of Virginia Charlottesville, Virginia.
5. Francis A. Carey and Richard J. Sundberg (Part-B: Reactions andSynthesis) University of Virginia Charlottesville, Virginia.
6. Organic Chemistry, R. T. Morrison and R. N. Boyd (Prentice-Hall)
7. Modern Organic Synthesis An Introduction, George S. Zweife Michael He Nantz University ofCalifornia.
8. W. Carruthers, Iain Coldham-Modern Methods of Organic Synthesis-Cambridge University Press (2004)

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Department of Chemistry
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M.Sc., CHEMISTRY(ORGANIC CHEMISTY)IIISEMESTER
PAPERCODE &TITLE:20OCH302: ORGANICREACTIONS& MECHANISMS

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: II M.Sc. Organic chemistry — Semester III
Paper: Organic reactions Mechanisms — Code: 20OCH302
Time: 3 Hrs. — Max.Marks: 60M

PART-A

I. Answer any 5 questions out of the 10 short answer questions **5x4=20 Marks**

1. Write a short note on oxidations using SeO_2
2. Write a short note on epoxidation
3. Define reduction.Discuss about different types of reductions
4. Write the synthetic applications of Diimide
5. Write a note on pinacole-pinacalone rearrangement
6. Explain wagner-meerwein rearrangement
7. Define pericyclic reactions with examples
8. Explain woodward –hoffmann rules
9. Discuss Norrish type-II reations
10. Explain photofries rearrangement

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PART-B

II. Answer any 5 questions out of the 10 internal choice essay questions 5x8=40 Marks

UNIT-I

11. Write the synthetic applications of a) Ruthenium tetroxide b)TI(III)Nitrate

(OR)

12. Write the prepartions of MnO_2 &OsO_2

UNIT-II

13. Write the synthetic applications of LiAl4 and NaBH4

(OR)

14. Write the preparation and synthetic applictaions of DIBAL

UNIT-III

15. i)Explain Bayer-villliger rearrangement ii)Expain Benzidine rearrangement

(OR)

16. I) Explain Bckmann rearrangement ii)Favorskii rearrangemet

UNIT-IV

17 .Discuss correlation diagram methods

(OR)

18. Discuss (2+2) and (4+2) cycloaddition reactions with examples

UNIT-V

19. Explain Barton reaction and Paternobuchi reaction

(OR)

20 i) Write the photochemistry of dienes ii)Di-pi methane rearrangement

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M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)
III SEMESTER
PAPER CODE & TITLE: 20 OCH 303: MODERN ORGANIC SYNTHESIS

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

Total marks: 100 **(Internal: 40 M & External: 60M)**

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on Formation of C-C single & double bonds, Diels–Aider and related reactions, Retro Synthetic Analysis and Protecting Groups.

Unit-I: Formation of C-C single bonds: Alkylation of relatively acidic methylene groups, alkylation of ketones, alkylation of enolate, enamines, enamine related reactions, umplong (dipole inversion), the aldol reaction, Allylic alkylation of alkenes, alkylation of α- thicarbonions- α-selenocarbonions, the addition of free radicals to alkenes and synthetic applications of carbenes and carbenoids.

Unit-II: Formation of C-C double bonds: Elimination reactions, sulphoxide-sulphonate rearrangement, synthesis of allyl alcohols, the witting reaction, alkenes from sulphones, decarboxylation of β-lactones, alkenes from arylsuphonyl hydrazones, claisen rearrangement of allylvinylethers. Stereo selective synthesis of tri and tetra substituted alkenes, fragmentation reactions, oxidative decarboxylation of carboxylic acids, stereospecific synthesis from 1,2-diols, reductive dimerization of carbonyl compounds.

UNIT-III: Diels–Aider and related reactions: The dienophile, heterodienophile, oxygen as a dienophile, The diene, acyclic dienes, hetero dienes, 1,2-dimethylene cyclo alkanes, vinyl cycloalkenes, and vinyl arenes, cyclic dienes, cyclopentadienones, o–quinines. Intra molecular Diels –Alder reactions, stereochemistry, and mechanism of retro Diels - Alder reaction, photosensitized Diels-Alder reactions, Ene reactions, and 1,3-dipolar cycloaddition reactions.

Unit-IV: Retro Synthetic Analysis: 1. Basic definitions of the following: a) Retro synthetic analysis b) Disconnection c) Target molecule d) Synthon e) Synthetic equivalent f) Functional Group Inter Conversion (FGI) g) Functional Group Addition (FGA). **2.** Guidelines for the order of events: One Group C-X disconnections (Carbonyl derivatives, ethers, sulphides and alcohols); Two group C-X disconnections (1,1-difunctionalised, 1,2-difunctionalised and 1,3-difunctionalised compounds), One group C-C disconnections (Alcohols and carbonyl compounds, 1,1- C-C, 1,2-C-C and 1,3-C-C). Linear and convergent synthesis.

Unit-V: Protecting Groups: Theory and importance of functional group protection and deprotection in organic synthesis: Protecting agents for the protection of functional groups:

D. Nallaya Reddy

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Hydroxyl group. Amino group. Carbonyl group and Carboxylic acid groups. carbon-carbon multiple bonds. chemo and regio selective protection and deprotection. Illustration of protection and deprotection in organic synthesis.

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of Formation of C-C single & double bonds, Diels–Aider and related reactions, Retro Synthetic Analysis and Protecting Groups.

Reference books:

1. Modern methods of Organic synthesis, W. Carruthers Cambridge Press.
2. Organic synthesis by H.O.House.
3. Modern Method of Organic Synthesis, Carruthers and Coldham Sachin kumar Ghosh,Cambridge New Central Book Agency.
4. Reduction, Techniques and Applications in Organic Synthesis, Robert L.Augustine,MarcelDekker Inc
5. Pharmaceutical Organic Chemistry, RamaRao Nadendla, Vallabh Publications, New Delhi.
6. Advances in Organic Reaction mechanism and structure, J. March, McGrew Hill.

