ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM
SCHOOL OF CHEMICAL SCIENCES
DEPARTMENT OF CHEMISTRY
SYLLABUS FOR Pre-PhD WRITTEN EXAMINATION

Name of the Research Guide : Dr. B. JAGAN MOHAN REDDY

Name of the Candidate :R Linga Reddy Mallampati (UGC-NSQF)

Title of the Research: A STUDY ON THE ANALYSISS OF BIOLOGICALLY POTENT HETEROCYCLIC COMPOUNDS BY USING VARIOUS ANALYTICAL TECHNIQUES.

PAPER-1: RECENT ADVANCES IN THE CHEMICAL SCIENCES.

Unit - I. Named reactions and mechanisms:

1) Aldol reaction 2) Benzoin condensation 3) Cannizzaro reaction 4) Wittig reaction 5) Bayer villager oxidation 6) Friedel-Crafts Reaction 7) Diels-Alder Reaction 8) Michael reaction 9) Reimer tiemann reaction 10) Mannich reaction 11) Sharpless asymmetric epoxidation 12) Sharpless asymmetric dihydoxylation.

Unit - II. Organic reagents and their applications:

1. NBS 2. $NaBH_4$ 3. $LiAlH_4$ 4. $MnO_2$5.LTA6.SeO_2 7. OsO_4 8. HIO_4 9. PCC 10. PDC. 11. IBX 12. TEMPO.

Unit - III. Rearrangement Reactions and mechanisms:

1) Beckmann rearrangement 2) Claisen rearrangement 3) Curtius rearrangement 4) Fries rearrangement 5) Hoffmann rearrangement 6) Schmidt rearrangement 7) Pinacol pinacolone rearrangement 8) Favorskii rearrangement 9) Wagner-Meerwein rearrangement 10) Tiffeneau-Demjanov rearrangement 11) Cope rearrangement 12) Baker–Venkataraman Rearrangement

UNIT-IV. Spectroscopy

UV:The absorption laws, measurement of the spectrum, chromophores, standard works of reference, Woodward rules for calculating λ_{max} of conjugated dienes and α,β – unsaturated compounds.

Research Supervisor

Principal
College of Science & Technology
Adikavi Nannaya University
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Department of Chemistry
ADIKAVI NANNAYA UNIVERSITY

IR: Infrared radiation and types of molecular vibrations, sampling techniques, characteristic frequencies of organic molecules, fingerprint region and interpretation of spectra.

NMR: Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals - spin-spin coupling, the separation of chemical shift and coupling on to different axes (2D-NMR,cosy).

UNIT-V.Chromatography

History, Classification, definition of terms, principles, basic theory of chromatographic technique and sample handling. Band broadening and column efficiency: Definition, plate theory and rate theory of chromatographic technique, their limitation and applications. preparation of TLC plate, Basic principles, instrumentation of HPTLC, Application of HPTLC. Principles of HPLC, instrumentation of HPLC, Types of column, Types of detectors use in HPLC, and difference between HPLC and UPLC, Application of HPLC. Basic principle of GC, difference between GLC and GSC, instrumentation of GC, Types of column, Types of detectors use in GC. Application of GC. GC-MS, LC-MS theory working and applications.

Books for References:

1) Advances in Organic chemistry: Jerry March, Wiley Eastern Limited.

2) Some modern methodologies in organic synthesis, W. Caruthers, Cambridge.

3) A textbook of Chromatography-Rajbir Singh

4)Spectroscopic identification of organic molecules by R. M. Silverstein and F. X. Webster, John Wiley & Sons, New York Organic Spectroscopy by William Kemp, 3rd Edition, Palgrave publishers (2002).

Research Supervisor

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ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARM

SCHOOL OF CHEMICAL SCIENCES

DEPARTMENT OF CHEMISTRY

Pre-PhD Examination Model Question Paper

PAPER-1: RECENT ADVANCES IN THE CHEMICAL SCIENCES.

Time: 3 hrs Max. Marks: 100

Answer any Five of the following

All questions carry equal marks

1.(a) Explain the following reactions with their mechanisms:

i) Michael reaction ii) Aldol reaction iii) Reimer-Tiemann reaction

(OR)

(b) Explain the following reactions with suitable examples:

i) Cannizzaro reaction ii) Wittig reaction. iii) Bayer Villager Oxidation

2.(a) Write the synthetic applications of the following reagents:

i) NBS ii) $NaBH_4$ iii) OsO_4 iv) PCC

(OR)

(b) Write the synthetic applications of the following reagents:

i) $LiAlH_4$ ii) LTA iii) SeO_2 iv) MnO_2

3.(a) write a short note on the following:

i) Beckmann rearrangement ii) Hoffmann rearrangement

(OR)

(b) Write a short note on the following:

i) Fries rearrangement with mechanism ii) Favorskii rearrangement with mechanism

4. (a) Write about chemical shift and NMR splitting of signals - spin-spin coupling

(OR)

(b)Discuss IR Radiation, its principle and also functional group and fingerprint region

5.(a) Give detailed explanation of Principle and applications of Thin layer Chromatography, HPLC.

