SRI A S N M GOVERNMENT COLLEGE, PALAKO	L, W.G. DT
<u>(Affiliated to Adikavi Nannaya University, Rajahm</u>	undry)
(Accredited with NAAC "B" Grade with 2.61 CGPA	<u>(points)</u>
<u>I. B.Sc.</u>	
<u>SEMESTER – II (W.E.F 2020-21 batch)</u>	
Paper II (Organic & General Chemistry)	60hrs (4h/w)

Course outcomes:

At the end of the course, the student will be able to;

- 1. Understand and explain the differential behaviour of organic compounds based on fundamental concepts learnt.
- 2. Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.
- 3. Learn and identify many organic reaction mechanisms including Free Radical Substitution, Electrophilic Addition and Electrophilic Aromatic Substitution.
- 4. Correlate and describe the stereochemical properties of organic compounds and reactions.

ORGANIC CHEMISTRY

UNIT-I

Carbon-Carbon sigma bonds (Alkanes and Cycloalkanes)

General methods of preparation of alkanes- Wurtz and Wurtz Fittig reaction, Corey House synthesis, physical and chemical properties of alkanes, Isomerism and its effect on properties, Free radical substitutions; Halogenation, concept of relative reactivity v/s selectivity. Conformational analysis of alkanes (Conformations, relative stability and energy diagrams of Ethane, Propane and butane).General molecular formulae of cycloalkanes and relative stability, Baeyer strain theory, Cyclohexane conformations with energy diagram, conformations of monosubstituted cyclohexane.

UNIT-II

Carbon-Carbon pi Bonds (Alkenes and Alkynes)

General methods of preparation, physical and chemical properties. Mechanism of E1, E2, E1cbreactions, Saytzeff and Hoffmann eliminations, Electrophilic Additions, mechanism Markownikoff/Antimarkownikoff addition with suitable examples, *syn* and *anti*-addition; addition of H₂, X₂, HX. oxymercuration-demercuration, hydroboration-oxidation, ozonolysis, hydroxylation, Diels Alderreaction, 1,2- and 1,4-addition reactions in conjugated dienes.

Reactions of alkynes; acidity, electrophilic and nucleophilic additions, hydration to form carbonylcompounds, Alkylation of terminal alkynes.

UNIT-V

Benzene and its reactivity

Concept of aromaticity, Huckel's rule-application to Benzenoid (Benzene, Naphthalene) and Non-Benzenoid compounds (cyclopropenylcation, cyclopentadienyl anion and tropyliumcation) Reactions-General mechanism of electrophilic aromatic substitution,

12h

12h

36h 12h

mechanism of nitration, Friedel-Craft's alkylation and acylation. Orientation of aromatic substitution-ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like NO_2 and Phenolic). Orientation of (i) Amino, methoxy and methyl groups (ii) Carboxy, nitro, nitrile, carbonyl and sulphonic acid groups Halogens.

(Explanation by taking minimum of one example from each type)

GENERAL CHEMISTRY

UNIT-IV

Surface chemistry

Colloids- Coagulation of colloids- Hardy-Schulze rule. Stability of colloids, Protection of Colloids, Gold number.

Adsorption- Physical and chemical adsorption, Langmuir adsorption isotherm, applications of adsorption.

Chemical Bonding

Valence bond theory, hybridization, VB theory as applied to ClF₃, Ni(CO)₄, Molecular orbital theory -LCAO method, construction of M.O. diagrams for homo-nuclear and hetero-nuclear diatomic molecules (N₂, O₂, CO and NO).

HSAB

Pearson's concept, HSAB principle & its importance, bonding in Hard-Hard and Soft-Soft combinations.

UNIT-V

Stereochemistry of carbon compounds

Molecular representations- Wedge, Fischer, Newman and Saw-Horse formulae.

Optical isomerism: Optical activity- wave nature of light, plane polarised light, optical rotation and specific rotation.

Chiral molecules- definition and criteria(Symmetry elements)- Definition of enantiomers and diastereomers – Explanation of optical isomerism with examples- Glyceraldehyde, Lactic acid, Alanine, Tartaric acid, 2,3-dibromopentane.

D, L, R, S and E, Z- configuration with examples.

Definition of Racemic mixture – Resolution of racemic mixtures (any 3 techniques)

Additional Inputs:

Types of bond fission and organic reagents i.e. Electrophilic, Nucleophilic, and free radical reagents including neutral molecules like H₂O,NH₃ & AlCl₃.

Types of Organic reactions : Addition, Substitution, Elimination and rearrangement.

Co-curricular activities and Assessment Methods

- 1. Continuous Evaluation: Monitoring the progress of student's learning
- 2. Class Tests, Work sheets and Quizzes
- 3. Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality
- 4. Semester-end Examination: Critical Indicator of Student's Learning and Teaching Methods adopted by teachers throughout the semester.

