

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

Name of the External Research Guide : Dr.B.Jagan Mohan Reddy
Name of the Internal Research Guide : Dr. P S R Prasad
Name of the Candidate : GANTEDARAMA RAO (EMR)
Title of the Research: Influence of low dosage green extracts on Methane and Carbon dioxide Hydrate formations

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 dihydroxylation.

Unit - II. Organic reagents and their applications:

1. NBS 2. NaBH₄ 3. LiAlH₄ 4. MnO₂ 5. LTA 6. SeO₂ 7. OsO₄ 8. HIO₄ 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) Pinacolpinacolone 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.

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


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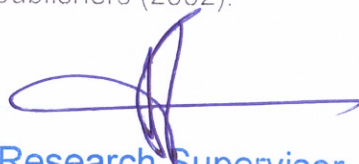
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limitation and applications. preparation of TLC plate, Basic principles, instrumentation of HPTLC, Application of HPTLC. Principles of HPLC, instrumentation of HPLC, Types of column, Types of detectors use in HPLC, and difference between HPLC and UPLC, 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).



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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. Explain the following reactions with their mechanisms:
a) Michael reaction b) Aldol reaction c) Reimer-Tiemann reaction
(OR)
2. Explain the following reactions with suitable examples:
a) Cannizzaro reaction b) Wittig reaction. c) Bayer Villager Oxidation
3. Write the synthetic applications of the following reagents:
a) NBS b) NaBH_4 C) OsO_4 D) PCC
(OR)
4. Write the synthetic applications of the following reagents:
a) LiAlH_4 b) LTA C) SeO_2 D) MnO_2
5. a) Beckmann rearrangement with mechanism b) Hoffmann rearrangement with mechanism
(OR)
6. a) Fries rearrangement with mechanism b) Favorskii rearrangement with mechanism
7. Write about chemical shift and NMR splitting of signals and spin-spin coupling
(OR)
8. Discuss IR Radiation, its principle and also functional group and fingerprint region
9. Give detailed explanation of Principle and applications of Thin layer Chromatography, HPLC.
(OR)
10. Discuss GC-MS, LC-MS theory working and applications


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SYLLABUS FOR Pre-PhD WRITTEN EXAMINATION

Title of the Research: Influence of low dosage green extracts on
Methane and Carbon dioxide Hydrate
formations and Research
Methodology.

Name of the External Research Guide : Dr. B. Jagan Mohan Reddy

Name of the Internal Research Guide : Dr. P S R Prasad

Name of the Candidate : GANTEDARAMA RAO (EMR)

Unit-I

Hydrates in the Natural Gas Industry- Initial Experiments on Natural Gas Hydrates- Initial Correlation of Hydrate Phase Equilibria - Hydrate Crystal Structures and Hydrate Type Definitions-Basis for Current Thermodynamic Models-Time-Dependent Studies of Hydrates-Work to Enable Gas Production, Transport, and Processing - Hydrates in Mass and Energy Storage and Separation-Hydrates as an Energy Resource -Molecular Structures and Similarities to Crystal Structures of Ice Ih and Natural Gas Hydrates - Ice, Water, Hydrogen Bonds, and Clusters - Ice and Bjerrum defects - The water molecule - Hydrogen bonds- Hydrogen bonds cause unusual water, ice, and hydrate properties - Pentamers and hexamers- Hydrate Crystalline Cavities and Structures - The cavities in hydrates -Hydrate crystal cells— structures I, II, and H - Characteristics of Guest Molecules - Chemical nature of guest molecules - Geometry of the guest molecules- Filling the hydrate cages

Unit-II

Hydrates in Production, Processing, and Transportation-Introduction- How Do Hydrate Plugs Form in Industrial Equipment? - Burying the pipeline - Line burial with wellhead heat addition -Burial, heat addition, and Insulation-Methanol addition


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alternative - Conceptual Overview: Hydrate Plug Formation in Oil-Dominated Systems
- Conceptual Overview: Hydrate Formation in Gas-Dominated Systems - How Are Hydrate Plug Formations Prevented? – Anti-agglomerant means of preventing hydrate plugs - How Is a Hydrate Plug Dissociated? - Safety and Hydrate Plug Removal - Applications to Gas Transport and Storage.