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Department of Chemistry
SRR & CVR Govt. Degree College(A), Vijayawada
M.Sc., CHEMISTRY(ORGANICCHEMISTRY) III SEMESTER
PAPERCODE&TITLE:20OCH303: MODERNORGANICSYNTHESIS

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: II M.Sc. Organic chemistry — Semester III

Paper: Modern organic synthesis — Code: 20OCH303

Time: 3 Hrs. — Max.Marks: 60M

PART-A

I. Answer any 5 questions out of the 10 short answer questions **5x4=20 Marks**

1. Explain Aldol condensation
2. Discuss synthetic applications of carbenes
3. Explain wittig reaction
4. Write a short note on fragmentation reactions
5 Write a note on ene reaction
6. Expain cyclo addition reactions
7. Write a short note on retrosynthetic analysis
8. Discuss about C-X disconnections
9. Write a short note on protecting groups
10. Explain the protecting agents for the protection of carbonyl group

PART-B

II. Answer any 5 questions out of the 10 internal choice essay questions **5x8=40 Marks**

UNIT-I

11. Write a short note on Umplong

(OR)

12. Discuss about the Alkylation of enolate

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UNIT-II

13. Discuss preparation of alkenes from arylsulphonyl hydrazones

(OR)

14. Explain stereospecific synthesis from 1,2-diols

UNIT-III

15. Disuss photosensitized diels alder reaction

(OR)

16. Explain diels alder and related reactions

UNIT-IV

17 .Explain two group disconnections

(OR)

18. Explain one group C-C disconnections

UNIT-V

19. Explain the theory and importance of functional group protection and deprotection of organic synthesis

(OR)

20. Explain chemo and regioselectivity of protection and deprotection

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Department of Chemistry

SRR & CVR Govt. Degree College(A), Vijayawada

M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)III SEMESTERPAPER CODE & TITLE: 20 OCH 304: CHEMISTRY OF NATURAL PRODUCTS

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

Total marks: 100 **(Internal: 40 M & External: 60M)**

Course Learning Objective(S): 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.

Unit-I: Alkaloids: Introduction, Definition, nomenclature, classification, isolation and general methods for structural elucidation of alkaloids. Structure elucidation of Morphine, Quinine and. Pepaverine, Nicotine.

Unit-II: Terpenoids: Introduction, Definition, nomenclature, classification, isolation, isoprene rule and general methods for structural elucidation of Terpenoids. Structure elucidation of Camphor, Zingiberene, and α- terpinol, Farnesol.

Unit-III: Steroids: Introduction, Definition, nomenclature, classification. Occurrence, isolation, physiological action, structure elucidation of Cholesterol, Androsterone, Ttestosterone and Progesterone.

Unit-IV: Flavonoids and Isoflavonoids: Introduction, Definition, nomenclature, classification, Occurrence, isolation, physiological action, structure elucidation of Kaempferol and Quercetin.

Unit-V: Natural pigments: Introduction, nomenclature, classification and general methods for structural elucidation of carotenoids. Functions of carotenoids in plants and animals, structure and synthesis of β-carotene and anthocyanins

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of Alkaloids, Terpenoids, Steroids, Flavonoids, Isoflavonoids and Plant pigments.

Text books / Reference books:

1. Chemistry of Natural Products, K.W. Bentley
2. Chemistry of Natural products by P.S. Kalsi Kalyani Publishers. 1983
3. Chemistry and physiology of alkaloids by Manske Vol.I & II, VII

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Department of Chemistry
SRR & CVR Govt. Degree College (A), Vijayawada
M.Sc., CHEMISTRY (ORGANICCHEMISTRY) IIISEMESTER
PAPERCODE&TITLE: 20OCH304: CHEMISTRYOFNATURALPRODUCTS

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: II M.Sc. Organic chemistry — Semester III

Paper: Chemistry of natural products — Code: 20OCH304

Time: 3 Hrs — Max.Marks: 60M

PART-A

I.Answer any 5 questions out of the 10 short answer questions — **5x4=20 Marks**

1. Give the classification of alkaloids
2. Explain isolation of alkaloids
3. Draw the structures of a) Camphorb) Zingiberene c) Farnesol
4. Discuss nomenclature of terpenoids
5. Draw the structures of a) Testosterone b) Progesterone
6. Give classification of steroids
7. Discuss the structure of kampferol
8. Explain physiological action of flavonoids and isoflavonoids
9. General methods for structural elucidation of plant pigments
10. Explain classification of plant pigments

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PART-B

II. Answer any 5 questions out of the 10 internal choice essay questions 5x8=40 Marks

UNIT-I

11. Explain genral methods for the structural elucidation of alkaloids

(OR)

12. Discuss structure and structural elucidatin of Quinine

UNIT-II

13. Discuss structure and structural elucidation of Zingiberene

(OR)

14. Explain general methods for structural elucidation of terpenoids

UNIT-III

15. Discuss structural elucidation of cholesterol

(OR)

16. Discuss structural elucidation of andesterone

UNIT-IV

17. Discuss structural elucidation of Quercetin

(OR)

18. Discuss nomenclature and classification of flavonoids

UNIT-V

19. Explain general methods for structural elucidation of carotenoids

(OR)

20. Give introduction and explain nomenclature of Anthocyanins

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Department of Chemistry
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M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)III SEMESTER
PAPER CODE & TITLE: 20 OCH 305:
ORGANIC CHEMISTRY PRACTICAL-III

No. of hours per week: 06 **Total credits: 03**

Total marks: 100 **(Internal: 40 M & External: 60M)**

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

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. **Preparation of organic compounds:** Four-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).

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

Reference books:

1. Practical Organic Chemistry A.I. Vogel (Longmans)
2. Text Book of practical organic Chemistry F.G. Mann& B.C. Sanders.
3. A Manual of Practical Organic Chemistry by Day Sitaramam & Govinda chari
4. Organic Experiments L.F. Fieser.
5. Practical Organic Chemistry H.T. Openshaw
6. Systematic Identification of Organic Compounds, P.L. Shriner, R.C. Fuson& D.Y. Curtin.
7. Identification of Organic Compounds by N.D. Cheronis & J.B. Entrilkin.
8. Advanced Organic Synthesis by R.S. Monson Academic Press.

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Department of Chemistry
SRR & CVR Govt. Degree College (A), Vijayawada
M.Sc., CHEMISTRY
(ORGANIC CHEMISTRY) III SEMESTER
PAPER CODE & TITLE: 20 OCH 306:
ORGANIC CHEMISTRY PRACTICAL-IV

No. of hours per week: 06 **Total credits: 03**

Total marks: 100 **(Internal: 40 M & External: 60M)**

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on Analysis of organic binary mixtures and Characterization of organic compounds using IR, UV-Vis, ^{1}H and ^{13}C-NMR spectral methods.

- **Analysis of organic binary mixtures:** Separation and identification of organic binarymixtures containing at least one component with two substituents. (A student is expected to separate at least 5 different binary mixtures using suitable separating reagents and analyze at least 5 different binary mixtures).