10h

24h

6h

6h

2h

List of Reference Books Theory:

- 1. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (PearsonEducation).
- 2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- 3. Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- 4. Eliel, E. L. &Wilen, S. H. Stereochemistry of Organic Compounds; Wiley: London, 1994. Kalsi, P. S.
- 5. Stereochemistry Conformation and Mechanism; New Age International, 2005.

Practical:

- 1. Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000).
- 2. Ahluwalia, V.K. & Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press (2000).
- 3. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012).

Additional Resources:

- 1. Solomons, T. W. G.; Fryhle, C. B. & Snyder, S. A. Organic Chemistry, 12th Edition,
- 2. Wiley.Bruice, P. Y. Organic Chemistry, Eighth Edition, Pearson.
- 3. Clayden, J.; Greeves, N. &Warren, S. Organic Chemistry, Oxford.
- 4. Nasipuri, D. Stereochemistry of Organic Compounds: Principles and Applications, Third Edition, New Age International.
- 5. Gunstone, F. D. Guidebook to Stereochemistry, Prentice Hall Press, 1975.

SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT (Affiliated to Adikavi Nannaya University, Rajahmundry) (Accredited with NAAC "B" Grade with 2.61 CGPA points) MODEL PAPER THREE YEAR B. Sc. DEGREE EXAMINATION FIRST YEAR EXAMINATIONS SEMESTER II Paper –II: INORGANIC & ORGANIC CHEMISTRY

Time: 3 hours

PART-A

<u>Maximum Marks: 75</u>

Answer ALL the questions. Each carries TEN marks

- 5X10=50 Marks
- 1. (a). (i) Write the preparation of alkanes by Wurtz and Corey-House reaction.
 - (ii) Explain Halogenation of alkanes. Explain the reactivity and selectivity infree radical substitutions.

(OR)

- (b). (i) Explain Baeyer Strain Theory
 - (ii) Draw the conformations of Cyclohexane and explain their stability by drawing energy profile diagram.
- 2. (a). (i) Write any two methods of preparation of alkenes.
 - (ii) Explain the mechanism of Markownikiff and Anti-Markownikoff addition of HBr to alkene.

(OR)

- (b). (i) Explain the acidity of 1-alkynes
 - (ii) How will you prepare acetaldehyde and acetone from alkynes?
 - (iii) Write alkylation reaction of terminal alkyne.
- 3. (a). Define Huckel rule of aromatic compounds. What are benzenoid and non-benzenoid aromatic compounds? Give examples.

(OR)

- (b). Explain the mechanisms of Nitration and Friedel-Craft's alkylation of Benzene.
- 4. (a). (i) Define Hardy-Schulze rule & Gold number.
 - (ii) Differentiate Physisorption & Chemisorption. Explain Langmuir adsorption isotherm.

(OR)

- (b). Construct the Molecular Orbital diagram for O₂ and NO and explain theirbond order and magnetic property.
- 5. (a). Define racemic mixture. Explain any two techniques for resolution of racemic mixture.

(OR)

- (b). (i) Define Optical activity and Specific rotation.
 - (ii) Draw the R- & S- isomers of Alanine, Glyceraldehyde.
 - (iii) Write the E- & Z- isomers of 2-butene

PART-B

Answer any **FIVE** questions. Each question carries **5** marks

5X5=25 Marks

6. Write different conformations of n-butane. Explain their relative stability..

7. Explain 1, 2- & 1, 4- addition reactions of conjugated dienes.

- 8. Explain the orientation effect of halogens on mono substituted benzene.
- 9. Explain the mechanism of E_1CB elimination reaction.
- 10. Explain the structure of ClF₃ by Valency Bond theory.
- 11. What are Hard & soft acids & bases? Explain with examples.
- 12. Draw the Wedge, Fischer, Newmann& saw-Horse representations for Tartaricacid.
- 13. Define Enantiomers and Diastereomers and give two examples for each.

LABORATORY COURSE –II Practical-II VOLUMETRIC ANALYSIS (At the end of Semester-II)

Course outcomes:

At the end of the course, the student will be able to;

- 1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
- 2. Understand and explain the volumetric analysis based on fundamental concepts learnt in ionic equilibria
- 3. Learn and identify the concepts of a standard solutions, primary and secondary standards
- 4. Facilitate the learner to make solutions of various molar concentrations. This may include: The concept of the mole; Converting moles to grams; Converting grams to moles; Defining concentration; Dilution of Solutions; Making different molar concentrations.

Volumetric Analysis

50 M

- 1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
- 2. Determination of Fe (II) using KMnO₄ with oxalic acid as primary standard.
- 3. Determination of Cu (II) using Na₂S₂O₃ with K₂Cr₂O₇ as primary standard.
- 4. Estimation of water of crystallization in Mohr's salt by titrating with KMnO₄