(OR)

(b) Discuss GC-MS, LC-MS theory working and applications

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ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM
SCHOOL OF CHEMICAL SCIENCES
DEPARTMENT OF CHEMISTRY
SYLLABUS FOR Pre-PhD WRITTEN EXAMINATION

Name of the Research Guide : Dr. B. JAGAN MOHAN REDDY

Name of the Candidate :R Linga Reddy Mallampati (UGC-NSQF)

Paper II: : A STUDY ON THE ANALYSISS OF BIOLOGICALLY POTENT HETEROCYCLIC COMPOUNDS BY USING VARIOUS ANALYTICAL TECHNIQUES and research methodology.

Unit- IChromatography Techniques

General principles, classification of chromatographic techniques, normal and reversed phase, bonded phase chromatography, stationary phases, activity of stationary phases, elutropic series, and separation mechanisms.

Thin layer chromatography: Principle, activation of adsorbent, development of chromatoplate, visualization methods, applications.

Paper Chromatography (PC): Definitions, theory and principle, techniques: one, two-dimensional and circular PC, mechanism of separation, methodology preparation of sample, choice of solvents, location of spots and measurement of RF value, factors affecting RF values, advantages and applications

Unit-IIHPLC and Analysis of hetero cyclic compounds by using chromatography techniques

High Pressure Liquid Chromatography(HPLC): Principles, instrumentation, peak shapes, capacity factor, selectivity, plate number, plate height, resolution, band broadening, pumps, injector, detectors, columns, column problems, gradient HPLC, HPLC solvents, trouble shooting, sample preparation, method development.

Analysis of biologically potent heterocyclic compounds brinzolamide, timolol maleate, flumethasone pivalate and clioquinol by using Gas chromatography, HPLC.

Research Supervisor

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V. Rambabu

ADIKAVI NANNAYA UNIVERSITY-RAJAMAHENDRAVARAM

SCHOOL OF CHEMICAL SCIENCES

SYLLABUS FOR Pre-Ph.D. WRITTEN EXAMINATION

Paper-I: RECENT ADVANCES IN CHEMICAL SCIENCES

Unit -I: Named reactions and Mechanisms:

1) Aldol Condensation 2) Benzoin condensation 3) Cannizzaro reaction 4) Wittig reaction 5) Bayer-Villiger oxidation 6) Friedel-Crafts reaction 7) Diels-Alder reaction 8) Michael addition 9) Reimer-Tiemann reaction 10) Mannich reaction 11) Sharpless asymmetric epoxidation 12) Sharpless asymmetric dihydoxylation.

Unit -II: Organic reagents and their applications

1.NBS 2.$NaBH_4$ 3.$LiAlH_4$ 4.MnO_2 5.LTA 6.SeO_2 7.OsO_4 8.HIO_4

9. PCC 10. PDC. 11. IBX 12. TEMPO.

Unit-III: Rearrangement reactions and Mechanisms

1) Beckmann rearrangement 2) Claisen rearrangement 3) Curtius rearrangement 4) Fries rearrangement 5) Hofmann rearrangement 6) Schmidt rearrangement

7) Pinacol-Pinacolone rearrangement 8) Favorskii rearrangement 9) Wagner-Meerwein rearrangement 10) Tiffeneau-Demjanov rearrangement 11) Cope rearrangement 12) Baker-Venkataraman rearrangement.

UNIT-IV: Molecular Spectroscopy

UV Spectroscopy: The absorption laws, measurement of the spectrum, Chromophores, Auxochromes, standard works of reference, Woodward rules for calculating λ_{max} of conjugated dienes and α, β – unsaturated compounds.

IR Spectroscopy: Infrared radiation and types of molecular vibrations, sampling techniques, characteristic frequencies of organic molecules, fingerprint region and functional group region, interpretation of spectra.

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Lecturer in Chemistry,
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NMR Spectroscopy: Principle of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals, chemical shift, splitting of NMR signals, spin-spin coupling, the separation of chemical shift and coupling on to different axes (2D- NMR, COSY).

UNIT-V: Chromatography

Chromatography: Classification of chromatography methods, principles of differential migration adsorption phenomenon, Nature of adsorbents, solvent systems, Rf values, factors effecting Rf values. Paper Chromatography: Principles, Rf values, experimental procedures, choice of paper and solvent systems, developments of chromatogram - ascending, descending and radial. Two dimensional chromatography - applications.

Thin layer Chromatography (TLC): Advantages - Principles, factors effecting Rf values - Experimental procedures - Adsorbents and solvents - Preparation of plates - Development of the chromatogram - Detection of the spots – Applications - Column Chromatography: Principles -experimental procedures - Stationary and mobile Phases - Separation technique – Applications. HPLC: Basic principles and applications

Reference Books:

1) Advances in Organic chemistry: Jerry March, Wiley Eastern Limited.

2) Some modern methodologies in organic synthesis, W. Caruthers, Cambridge.

3) Spectroscopic identification of organic molecules by R. M. Silverstein and F. X. Webster, John Wiley & Sons, New York.