- Characterization of organic compounds using IR, UV-Vis, ^{1}H, and ^{13}C-NMR spectral methods. (At least 20 different molecules).

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of Analysis of organic binary mixtures and Characterization of organic compounds using IR, UV-Vis, ^{1}H and ^{13}C-NMR spectral methods.

Reference books:

1. Practical Organic Chemistry A.I.Vogel (Longmans).
2. Text Book of practical organic Chemistry F.G.Mann& B.C. Sanders.
3. A Manual of Practical Organic Chemistry by Day Sitaramam&Govindachari.
4. Organic Experiments L.F.Fieser.
5. Practical Organic Chemistry H.T.Openshaw.
6. Systematic Identification of Organic Compounds, P.L.Shriner, R.C.Fuson& D.Y.Curtin.
7. Identification of Organic Compounds by N.D. Cheronis &J.B. Entrilkin.
8. Advanced Organic Synthesis by R.S. Monson Academic Press.
9. Introduction to Spectroscopy by D. L. Pavia, G.M. Lampman, G. S. Kriz, 3rd Ed. (Harcourt college publishers).
10. Spectrometric identification of organic compounds R. M. Silverstein, F. X. Webster, 6thEd.John Wiley and Sons.

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Department of Chemistry
SRR & CVR Govt. Degree College (A), Vijayawada
M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)III SEMESTER
PAPER CODE & TITLE: 20 OEOCH 307.1: (OPEN ELECTIVE-II)WATER ANALYSIS

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

Total marks: 100 **(Internal: 40 M & External: 60M)**

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

Unit-I: Water quality parameters and their determination: Physical, chemical and biological standards significance of these contaminants over the quality and their determinations - Electrical conductivity - turbidity - pH, total solids, TDS - alkalinity - hardness - chlorides - DO - BOD- COD - TOC - nitrate –sulphate-fluoride - iron - arsenic - mercury/Algal analysis plankton analysis - biomass and chlorophyll estimation – microbial examination -standard plate count - MPN of coliforms - estimation of MPN – bioassay - requirements of bioassay.

Unit-II: Ground water and surface water pollution and control measures: Surface water and ground water pollution - Harmful effects-pollution of major rivers - protecting ground water from pollution - ground water pollution due to Fluoride, Iron, Chromium and Arsenic sources, ill effects and treatment methods. Water pollution control- stabilization of the ecosystem – waste treatment reclamation - various approaches to prevent and control water pollution.

Unit-III: Water treatment methods: Treatment for community supply - screening, sedimentation, coagulation, filtration - removal of microorganisms - chlorination, adding bleaching powder, UV irradiation and ozonation. Demineralization of water for industrial purposes - boiler problems - scale and sludge formation - prevention of scale formation-internal and external treatment - lime soda - zeolite process.

Unit-IV: Sewage and industrial effluent treatment: Sewage - characteristics - purpose of sewage treatment - methods of sewage treatment - primary - secondary and tertiary - Role of algae in sewage treatment. Types of industrial wastes - treatment of effluents with organic and inorganic impurities - treatment of waste waters from specific industries - pulp and paper
- Chemical industry - food processing-water hyacinth in the treatment of industrial effluents.

Unit-V: Water Management: Water resources management - rain water harvesting methods - percolation ponds - check darns - roof top collection methods - water management in industries - recycling and reuse of waste water - metal recovery from metal bearing waste water - recovery of zinc and nickel.

M. Obulesu D. Vallapa Reddy P. Venkateswarlu P. Ashok Kumar

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

Text books/ Reference books:

1. Chemical and Biological Methods for Water Pollution Studies, R.K. Trivedy and
   P.K. Goel, Environmental Publications, 1986.
2. Engineering Chemistry, P.C. Jain and Monica Jain, Dhanpat Rai & Sons, 1993.
3. Environmental Chemistry, B.K. Sharma, Goel Publishing House, 2001.

Water Quality and Defluorination Techniques, Rajiv Gandhi National Drinking Water Mission Publication, 1994

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Department of Chemistry

SRR & CVR Govt. Degree College(A), Vijayawada

M.Sc.,CHEMISTRY(ORGANIC CHEMISTRY) IIISEMESTER

PAPER CODE & TITLE: 20 OEOCH 307.1:

(OPEN ELECTIVE-II) WATERANALYSIS

Weightage to content

S.No	Course content	Essay questions	Short answer questions .	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: II M.Sc. Organic chemistry — Semester III

Paper: Water analysis — Code: **20 OE OCH 207.1**

Time: 3 Hrs. — Max.Marks: 60M

PART-A

I. Answer any 5 questions out of the 10 short answer questions **5x4=20 Marks**

1. Write a short note on water quality parameters
2. Explain TDS
3. Explain harmful effects of Ground water and surface water pollution
4. Explain ill effect and treatment methods for ground water and surface method pollution
5. What are water treatment methods and explain
6. Explain sedimentation
7. Explain characterstics of sewage
8. What is industrial waste .Explain different types
9. Explain metal recovey from metal bearing waste water
10. Explain recycling and rescue of waste water

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PART-B

II. Answer any 5 questions out of the 10 internal choice essay questions 5x8=40 Marks

UNIT-I

11. Discuss physical, chemical and biological standards and significance of water quality parameters

(OR)

12. Discuss i) chlorophyll estmation ii) turbidity iii) standard plate count

UNIT-II

13. Discuss i) ground water pollution ii) surface water iii) water pollution control

(OR)

14 Explain the various approaches to prevent and control water pollution

UNIT-III

15. Explain i) coagulation ii) chlorination iii) adding bleaching powder

(OR)

16. Discuss water treatment methods in i)uv irradiation and ozonation ii)scale and sludge formation

UNIT-IV

17 .Explain primary secondary and teritiary methods of sewage treatment

(OR)

18Discuss the treatment of effluents with organic and inorganic impurities

UNIT-V

19. Explain the methods of rain water harvesting

(OR)

20 Discuss i) percolation ponds ii)Waste management in industries

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Department of Chemistry
SRR & CVR Govt. Degree College (A), Vijayawada
M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)III SEMESTER
PAPER CODE & TITLE: 20 OEOCH 307.2: (OPEN ELECTIVE-II)TECHNIQUES FOR MODERN INDUSTRIAL APPLICATIONS

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

Total marks: 100 **(Internal: 40 M & External: 60M)**

Course Learning Objective(S): The main objective of this paper is to give a basic and updated knowledge for the students on Recrystallization, Distillation, Solvent extraction, Adsorption and Partition Chromatography, Gas Chromatography and High-Performance Liquid Chromatography and Ion-Exchange Chromatography and Electrophoresis.

Unit-I: Classical Methods of purification: Recrystallization: Basic principles, choice of solvent, seeding, filtration and centrifugation and drying. Industrial applications. Concepts of fractional crystallization. **Distillation: Basic principles**. Distillation types-continuous distillation, batch distillation, fractional distillation, vacuum distillation and steam distillation. Industrial applications. **Solvent extraction:** Basic principles, Different types of extraction. Selection of solvents. Avoiding emulsion formation. Basic concepts on Soxhlet extraction. Industrial applications.

Unit-II: Adsorption and Partition Chromatography: **Introduction to chromatography.** Different types of Chromatography. Adsorption chromatography-adsorbents, solvents, solutes, apparatus. Column Chromatography-stationary phase, Mobile phase, packing of column, advantages and disadvantages. **Thin Layer chromatography:** Basic Principles. Common stationary phases, Methods of preparing TLC plates, Selection of mobile phase, Development of TLC plates, Visualization methods, Rf value. Application of TLC in monitoring organic reactions. identification and quantitative analysis. **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.

Unit-III: 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.

Unit-IV: Ion-Exchange Chromatography and Electrophoresis: Ion exchange chromatography: Basic Principles. Preparation of cross-linked polystyrene resins.

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Different types of cation and anoin exchange resins. Application in the purification of carboxylic acids and amines. **Electrophoresis:** Basic Principles. Capillary electrophoresis. Instrumentation, applications, zone- electrophoresis, gel-electrophoresis.

Unit-V: GC-MS – Introduction: Instrumentation – GC – MS interface – Mass spectrometer (MS) Instrument operation, processing GC – MS data – ion chromatogram Library searching
– Quantitative measurement – sample preparation Selected ion monitoring – Application of GC-MS for Trace constituents. Drugs analysis, Environmental analysis and others.

Course Learning Outcome(S): After studying this paper, students will acquire the knowledge of Recrystallization, Distillation, Solvent extraction, Adsorption and Partition Chromatography, Gas Chromatography and High-Performance Liquid Chromatography and Ion-Exchange Chromatography and Electrophoresis.

Text books/ 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. Introduction to Organic Laboratory Techniques-D. L. Pavia, G. M. Lampman, G. S. Krizand R. G. Engel, Saunders College Pub (NY).
4. Instrumental Methods of Chemical Analysis by H. Kaur, Pragati Prakashan, Meerut.
5. Protein Purification-Principles and practice, III Edn- R. K. Scopes, Narosa Publishing House, Delhi.

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SRR & CVR Govt. Degree College(A), Vijayawada
M.Sc.,CHEMISTRY
(ORGANIC CHEMISTRY) IIISEMESTER
PAPER CODE & TITLE: 20 OEOCH 307.2: (OPEN ELECTIVE-II)
TECHNIQUESFORMODERNINDUSTRIALAPPLICATIONS

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: II M.Sc. Organic chemistry — Semester III

Paper: Techniques for modern industrial applications — Code: **20 OE OCH 207.2**

Time: 3 Hrs. — Max.Marks: 60M

PART-A

I. Answer any 5 questions out of the 10 short answer questions — **5x4=20 Marks**

1. Explain the basic principles of recrystallization
2. Explain the choice of solvent and seeding in purification methods
3. Explain partition chromatography
4. Explain column chromatography
5. Explain basic principles of gas chromatography
6. Explain different types of GC techniques
7. What is electrophoresis
8. Explain basic principle of ion exchange chromatography
9. Explain instrument operation in GC-MS
10. Explain mass spectrometer

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PART-B

II. Answer any 5 questions out of the 10 internal choice essay questions 5x8=40 Marks

UNIT-I

11. Explain different types of solvent extraction ii) explain basic principle of soxhleet extraction

(OR)

12. Explain different types of distillation

UNIT-II

13. Explain about thin layer chromatography

(OR)

14. Explain different types of paperchromatography

UNIT-III

15. Explain th applications of gas chromatography

(OR)

16. Explain the concept of HPLC method

UNIT-IV

17 .Discuss sthe preparation of cross linked polystyrene resin

(OR)

18. Explain different types of anionic and cationic exchange resins

UNIT-V

19. Discuss the sample preparation selected in monitoring in GC-MS

(OR)

20Explain the sample preparation in GC-MS

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Department of Chemistry
SRR & CVR Govt. Degree College (A), Vijayawada
M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)III SEMESTER
PAPER CODE & TITLE: 20 OEOCH 307.3:

(OPEN ELECTIVE-II) POLYMER CHEMISTRY

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

Total marks: 100 **(Internal: 40 M & External: 60M)**

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

UNIT – I: Introduction, Classification of polymers, Polymerization, chain polymerization, step polymerization, Copolymerization, Free radical chain polymerization, cationic polymerization, anionic polymerization, Polymerization Techniques, Graft and Block Copolymers.

UNIT – II: Polymer Synthesis, Isolation and Purification of polymers, Polymer Fractionation, Molecular weight determination, Molecular weight determination curve, Processing Techniques.

UNIT – III: Polymer Reactions – Introduction, Hydrolysis, Acidolysis, Aminolysis, Hydrogenation, Addition and Substitution Reactions, Cyclisation reactions, Cross-linking Reactions.

UNIT – 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.

UNIT – V: Plastics, Fibres, Elastomers - Polyethylene, Polystyrene, Poly Esters, Poly Acrylonitrile, Polyurethanes, Polyvinyl Chloride, Polyisoprenes. Resins – Phenol Formaldehyde Resin, Urea Formaldehyde and Melamine –Formaldehyde Resins, Epoxy Polymers, Silicon Polymers.

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

Reference books:

1. Textbook of Polymer Science by Frod, W. Billmayer,
2. An Introduction to Polymer Chemistry by Moore.
3. Polymer Chemistry - An Introduction by M.P. Stevens.
4. Polymer Science – V R Gowariker, N V Viswanathan, Jayadev Sreedhar.

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SRR & CVR Govt. Degree College (A), Vijayawada
M.Sc., CHEMISTRY (ORGANIC CHEMISTRY) IIISEMESTER
PAPER CODE & TITLE: 20 OEOCH 307.3:
(OPEN ELECTIVE-II) POLYMERCHEMISTRY

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: II M.Sc. Organic chemistry
Paper: Polymer Chemistry
Time: 3 Hrs.