4. Organic Spectroscopy by William Kemp, 3rd Edition, Palgrave publishers (2002).

5. Instrumental Methods of Chemical Analysis by B.K. Sharma.

6. Instrumental Methods of Chemical Analysis" by G.Chatwal & S.Anand.

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ADIKAVI NANNAYA UNIVERSITY - RAJAMAHENDRAVARAM

SCHOOL OF CHEMICAL SCIENCES

Pre-Ph.D. Examination Model Question Paper

PAPER-1: RECENT ADVANCES IN CHEMICAL SCIENCES

Time: 3 Hours **Max. Marks: 100**

Answer all questions

Each question carries 20 marks

1. (a) Explain the following reactions with mechanism.

(i) Michael addition (ii) Aldol condensation (iii) Reimer-Tiemann reaction

(OR)

(b) Explain the following reactions with mechanism and suitable examples.

(i) Cannizzaro reaction (ii) Wittig reaction (iii) Bayer- Villiger Oxidation

2. (a) Write the synthetic applications of the following reagents.

(i) NBS (ii) $NaBH_4$ (iii) OsO_4 (iv) PCC

(OR)

(b) Write the synthetic applications of the following reagents.

(i)$LiAlH_4$ (ii) LTA (iii) SeO_2 (iv) MnO_2

3. (a) Explain the following reactions with mechanism.

(i) Beckmann rearrangement (ii) Hofmann rearrangement

(OR)

(b) Explain the following reactions with mechanism.

(i) Fries rearrangement (ii) Favorskii rearrangement

4. (a) Write a note on the following.

(i) Chemical shift and factors affecting chemical shift (ii) Spin-Spin coupling

(OR)

(b) Explain the following in detail.

(i) Types of fundamental vibrations

(ii) Importance of functional group and fingerprint regions

5. (a) Write the preparation of thin layer chromatography plates. Explain the principle and applications of thin layer chromatography

(OR)

(b) Discuss the theory, working and applications of Column Chromatography and HPLC.

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ADIKAVI NANNAYA UNIVERSITY :: RAJAMAHENDRAVARAM

SCHOOL OF CHEMICAL SCIENCES

SYLLABUS FOR Pre-Ph.D. WRITTEN EXAMINATION

Paper-II SYNTHESIS OF VARIOURS ORGANIC COMPOUNDS BY ADOPTING GREEN PROTOCOLS AND RESEARCH METHODOLOGY

Name of the Research Guide : **1. Dr. B. Madhav**

Name of the Research Scholar: **V. Rambabu (Part Time)**

Unit-I: Philosophy, Ethics of research and Scientific conduct

Introduction to Philosophy: Definition, nature and scope, concept, nature and importance of research, aims and objectives of research, selection of area of research, design of experimental program, applications of research and types.

Ethics: Definition, moral philosophy, nature of moral judgments and reactions.

Scientific conduct: Falsification, fabrication and plagiarism (FFP), duplicate and overlapping publications, violation of publication ethics, authorship and contributor ship and predatory publishers and journals.

Unit-II: Searching the chemical literature and Research metrics

Search for existing literature, review the literature selected, develop a theoretical and conceptual framework, writing up the review, selection of literature, collection of literature, manual collection from Library, usage of E-library, collection of literature from web, collection of literature from Scopus, Science direct, Scifinder etc.

Research Metrics, Impact factor of journal as per journal citation report, SNIP, SJR, IPP, Cite score, Metrics: h-index, g-index, i-10 index, altmetrics.

Unit-III: Thesis and report writing:

General format, title page, dedication, abstract, table of contents, introduction, back ground information, acknowledgements, preface, theory, results, discussions, materials and methods, list of tables and list of figures, experimental details, pagination, spacing and alignment,

number schemes, spacing, margins, appendixes, bibliography, abbreviations, special symbols, conclusions, recommendations and references. Literature cited, publications by the candidate and setting, text processing and printing.

Unit-IV: Green Chemistry:

Introduction - Definition of green chemistry, need of green chemistry, basic principles of green chemistry. Green synthesis - Evaluation of the type of the reaction i) Rearrangements (100% atom economic), ii) Addition reactions (100% atom economic). Organic reactions by Sonication method: apparatus required examples of sonochemical reactions (Heck, Hunds-Diecker and Wittig reactions). Selection of solvent: i) Aqueous phase reactions ii) Reactions in ionic liquids. Heck reaction, Suzuki reactions, epoxidation. iii) Solid supported synthesis

Unit-V: Microwave and Ultrasound assisted green synthesis:

Apparatus required, examples of MAOS (synthesis of fused anthro quinones, Leukart reductive amination of ketones) - Advantages and disadvantages of MAOS. Aldol condensation-Cannizzaro Reaction-Diels-Alder reactions-Strecker's synthesis

Examples of green synthesis / reactions and some real world cases: 1. Green synthesis of the following compounds: adipic acid, catechol, disodium imino diacetate (alternative Strecker's synthesis) 2. Microwave assisted reaction in water – Hoffmann elimination – methyl benzoate to benzoic acid – oxidation of toluene and alcohols – microwave assisted reactions in organic solvents. Diels-Alder reactions and decarboxylation reaction. 3. Ultrasound assisted reactions – sonochemical Simmons –Smith reaction (ultrasonic alternative to iodine)