Semester III
Code: **20 OE OCH 307.3**
Max.Marks: 60M

PART-A

I. Answer any 5 questions out of the 10 short answer questions **5x4=20 Marks**

1. Write different types of polymers
2. Explain different types of polymerization
3. Explain polymer synthesis
4. Explain processing technique
5. Explain polymer reactions
6. Explain cyclization reactions
7. Define polymer degradation
8. Explain oxidative degradation
9. Explain plastics
10. Explain silicon polymers

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PART-B

II. Answer any 5 questions out of the 10 internal choice essay questions 5x8=40 Marks

UNIT-I

11. Explain classification of polymers give some examples

(OR)

12. Discuss cationic and anionic polymerization

UNIT-II

13. Explain molecular weight determination in polymers

(OR)

14. Explain isolation and purification of polymers

UNIT-III

15. Explain i) Cross linking reaction ii) Aminolysis

(OR)

16. Explain addition and substitution reactions

UNIT-IV

17 .Explain different types of degradation

(OR)

18. Explain i) mechanical degradation ii) high energy radiation degradation

UNIT-V

19. Explain i) polyethene ii) polyvinyl chloride iii) phenylformaldehyde resin

(OR)

20. Explain i) polyethers ii) acrylonitrile iii) urea formaldehyde

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IV SEMESTER SYLLABUS

Department of Chemistry

SRR & CVR Govt. Degree College (A), Vijayawada

M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)IV SEMESTER

PAPER CODE & TITLE: 20 OCH 401: MOOCS

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

Total marks: 100 **(Internal: 40 M & External: 60M)**

Course Learning Objective(S): The main objective of this paper is to give a knowledge forthe students on MOOCS COURSES.

MOOCS COURSE

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

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Department of Chemistry
SRR & CVR Govt. Degree College (A), Vijayawada
M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)IV SEMESTER
PAPER CODE & TITLE: 20 OCH 402.1:
(ELECTIVE-I) HETERO CYCLIC CHEMISTRY

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

Total marks: 100 **(Internal: 40 M & External: 60M)**

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 heterocycles. Three membered Heterocyclic Compounds with one and two hetero atoms. Synthesis, reactivity, and importance of the following ring systems: Aziridines, Oxiranes, Thiiranes, azirine.

UNIT-II: Four membered Heterocyclic Compounds with one and two hetero atoms. 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 one and two hetero atoms: Synthesis, reactivity, aromatic character, and importance of the following heterocycles: Pyrrole, Furan, Thiophene, Pyrazole, Imidazole, Oxazole, Isoxazole, Thiazole.Fused systems: Synthesis and reactivity of Indole, Benzofuran, Benzo thiophene and Benzimidazoles

UNIT-IV: Six-membered Heterocyclic Compounds with one and two hetero atoms: Synthesis, reactivity, aromatic character, and importance of the following heterocycles: Pyridine, Pyridine-N-oxide, Pyridazines, Pyrazine, Oxazine, Thiazine.
Fused systems: Acridines and Benzodiazines, Quinoline, Isoquinoline.
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, Herbet C. Brown Gray, W. Kramer Alan B. Levy and M.Mark Midland John Willy& Sons, New York.

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3. Hetero chemistry, T.L. Gilchrist, Longman science and tech.
4. An introduction to the Chemistry of Heterocyclic Compounds, R.M. Acheson, Interscience Publishers, New York
5. Principle of Organic Chemistry, Roc Norman, J.M. Coxon, Nelson Throms
6. Advanced Organic Chemistry, F.A Carey and R.J. Sundberg. Plenum.
7. Heterocyclic chemistry by Jai Jack Lie, Springer publications.

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Department of Chemistry
SRR & CVR Govt. Degree College (A), Vijayawada
M.Sc., CHEMISTRY (ORGANIC CHEMISTRY) IVSEMESTER
PAPERCODE&TITLE: 20 OCH402.1: (ELECTIVE-I)
HETERO CYCLICCHEMISTRY

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: II M.Sc. Organic chemistry — Semester IV

Paper: Heterocyclic chemistry — Code: 20 OCH402.1

Time: 3 Hrs. — Max.Marks: 60M

PART-A

I. Answer any 5 questions out of the 10 short answer questions **5x4=20 Marks**

1. Define and classify heterocyclic compounds
2. Explain the reactivity of pyridine -N-oxide
3. Discuss importance of oxetanes (four membered)
4. Discuss synthesis of pyridine
5. Write one method of preparation of thiazole
6. Write any twomethods for the synthesis of pyrazole
7. Explain the aromatic character of thiazine
8. Explain importance of quinoline

PART-B

II. Answer any 5 questions out of the 10 internal choice essay questions 5x8=40 Marks

UNIT-I

11 Discuss synthesis of any 3 five membered heterocycles with one hetero atom

(OR)

12. Discuss synthesis and reactivity of thiranes

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UNIT-II

13. Discuss synthesis and recativity of pencillin.G

(OR)

14. Discuss synthesis of thietanes

UNIT-III

15. Write aromatic character and imporatnace of imidazole

(OR)

16. Explain the reactivity of benzimidazole

UNIT-IV

17 .Write synthesis and reactivity of pyrazines

(OR)

18. Write synthesis and aromatic character of acridines

UNIT-V

19.i) Write synthesis of benzodiazipines ii) Write reactivity of azepines

(OR)

20. Explain synthesis and reactivity of isoquinoline

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Department of Chemistry
SRR & CVR Govt. Degree College (A), Vijayawada
M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)IV SEMESTER
PAPER CODE & TITLE: 20 OCH 402.2: (ELECTIVE-I)
GREEN CHEMISTRY

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

Total marks: 100 **(Internal: 40 M & External: 60M)**

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

Unit-I: Fundamentals and significance of Green Chemistry: Discussion of the current state of chemistry and the environment and the definition of green chemistry. Assessment of the impact of chemistry in the environment and definition of risk hazard. An introduction to the tools of green chemistry and its fundamental principles.

Unit-II: Principles of Green Chemistry: Prevention of waste / by-products, Hazardous products- Designing of safer chemicals- Selection of appropriate solvents and starting materials- Use of protecting groups and catalysis- Designing of biodegradable products.

Unit-III: Microwave assisted reactions: Introduction to Microwave organic synthesis, Applications: solvents (water and organic solvents), solvent free reactions (solid state reactions), Phase transfer catalysis-Principle, Types, advantages and applications, Crown ethers.