Reference Books:

1. Green Chemistry Theory and Practice. P.T. Anatas and J.C. Warner
2. Green Chemistry V.K. Ahluwalia Narosa, New Delhi.

Dr. B. MADHAV, M.Sc., Ph.
Lecturer in Chemistry,
Government College (A
RAJAHMUNDRY 53

Reference Books:

1. Blum, Deborah and Mary Knudson, eds. A field guide for science writers: the official guide of the National Association of Science Writers, New York: Oxford University Press, 1997.
2. Booth, Wayne, Gregory G Colombo, Joseph M. Williams. The craft of Research Chicago University of Chicago Press, 1995.
3. Davis, Martha. Scientific Papers and Presentations. San Diego: Academic Press, 1997.
4. Green Chemistry Theory and Practice. P.T. Anatas and J.C. Warner
5. Green Chemistry V.K. Ahluwalia Narosa, New Delhi.
6. Real world cases in Green Chemistry M.C. Cann and M.E. Connelly
7. Green Chemistry: Introductory Text M. Lancaster: Royal Society of Chemistry (London)
8. Green Chemistry: Introductory Text, M. Lancaster
9. Principles and practice of heterogeneous catalysis, Thomas J.M., Thomas M.J., John Wiley
10. Green Chemistry: Environmental friendly alternatives R S Sanghli and M.M. Srivastava, Narosa Publications

Dr. B. MADHAV, M.Sc., Ph.D.
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RAJAHMUNDRY 533

ADIKAVI NANNAYA UNIVERSITY :: RAJAMAHENDRAVARAM

SCHOOL OF CHEMICAL SCIENCES

SYLLABUS FOR Pre-Ph.D. WRITTEN EXAMINATION

Paper-II SYNTHESIS OF VARIOURS ORGANIC COMPOUNDS BY ADOPTING GREEN PROTOCOLS AND RESEARCH METHODOLOGY

Time: 3 Hours **Max. Marks: 100**

Answer all questions

Each question carries 20 marks

1. (a) Write about the following
   (i) Nature and importance of research
   (ii) Aims and objectives of research
   (iii) Research process and steps in it.

   (OR)

   (b) Write about the following
   (i) Formulation of a research problem
   (ii) Types of research
2. (a) How to collect literature through different sources?

   (OR)

   (b) How to develop a theoretical & conceptual framework and write a review?
3. (a) Write short note on the following:
   (i) General format for thesis writing (ii) Tables, figures and bibliography
   (iii) Abbreviations and symbols.

   (OR)

   (b) Explain the various factors to be taken into account while writing a thesis.
4. (a) Explain the basic principles of green chemistry.

   (OR)

   (b) Illustrate the sonication method with any two reactions.
5. (a) Write the green synthesis procedures for
   (i) Cannizaro reaction and (ii) Aldol condensation.

   (OR)

   (b) Describe the green synthesis of
   (i) Diels-Alder reaction and (ii) Hoffmann elimination.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

SCHOOL OF CHEMICAL SCIENCES

SYLLABUS FOR Pre-Ph.D. WRITTEN EXAMINATION

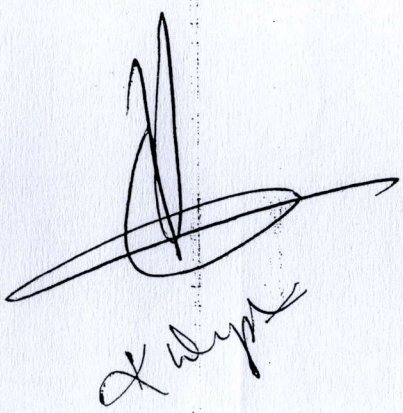
PAPER-I : RECENT ADVANCES IN CHEMICAL SCIENCES

Paper-II: SYNTHESIS OF VARIOURS ORGANIC COMPOUNDS BY ADOPTING GREEN PROTOCOLS AND RESEARCH METHODOLOGY

Paper-III: ORAL PRESENTATION (Seminar):

Name of the Research Guide : **1. Dr. B. Madhav**

Name of the Research Scholar: **V. Rambabu (Part Time)**



B. Balaji

ADIKAVI NANNAYA UNIVERSITY :: RAJAMAHENDRAVARAM

SCHOOL OF CHEMICAL SCIENCES

SYLLABUS FOR Pre-Ph.D. WRITTEN EXAMINATION

Paper-I: RECENT ADVANCES IN CHEMICAL SCIENCES

Unit -I: Named reactions and Mechanisms:

1) Aldol Condensation 2) Benzoin condensation 3) Cannizzaro reaction 4) Wittig reaction 5) Bayer-Villiger oxidation 6) Friedel-Crafts reaction 7) Diels-Alder reaction 8) Michael addition 9) Reimer-Tiemann reaction 10) Mannich reaction 11) Sharpless asymmetric epoxidation 12) Sharpless asymmetric dihydoxylation.

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1.NBS 2. $NaBH_4$ 3.$LiAlH_4$ 4.MnO_2 5.LTA 6.SeO_2 7.OsO_4 8.HIO_4

9. PCC 10. PDC. 11. IBX 12. TEMPO.

Unit-III: Rearrangement reactions and Mechanisms

1) Beckmann rearrangement 2) Claisen rearrangement 3) Curtius rearrangement 4) Fries rearrangement 5) Hofmann rearrangement 6) Schmidt rearrangement

7) Pinacol-Pinacolone rearrangement 8) Favorskii rearrangement 9) Wagner-Meerwein rearrangement 10) Tiffeneau-Demjanov rearrangement 11) Cope rearrangement 12) Baker-Venkataraman rearrangement.

UNIT-IV: Molecular Spectroscopy

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NMR Spectroscopy: Principle of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals, chemical shift, splitting of NMR signals, spin-spin coupling, the separation of chemical shift and coupling on to different axes (2D- NMR, COSY).

UNIT-V: Chromatography

Chromatography: Classification of chromatography methods, principles of differential migration adsorption phenomenon, Nature of adsorbents, solvent systems, Rf values, factors effecting Rf values. Paper Chromatography: Principles, Rf values, experimental procedures, choice of paper and solvent systems, developments of chromatogram - ascending, descending and radial. Two-dimensional chromatography - applications.

Thin layer Chromatography (TLC): Advantages - Principles, factors effecting Rf values - Experimental procedures - Adsorbents and solvents - Preparation of plates - Development of the chromatogram - Detection of the spots – Applications - Column Chromatography: Principles -experimental procedures - Stationary and mobile Phases - Separation technique – Applications. HPLC: Basic principles and applications

Reference Books:

1) Advances in Organic chemistry: Jerry March, Wiley Eastern Limited.

2) Some modern methodologies in organic synthesis, W. Caruthers, Cambridge.

3) Spectroscopic identification of organic molecules by R. M. Silverstein and F. X. Webster, John Wiley & Sons, New York.

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5. Instrumental Methods of Chemical Analysis by B.K. Sharma.

6. Instrumental Methods of Chemical Analysis" by G.Chatwal & S.Anand.

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ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM

SCHOOL OF CHEMICAL SCIENCES

Pre-Ph.D. Examination Model Question Paper

PAPER-1: RECENT ADVANCES IN CHEMICAL SCIENCES

Time: 3 Hours **Max. Marks: 100**

Answer all questions

Each question carries 20 marks

1. (a) Explain the following reactions with mechanism.

(i) Michael addition (ii) Aldol condensation (iii) Reimer-Tiemann reaction

(OR)

(b) Explain the following reactions with mechanism and suitable examples.

(i) Cannizzaro reaction (ii) Wittig reaction (iii) Bayer- Villiger Oxidation

2. (a) Write the synthetic applications of the following reagents.

(i) NBS (ii) $NaBH_4$ (iii) OsO_4 (iv) PCC

(OR)

(b) Write the synthetic applications of the following reagents.

(i)$LiAlH_4$ (ii) LTA (iii) SeO_2 (iv) MnO_2

3. (a) Explain the following reactions with mechanism.

(i) Beckmann rearrangement (ii) Hofmann rearrangement

(OR)

(b) Explain the following reactions with mechanism.

(i) Fries rearrangement (ii) Favorskii rearrangement

4. (a) Write a note on the following.

(i) Chemical shift and factors affecting chemical shift (ii) Spin-Spin coupling

(OR)

(b) Explain the following in detail.

(i) Types of fundamental vibrations

(ii) Importance of functional group and fingerprint regions

5. (a) Write the preparation of thin layer chromatography plates. Explain the principle and applications of thin layer chromatography

(OR)

(b) Discuss the theory, working and applications of Column Chromatography and HPLC.

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM

SCHOOL OF CHEMICAL SCIENCES

SYLLABUS FOR Pre-Ph.D. WRITTEN EXAMINATION

Paper-II: SYNTHESIS, CHARACTERIZATION OF NANO BASED METAL ORGANIC FRAME WORKS AND THEIR COMPOSITION WITH VARIOUS POLYMERS AND RESEARCH METHODOLOGY

Name of the Research Guide : **1. Dr. M. TRINADH**
Name of the Research Scholar: **S. BALAJI (Part Time)**

Unit-I: Philosophy, Ethics of research and Scientific conduct

Introduction to Philosophy: Definition, nature and scope, concept, nature and importance of research, aims and objectives of research, selection of area of research, design of experimental program, applications of research and types.

Ethics: Definition, moral philosophy, nature of moral judgments and reactions.

Scientific conduct: Falsification, fabrication and plagiarism (FFP), duplicate and overlapping publications, violation of publication ethics, authorship and contributor ship and predatory publishers and journals.

Unit-II: Searching the chemical literature and Research metrics

Search for existing literature, review the literature selected, develop a theoretical and conceptual framework, writing up the review, selection of literature, collection of literature, manual collection from Library, usage of E-library, collection of literature from web, collection of literature from Scopus, Science direct, Scifinder etc.