Unit-IV: Solvent Free Reactions: Solvent free techniques- Reactions on solid mineral supports, Phase Transfer Catalysis- C-alkylation, N-alkylation, Darzen"s reaction, Wittig reaction. Ultrasound assisted green synthesis- Oxidation, Reduction, Hydroboration, Strecker reaction.

Unit-V: Ionic liquids: Definition- Types of Ionic Liquids-Synthesis of Ionic Liquids-Selection of ionic liquids- physical properties- Application in organic synthesis- alkylation, allylation, oxidation, reduction, polymerization, hydrogenation, hydroformylation, alkoxy carbonylation, carbon-carbon bond forming reactions, alkene metathesis.

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

Text books/ Reference books:

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, Rajender S. Varma
4. Green Analytical Chemistry by Mihkel Koel and Mihkel Kaljurand.

P. Nakaja Reddy

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M.Sc., CHEMISTRY
(ORGANICCHEMISTRY) IVSEMESTER
PAPERCODE&TITLE: 20 OCH402.2: (ELECTIVE-I)
GREENCHEMISTRY

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: II M.Sc. Organic chemistry — Semester IV

Paper: Green chemistry — Code:20 OCH402.2

Time: 3 Hrs — Max.Marks: 60M

PART-A

I. Answer any 5 questions out of the 10 short answer questions **5x4=20 Marks**

1. Write a short note on green chemsitry
2. Define Green chemistry and risk hazard
3. Explain prevention of waste
4. Discuss designing of biodegradable polymers
5. Write the advantages of phase transfer catalysis
6. Explain crownethers in microwave assisted reaction
7. What is solvent free raection
8. Explain strecker reaction
9. Write the physical properties of ionic liquids
10. Discuss alkylation of ionic liquids

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PART-B

II. Answer any 5 questions out of the 10 internal choice essay questions 5x8=40 Marks

UNIT-I

11. Write a short note on fundamental principles of green chemistry

(OR)

12. Explain the impact of chemistry on environment

UNIT-II

13. Discuss about hazardous products

(OR)

14. Explain the section of appropriate solvents and starting materials

UNIT-III

15. Write microwave organic synthesis applications

(OR)

16. Discuss phase transfer catalysis and types

UNIT-IV

17. Explain phase transfer catalysis

(OR)

18. Discuss about ultrasound assisted green synthesis of oxidation and hydroboration

UNIT-V

19. Discuss different types of ionic liquids

(OR)

20. Explain alkoxy carbonylation and carbon –carbon forming reactions

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Department of Chemistry
SRR & CVR Govt. Degree College (A), Vijayawada
M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)IV SEMESTER
PAPER CODE & TITLE: 20 OCH 403.1: (ELECTIVE-II)
CHEMISTRY OF BIO-ORGANIC COMPOUNDS

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

Total marks: 100 **(Internal: 40 M & External: 60M)**

Course Learning Objective(S): The main objective of this paper is to give a basic andupdated knowledge for the students on Bio-Organic Chemistry.

UNIT-I: Carbohydrates: Introduction, Classification, Occurrence of Hexoses and Ketoses, Nomenclature, Mutarotation, anomeric effects and Stereochemistry and ring structures of Carbohydrates. Chemistry of Glucose, Fructose, and Sucrose.

UNIT-II: Amino Acids and Proteins: Classification of Amino acid and their general properties. General methods of synthesis of alpha-amino acids. Definition and Classification of Peptides and Proteins. Introduction of Proteins, Determination of C-Terminal and N- terminal Amino acid.

UNIT-III: Vitamins: Classification, Occurrence, Structural elucidation, synthesis, stereochemistry and biogenesis of Vitamin- A1, B1, C and D.

UNIT-IV: Nucleic acids: Basic concepts of the Structure of RNA, DNA, and their hydrolysis products. Nucleotides, Nucleosides, reactions of nucleic acid bases, mutations, andHeterocyclic bases.

UNIT-V: Bio polymers: Introduction, Classification of bio-polymers, properties of biopolymers, Difference between bio polymers and synthetic polymers, production and processing of biopolymers. Applications of bio-polymers.

Reference Books:

1. Natural products: Chemistry and Biological significance, J.Mann, R.S.Davidson, J.B.Hobbs, D.V. Banthropde and J.B. Harborne.
2. Organic Chemistry, vol-2, I.L. Finar.
3. Stereoselective synthesis: a practical Approach, M. Nogrudi.
4. Rodd's Chemistry of carbon compounds, Ed. S. Coffey.
5. Chemistry, Biological and Pharmacological Properties of Medicinal Plants from the Americans By Ed.Kurt. Hostettmann, M.P. Gupta and A. Marston.
6. Introduction to Flavonoids by B.A. Bohm.
7. Neco trends in natural products Chemistry by Ata-ur-Rahman and M.I. Choudhary.
8. Chemistry of natural products by S.V. Bhat, B.A. Naga Sampagi and M.Siva Kumar.
9. Biopoymers: Biomedical and Environmental applications by Susheel kalia Scrivener, Willey publication.

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Department of Chemistry
SRR & CVR Govt. Degree College(A), Vijayawada
M.Sc.,CHEMISTRY(ORGANICCHEMISTRY)IVSEMESTER
PAPER CODE & TITLE: 20 OCH 403.1:(ELECTIVE-II)
CHEMISTRYOFBIO-ORGANICCOMPOUNDS

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: II M.Sc. Organic chemistry — Semester IV
Paper: Chemistry of bioinorganic compounds — Code: 20 OCH403.1
Time: 3 Hrs. — Max.Marks: 60M

PART-A

I. Answer any 5 questions out of the 10 short answer questions — 5x4=20 Marks

1. Explain classification of carbohydrates
2. Explain mutarotation in carbohydrates
3. Discuss classification of proteins
4. Discuss general properties of amino acids
5. Explain biogenesis of vitamins Cand D
6. Discuss classification of vitamins
7. Explain heterocyclic bases
8. What are nucleosides and nucleotides
9. Explain difference between biopolymers and synthetic polymers
10. Discusss applications of biopolymers

PART-B

II. Answer any 5 questions out of the 10 internal choice essay questions — 5x8=40 Marks

UNIT-I

11. Explain stereochemistry and ring structure of carbohydrates

(OR)

12. Explain chemistry of Glucose and Fructose .

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UNIT-II

13. Discuss proteins and explain C-terminal and N-terminal amino acids

(OR)

14. Discuss general methods of synthesis of alpha amino acids

UNIT-III

15. Explain structure and synthesis of vitamin B1

(OR)

16. Explain structure and synthesis of vitamin A1

UNIT-IV

17 .Explain reactions of nucleic acid bases and mutations

(OR)

18. Explain the structures of RNA&DNA

UNIT-V

19. Disscuss classification and properties of biopolymers

(OR)

20. Discuss production and processing of biopolymers

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SRR & CVR Govt. Degree College (A), Vijayawada
M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)IV SEMESTER
PAPER CODE & TITLE: 20 OCH 403.2: (ELECTIVE-II)
NANO CHEMISTRY

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

Total marks: 100 **(Internal: 40 M & External: 60M)**

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 Nano chemistry.