Research Metrics, Impact factor of journal as per journal citation report, SNIP, SJR, IPP, Cite score, Metrics: h-index, g-index, i-10 index, altmetrics.

Unit-III: Thesis and report writing:

General format, title page, dedication, abstract, table of contents, introduction, back ground information, acknowledgements, preface, theory, results, discussions, materials and methods,

list of tables and list of figures, experimental details, pagination, spacing and alignment, number schemes, spacing, margins, appendixes, bibliography, abbreviations, special symbols, conclusions, recommendations and references. Literature cited, publications by the candidate and setting, text processing and printing.

Unit-IV: Metal organic Frame works and their applications:

Concepts of supramolecular Chemistry: Chemistry of Molecular recognition- crown ethers and related hosts, cyclodextrins, calixarene as a versatile host; various synthetic methods of metal organic frame works and supramolecular interaction in MOFs (Metal-Organic Frameworks) and their applications in Gas adsorption, photo catalysis, sensor, fuel cell and drug deliver applications.

Unit-V: Synthesis of Nano materials and their characterization:

Nanomaterials- Definition, Methods of Preparation, Properties of Nanomaterials - Physio-chemical and optical, Electrical and Electronics properties, Applications of Nanomaterials Gold, Silver & Pt Nanomaterials- General Properties and Applications, Principle, Instrumentation and applications of Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Scanning Probe Microscopy (SPM), Atomic Force Microscopy (AFM)

Reference Books:

1. Blum, Deborah and Mary Knudson, eds. A field guide for science writers: the official guide of the National Association of Science Writers, New York: Oxford University Press, 1997.
2. Booth, Wayne, Gregory G Colombo, Joseph M. Williams. The craft of Research Chicago University of Chicago Press, 1995.
3. Davis, Martha. Scientific Papers and Presentations. San Diego: Academic Press, 1997.
4. N Stock and S Biswas, Chem.rev.2012,112,933-969.
5. M Safaei et al. trends in Analytical chemistry 2019,118, 401-425

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SCHOOL OF CHEMICAL SCIENCES

SYLLABUS FOR Pre-Ph.D. WRITTEN EXAMINATION

Paper-II: SYNTHESIS, CHARACTERIZATION OF NANO BASED METAL ORGANIC FRAME WORKS AND THEIR COMPOSITION WITH VARIOUS POLYMERS AND RESEARCH METHODOLOGY

Time: 3 Hours **Max. Marks: 100**

Answer all questions

Each question carries 20 marks

1. (a) Write about the following

(i) Nature and importance of research

(ii) Aims and objectives of research

(iii) Research process and steps in it.

(OR)

(b) Write about the following

(i) Formulation of a research problem

(ii) Types of research

2. (a) How to collect literature through different sources?

(OR)

(b) How to develop a theoretical & conceptual framework and write a review?

3. (a) Write short note on the following:

(i) General format for thesis writing (ii) Tables, figures and bibliography

(iii) Abbreviations and symbols.

(OR)

(b) Explain the various factors to be taken into account while writing a thesis.

4. (a) Write about different synthetic routes of metal organic frame works.

(OR)

(b) Write the different applications Metal Organic Frameworks

5. (a) Write about Physio-chemical and optical, Electrical and Electronics properties of nano materials

(OR)

(b) Write the instrumentation and applications of scanning electron microscope and transmission electron microscope

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM

SCHOOL OF CHEMICAL SCIENCES

SYLLABUS FOR Pre-Ph.D. WRITTEN EXAMINATION

PAPER-I: RECENT ADVANCES IN CHEMICAL SCIENCES

Paper-II: SYNTHESIS, CHARACTERIZATION OF NANO BASED METAL ORGANIC FRAME WORKS AND THEIR COMPOSITION WITH VARIOUS POLYMERS AND RESEARCH METHODOLOGY

Paper-III: ORAL PRESENTATION (Seminar):

Name of the Research Guide : **1. Dr. M. TRINADH**

Name of the Research Scholar: **S. BALAJI (Part Time)**

V. Ramesh

(4)

V. Ramesh

ADIKAVI NANNAYA UNIVERSITY-RAJAMAHENDRAVARAM

SCHOOL OF CHEMICAL SCIENCES

SYLLABUS FOR Pre-Ph.D. WRITTEN EXAMINATION

Paper-I: RECENT ADVANCES IN CHEMICAL SCIENCES

Unit -I: Named reactions and Mechanisms:

1) Aldol Condensation 2) Benzoin condensation 3) Cannizzaro reaction 4) Wittig reaction 5) Bayer-Villiger oxidation 6) Friedel-Crafts reaction 7) Diels-Alder reaction 8) Michael addition 9) Reimer-Tiemann reaction 10) Mannich reaction 11) Sharpless asymmetric epoxidation 12) Sharpless asymmetric dihydoxylation.

Unit -II: Organic reagents and their applications

1.NBS 2.$NaBH_4$ 3.$LiAlH_4$ 4.MnO_2 5.LTA 6.SeO_2 7.OsO_4 8.HIO_4

9. PCC 10. PDC. 11. IBX 12. TEMPO.

Unit-III: Rearrangement reactions and Mechanisms

1) Beckmann rearrangement 2) Claisen rearrangement 3) Curtius rearrangement 4) Fries rearrangement 5) Hofmann rearrangement 6) Schmidt rearrangement

7) Pinacol-Pinacolone rearrangement 8) Favorskii rearrangement 9) Wagner-Meerwein rearrangement 10) Tiffeneau-Demjanov rearrangement 11) Cope rearrangement 12) Baker-Venkataraman rearrangement.

UNIT-IV: Molecular Spectroscopy

UV Spectroscopy: The absorption laws, measurement of the spectrum, Chromophores, Auxochromes, standard works of reference, Woodward rules for calculating λ_{max} of conjugated dienes and α, β – unsaturated compounds.

IR Spectroscopy: Infrared radiation and types of molecular vibrations, sampling techniques, characteristic frequencies of organic molecules, fingerprint region and functional group region, interpretation of spectra.

B Mallikarjuna

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NMR Spectroscopy: Principle of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals, chemical shift, splitting of NMR signals, spin-spin coupling, the separation of chemical shift and coupling on to different axes (2D- NMR, COSY).

UNIT-V: Chromatography

Chromatography: Classification of chromatography methods, principles of differential migration adsorption phenomenon, Nature of adsorbents, solvent systems, Rf values, factors effecting Rf values. Paper Chromatography: Principles, Rf values, experimental procedures, choice of paper and solvent systems, developments of chromatogram - ascending, descending and radial. Two dimensional chromatography - applications.

Thin layer Chromatography (TLC): Advantages - Principles, factors effecting Rf values - Experimental procedures - Adsorbents and solvents - Preparation of plates - Development of the chromatogram - Detection of the spots – Applications - Column Chromatography: Principles -experimental procedures - Stationary and mobile Phases - Separation technique – Applications. HPLC: Basic principles and applications

Reference Books:

1) Advances in Organic chemistry: Jerry March, Wiley Eastern Limited.

2) Some modern methodologies in organic synthesis, W. Caruthers, Cambridge.

3) Spectroscopic identification of organic molecules by R. M. Silverstein and F. X. Webster, John Wiley & Sons, New York.

4. Organic Spectroscopy by William Kemp, 3rd Edition, Palgrave publishers (2002).

5. Instrumental Methods of Chemical Analysis by B.K. Sharma.

6. Instrumental Methods of Chemical Analysis" by G.Chatwal & S.Anand.

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ADIKAVI NANNAYA UNIVERSITY - RAJAMAHENDRAVARAM

SCHOOL OF CHEMICAL SCIENCES

Pre-Ph.D. Examination Model Question Paper

PAPER-1: RECENT ADVANCES IN CHEMICAL SCIENCES

Time: 3 Hours **Max. Marks: 100**

Answer all questions

Each question carries 20 marks

1. (a) Explain the following reactions with mechanism.

(i) Michael addition (ii) Aldol condensation (iii) Reimer-Tiemann reaction

(OR)

(b) Explain the following reactions with mechanism and suitable examples.

(i) Cannizzaro reaction (ii) Wittig reaction (iii) Bayer- Villiger Oxidation

2. (a) Write the synthetic applications of the following reagents.

(i) NBS (ii) $NaBH_4$ (iii) OsO_4 (iv) PCC

(OR)

(b) Write the synthetic applications of the following reagents.

(i)$LiAlH_4$ (ii) LTA (iii) SeO_2 (iv) MnO_2

3. (a) Explain the following reactions with mechanism.

(i) Beckmann rearrangement (ii) Hofmann rearrangement

(OR)

(b) Explain the following reactions with mechanism.

(i) Fries rearrangement (ii) Favorskii rearrangement

4. (a) Write a note on the following.

(i) Chemical shift and factors affecting chemical shift (ii) Spin-Spin coupling

(OR)

(b) Explain the following in detail.

(i) Types of fundamental vibrations

(ii) Importance of functional group and fingerprint regions

5. (a) Write the preparation of thin layer chromatography plates. Explain the principle and applications of thin layer chromatography

(OR)

(b) Discuss the theory, working and applications of Column Chromatography and HPLC.

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ADIKAVI NANNAYA UNIVERSITY - RAJAMAHENDRAVARAM

SCHOOL OF CHEMICAL SCIENCES

SYLLABUS FOR Pre-Ph.D. WRITTEN EXAMINATION

PAPER-II: SYNTHESIS, CHARACTERIZATION OF POLYMERIC NANOSPONGES AND ITS DRUG DELIVEVERY APPLICATIONS AND RESEARCH METHODOLOGY

Name of the Research Guide : **1. Dr. B. Mallikarjuna**
Name of the Research Scholar: **V Ramesh (Part Time)**

Unit-I: Philosophy, Ethics of research and Scientific conduct

Introduction to Philosophy: Definition, nature and scope, concept, nature and importance of research, aims and objectives of research, selection of area of research, design of experimental program, applications of research and types.