Unit-II: Synthesis of Nanomaterials: Top down and bottom- up approaches- synthesis of carbon nanotubes, quantum dots, gold and silver nanoparticles.

Unit-III: Characterization of Nanomaterials: 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: Nano chemistry in Nature: The science behind the nanotechnology in lotus effect-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 spider silk.

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

Text books/ Reference books:

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, CRC press, BocaRaton, 2008.

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Department of Chemistry
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M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)IVSEMESTER
PAPERCODE &TITLE: 20OCH403.2: (ELECTIVE-II)
NANOCHEMISTRY

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: II M.Sc. Organic chemistry — Semester IV
Paper: Nano chemistry — Code:20 OCH403.2
Time: 3 Hrs — Max.Marks: 60M

PART-A

I. Answer any 5 questions out of the 10 short answer questions **5x4=20 Marks**

1. Discuss some contributors to the field of nanochemistry
2. Define the terms i)Nanoscince ii)Nanotechnology
3. Discuss gold and silver nanoparticles
4. Discuss quantum dots
5. Discuss scanning electron microscopy
6. Discuss characterization of nanomaterials
7. Discuss applications of nanomaterials in solar cells and smart materials
8. Discuss applictaions of nanomaterials in molecular electronics and biosensors
9. Discuss some of the examples of nanochemistry in nature
10. Explain self-cleaning property of lotus

PART-B

II.Answer any 5 questions out of the 10 internal choice essay questions **5x8=40 Marks**

UNIT-I

11. Explain Nanoscience practiced during ancient and modern periods

(OR)

12. Explai scale of nanomaterials naturaland manmade

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UNIT-II

13. Discuss topdown and bottom up approach for synthesis of nanomaterials

(OR)

14. Explain synthesis of carbon nanaotubes

UNIT-III

15. Explain electron microscopic techniques for characterization of nanomaterials

(OR)

16. Discuss a) Transmission electron microscopy b) atomic force microscopy

UNIT-IV

17 .Discuss applications of nanomaterials in drugdelivery,therapy ,detection of cancer cells

(OR)

18. Discuss various applications in nanomaterials

UNIT-V

19. Discuss footclimbing ability of geckos –waterstrider,antiwetting property of water strider

(OR)

20. Discuss spider silk and mechanical properties of spider silk

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Department of Chemistry
SRR & CVR Govt. Degree College (A), Vijayawada
M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)IV SEMESTER
PAPER CODE & TITLE: 20 OCH 404: ORGANO METALLIC REAGENTS

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

Total marks: 100 **(Internal: 40 M & External: 60M)**

Course Learning Objective(S): The main objective of this paper is to give a basic andupdated 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, alcohols, amines, acids, carbon dioxide, carbon disulfide, sulfur dioxide. Preparation ofalkyllithium reagents, Lithium Di isopropyl amide (LDA) and its synthetic applications.

Unit-II: Organo Copper and Nickel compounds: Organo copper reagents, organo cuprates, lithium organo cuprates (Gilman reagents). Organo nickel compounds: π-allyl nickel complexes, preparation of 1,5 cyclic dienes, nickel carbonyl. Organo Zinc and Tin compounds.

Unit-III: Organo Palladium and Platinum compounds: Preparation of palladium reagents, π-allyl palladium complexes, Heck reaction, Still coupling reaction, Sonogashira coupling reaction, Suzuki coupling reaction. Preparation of organo platinum compounds, special properties, and medicinal applications of organo platinum complexes.

Unit-IV: Organoboranes: Preparation of Organobornaes viz hydroboration with BH_3-THF, dicylohexylboranes, disiamylborane, thexylborane, 9-BBN, and catacol boranes. protonolysis, oxidation, isomerization, cyclization, rearrangements. Free radical reactions of organoboranes, reactions with α- bromoketones, α-bromoesters, functional group transformations of Organoboranes, the cyanoborate process and the reaction of alkenylboranes and trialkenyl boranes. .

Unit-V: Organosilanes: Synthetic applications of organosilicon compounds, protection of functional groups, trimethylsilly ethers, sillylenolethers, trimethylsilyl chloride, trimethylsilyliodide, trimethylsilyl triflate, Peterson olefination.Synthetic applications of α-silylcarbanion and β-silyl carbonyl compounds, alkenyl silanes,Allyl silanes, The β-effect, control of rearrangement of carbonium ions by silicon.

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

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Reference books:

1. Organometallic in Synthesis A Manual by M Schlosser, L. Hegedus, B. Lipshutz et al, John Wily & Sons
2. Modern methods of organic synthesis by W. Carruthers (Cambridge).
3. Organic synthesis by H.O. House.
4. Organometallics: A concise introduction, Christoph Elschenbroich, 3rd edition, Willey-VCH.
5. Advanced Organic Chemistry, F.A Carey and R.J. Sundberg. Plenum.
6. Transition metals in the synthesis of complex organic molecules, Hegedus, L.S,second edition, University Science, Book, CA, 1999.
7. Organometallic Chemistry and Catalysis, Astruc, D, Springer Verlag, 2007. Organotransition metal chemistry: Applications to organic synthesis, Davies, S. G,Pergamon Press, New York, 1986.