Ethics: Definition, moral philosophy, nature of moral judgments and reactions.

Scientific conduct: Falsification, fabrication and plagiarism (FFP), duplicate and overlapping publications, violation of publication ethics, authorship and contributor ship and predatory publishers and journals.

Unit-II: Searching the chemical literature and Research metrics

Search for existing literature, review the literature selected, develop a theoretical and conceptual framework, writing up the review, selection of literature, collection of literature, manual collection from Library, usage of E-library, collection of literature from web, collection of literature from Scopus, Science direct, Scifinder etc.

Research Metrics, Impact factor of journal as per journal citation report, SNIP, SJR, IPP, Cite score, Metrics: h-index, g-index, i-10 index, altmetrics.

Unit-III: Thesis and report writing:

General format, title page, dedication, abstract, table of contents, introduction, back ground information, acknowledgements, preface, theory, results, discussions, materials and methods, list of tables and list of figures, experimental details, pagination, spacing and alignment,

number schemes, spacing, margins, appendixes, bibliography, abbreviations, special symbols, conclusions, recommendations and references. Literature cited, publications by the candidate and setting, text processing and printing.

Unit-IV: Sustained Release (SR) and Controlled Release (CR) Formulations:

Introduction & basic concepts, advantages/disadvantages, factors influencing, Physicochemical & biological approaches for SR/CR formulation, Mechanism of Drug Delivery from SR/CR formulation. Polymers: Introduction, definition, classification, properties and application.

Unit V: Rate Controlled Drug Delivery Systems:

Principles & Fundamentals, Types, Activation; Modulated Drug Delivery Systems; Mechanically activated, pH activated, Enzyme activated, and Osmotic activated Drug Delivery Systems Feedback regulated Drug Delivery Systems; Principles and Fundamentals.

Reference Books:

1. Blum, Deborah and Mary Knudson, eds. A field guide for science writers: the official guide of the National Association of Science Writers, New York: Oxford University Press, 1997.
2. Booth, Wayne, Gregory G Colombo, Joseph M. Williams. The craft of Research Chicago University of Chicago Press, 1995.
3. Davis, Martha. Scientific Papers and Presentations. San Diego: Academic Press, 1997.
4. Y W. Chien, Novel Drug Delivery Systems, 2nd Edn., revised and expanded, Marcel Dekker
5. Robinson, J. R., Lee V. H. L, Controlled Drug Delivery Systems, Marcel Dekker, Inc.
6. Encyclopedia of controlled delivery, Editor- Edith Mathiowitz, Published by Wiley

Dr. B. MALLIKARJUNA, M.Sc., Ph.D.,
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Government College (A),

7. Interscience, John Wiley and Sons, Inc, New York, Chichester/Weinheim

8. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers, New Delhi, 1st Edn.

9. S.P.Vyas and R.K.Khar, Controlled Drug Delivery, Vallabh Prakashan, New Delhi, 1st.Edn.

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ADIKAVI NANNAYA UNIVERSITY :: RAJAMAHENDRAVARAM

SCHOOL OF CHEMICAL SCIENCES

SYLLABUS FOR Pre-Ph.D. WRITTEN EXAMINATION

PAPER-II: SYNTHESIS, CHARACTERIZATION OF POLYMERIC NANOSPONGES AND ITS DRUG DELIVEVERY APPLICATIONS AND RESEARCH METHODOLOGY

Time: 3 Hours **Max. Marks: 100**

Answer all questions

Each question carries 20 marks

1. (a) Write about the following
   (i) Nature and importance of research
   (ii) Aims and objectives of research
   (iii) Research process and steps in it.

   or

   (b) Write about the following
   (i) Formulation of a research problem
   (ii) Types of research
2. (a) How to collect literature through different sources?

   or

   (b) How to develop a theoretical & conceptual framework and write a review?
3. (a) Write short note on the following:
   (i) General format for thesis writing (ii) Tables, figures and bibliography
   (iii) Abbreviations and symbols.

   or

   (b) Explain the various factors to be taken into account while writing a thesis.
4. (a) Explain about the physicochemical and biological approaches for sustained Controlled release formulations.

   or

   (b) Explain the mechanism for drug delivery from controlled release formulations.
5. (a) Explain in detail about Osmotic activated drug delivery systems.

   or

   (b) Give the principles and fundamentals of rate controlled drug delivery systems.

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SYLLABUS FOR Pre-Ph.D. WRITTEN EXAMINATION

PAPER-I RECENT ADVANCES IN CHEMICAL SCIENCES

PAPER-II: SYNTHESIS, CHARACTERIZATION OF POLYMERIC NANOSPONGES AND ITS DRUG DELIVEVERY APPLICATIONS AND RESEARCH METHODOLOGY

PAPER-III

ORAL PRESENTATION (Seminar):

Name of the Research Guide : **1. Dr. B. Mallikarjuna**

Name of the Research Scholar: **V. Ramesh Babu (Part Time)**