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Department of Chemistry
SRR & CVR Govt. Degree College (A), Vijayawada
M.Sc.,CHEMISTRY
(ORGANIC CHEMISTRY)IVSEMESTER
PAPERCODE &TITLE:20OCH404:ORGANOMETALLIC REAGENTS

Weightage to content

S.No	Course content	Essay questions	Short answer questions	Total number of questions from each unit	Maximum marks allotted to each unit
1.	UNIT-I	2	2	4	12
2.	UNIT-II	2	2	4	12
3.	UNIT-III	2	2	4	12
4.	UNIT-IV	2	2	4	12
5.	UNIT-V	2	2	4	12
	TOTAL	10	10	20	60

MODEL QUESTION PAPER

Class: II M.Sc. Organic chemistry — Semester IV

Paper: Organo metallic reagents — Code:20 OCH404

Time: 3 Hrs. — Max.Marks: 60M

-

PART-A

I. Answer any 5 questions out of the 10 short answer questions — **5x4=20 Marks**

1. Explain organomagnesium and lithium compounds
2. Write a short note on carbondixide and its synthetic applications
3. Explain organocopper reagents
4. Explain organonickel compounds
5. Explain Heck reaction
6. Explain Suzuki coupling reaction
7. Explain the reactions with alphabromo ketones
8. Explain cyclization rearrangement reactions
9. Explain the control of rearrangement reactons of carbonium ion by silicon
10. Explain the betaeffect

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PART-B

II.Answer any 5 questions out of the 10 internal choice essay questions 5x8=40 Marks

UNIT-I

11. Discuss the preparation of Grignard reagents with alkyl and allyl halides in organomagnesium and lithium compounds

(OR)

12. Discuss the preparation of alkyllithium reagents and its synthetic applications

UNIT-II

13. What is Gilman reagent give some examples

(OR)

14. Explain the preparation of 1,5 cyclic dienes and nickel carbonyls

UNIT-III

15. Discuss the preparation of palladium reagent in organopalladium and platinum compounds

(OR)

16. Explain the special properties and medicinal applications of organoplatinumcompounds

UNIT-IV

17 .Define organoboranes and explain their preparation

(OR)

18. Discuss functional group transformations of organoboranes

UNIT-V

19. Discuss the synthetic applications of organo silicon compounds and protection of functional groups

(OR)

20. Discuss the synthetic applications of alpha silyl and betasilyl carbonyl compounds

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Department of Chemistry
SRR & CVR Govt. Degree College (A), Vijayawada
M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)IV SEMESTER
PAPER CODE & TITLE: 20 OCH 405: ORGANIC CHEMISTRY PRACTICAL-V

No. of hours per week: 06 **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 separation techniques.

1. Column chromatography – separation of the given mixture of o-and p-nitro aniline.
2. Paper chromatography - separate the given mixture of sugars and amino acids.
3. Thin-layer chromatography - separate the given mixture of phenols and 2,4 DNP derivatives of carbonyls compounds.
4. Analysis of samples by HPLC.
5. Water analysis of five different samples (at least five parameters).

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

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, TheophilEicher, University Science Book.

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Department of Chemistry
SRR & CVR Govt. Degree College (A), Vijayawada
M.Sc., CHEMISTRY (ORGANIC CHEMISTRY)IV SEMESTER
PAPER CODE & TITLE: 20 OCH 406:
IN HOUSE MINOR RESEARCH PROJECT

No. of hours per week: 08 **Total credits: 04**

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

Course Learning Objective(S): The main objective of this paper is to give a practicalknowledge for the students on separation techniques.

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

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

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Student Evaluation Policy and Procedure

EVALUATION POLICY AND PROCEDURE:

Students are evaluated for 100 marks in each course. These 100 Marks are splitted into Continuous Internal Assessment (CIA) and Semester End Evaluation (SEE). 40 marks are allocated to CIA and 60marks for SEE.

1. **CONTINUOUS INTERNAL ASSESSMENT (CIA) FOR Theory 40MARKS:**

Out of a maximum of 100 marks in each theory paper, 40marks shall normally be allotted for continuous internal assessment. The Assessment shall be made by the teacher handling that paper in the manner prescribed here under. Where the same paper is handled by two or more teachers, the Head of the Department shall decide upon the teacher, who shall make the internal assessment or fix the proportion of the marks among the teachers for the internal assessment of the students.

A. **Out of these 40 marks, 10 marks are allotted to Continuous Internal Exams.** Two Continuous Internal exams are conducted for 20 marks in each exam and the average of these two exams scale down to 10 marks, shall be deemed as the marks obtained by the student in Continuous Internal Exams. Out of these two exams, one exam is conductedthroughonlineusingGoogleclassroom/moodleCloud/gnomio/ anyotheronlineplatform.

B. **Out of these 40 marks, 10 marks are allotted to Assignments.** Two assignments are given to the students during the course. 5 marks are allotted for each assignment and total of these two assignments are included in Continuous Internal Assessment. The students can submit assignments through blended mode.

C. **Out of these 40 marks, 10 marks are allotted to Project Work/ Group Discussion.** Students will be assigned student study project for 10 Marks under CIA. Then the student has to submit a project report under the supervision of Faculty Member. These 10 marks may also be assigned to group discussion and paper presentation in any national

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seminar also. Student will be evaluated here based on his/her way of expression, conceptual strength, attitude, listening -understanding skills and level of participation in the discussion.

D. **Out of these 40 marks, 5 marks are allotted to Student Seminar and 5 marks forViva-Voce.**Each Student may give student seminar to the peer team. This student seminar will carry 5 marks. Here feedback will be collected on 5 points scale from the participants in the student seminar [or] Viva- Voce will be conducted by the concerned subject faculty for 5 marks.

The summarized continuous internal assessment is:

a. Average of two mid exams -10 Marks
b. Average of two assignments - 10 Marks
c. Project work/Group discussion/ - 10 Marks
paper presentation in National seminars.
d. Student seminar - 5 Marks
e. Viva-voce - 5 Mark

E. CONTINUOUSINTERNALASSESSMENT (CIA) FOR Practical 40MARKS:

Each student must attend Minimum 10 experiments. The entire assessment is based on the Day to day work.

Practical Internal assessment – continuous assessment / Day to Day work

10 X 4 = 40 Marks

Practical external Assessment

Q .1 Experiment	Principle /Theory	10 Marks
	Experiment	20 Marks
	Result and discussion	10 Marks
Q.2	Viva -voce	10 Marks
Q.3	Record	10 marks
	Total	**60 Marks**

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F. Permission to write Internal Assessment test at the end of corresponding Semester –end exams may be given on medical grounds and other valid grounds. For such candidates, test/s is/are conducted by the faculty member concerned in consultation with the Head of the Department with a different question paper.

G. The Student has to get minimum 40 per cent (16 Marks) marks in the Continuous Internal Assessment to complete the Course Paper.

Suggestive Question Paper Pattern for CIA& SEE (Based on Blooms Taxonomy):

Though the faculty concerned is empowered to adopt their own pattern for question paper, a general and suggestive model for question paper is given below based on Blooms Taxonomy.

University Representative Subject Expect Subject Expert Chairman of BoS

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