Unit-III Philosophy and 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-IV 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.

Unit-V 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,

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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.

Books and References:

- Hetero cyclic chemistry by V.K. Ahluwalia
- Heterocyclic Chemistry by R.R.Gupta,M.kumar,V.Gupta
- March: Advanced Organic chemistry : 6th edition ,wiley, madras
- Research Methodology- A Step- Jerry By-Step Guide for Beginners by Ranjit Kumar.
- Clathrate Hydrates of natural gases: 3rd edition, E. Dendy Sloan Carolyn A.Koh



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DEPARTMENT OF CHEMISTRY

Pre-PhD Examination Model Question Paper

PAPER-II: Influence of low dosage green extracts on Methane and Carbon dioxide Hydrate formations and research methodology.

Time: 3 hrs

Max.Marks:100

Answer any Five of the following
All questions carry equal marks

1. Is Gas Hydrates being a good conventional source of energy? Write a short note on impact of Gas hydrates socio-economic development of India.

OR

2. Write a short note on

a) Occurrence of Gas hydrates in Earth b) Difference between Ice and Gas hydrates
(c) Classification of gas hydrates based on structures

3. Write a short note on the following:

a) Explain Gas hydrate synthesis is the best technic for storage and transportation of gases.

b) Drawbacks of offshore operations of gas hydrates production, transportation and storage.

OR

4. Write a short note on

a) Gas hydrate promoters b) Gas hydrate Inhibitors and give any two examples for each one.

5. Write about the following:

a) Nature and importance of Research b) Aims and Objectives of Research

c) Research process and steps in it.

(OR)

6. Write about the following:

a) Formulating a research problem

b) Formulation of a research problem, formulation of objectives.

7. How to collect literature through different sources?

(OR)

8. How to develop a theoretical and conceptual framework and writing a review?

9. Write short note on the following:

i) General format for thesis writing

ii) Tables, figures and bibliography

iii) Abbreviations and symbols.

(OR)

10. Explain the various factors to be taken into account while writing a thesis?


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SYLLABUS FOR Pre-PhD WRITTEN EXAMINATION

Paper-III

Name of the External Research Guide : Dr. B. Jagan Mohan Reddy
Name of the Internal Research Guide : Dr. P S R Prasad
Name of the Candidate : GANTEDARAMA RAO (EMR)
Title of the Research : Influence of low dosage green extracts on
Methane and Carbon dioxide Hydrate
formations.

ORALPRESENTATION: (Seminar)


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DEPARTMENT OF CHEMISTRY
SYLLABUS FOR Pre-PhD WRITTEN EXAMINATION

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

Name of the Candidate: SURESH GOWD VEERINA (Part time)

Title of the Research: Synthesis of some novel hetero cyclic compounds and study of their biological activity.

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 dihydroxylation.

Unit - II. Organic reagents and their applications

1. NBS 2. NaBH₄ 3. LiAlH₄ 4. MnO₂ 5. LTA 6. SeO₂ 7. OsO₄ 8. HIO₄ 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. Molecular Spectroscopy

UV Spectroscopy: 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.


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


NMR Spectroscopy: 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 Reference:

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


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DEPARTMENT OF CHEMISTRY

Pre-PhD Examination Model Question Paper


PAPER-1: RECENT ADVANCES IN THE CHEMICAL SCIENCES.

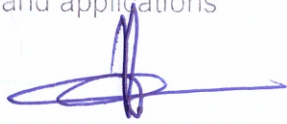
Time: 3 hrs

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 with mechanism ii) Hoffmann rearrangement with mechanism
(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: SURESH GOWD VEERINA (Part time)

PAPER-II: Synthesis of some novel heterocyclic compounds and study of their biological activity and research methodology.

Unit-I Hetero cyclic compounds

Five and six membered heterocycles with one and two hetero atoms: synthesis, reactivity, aromatic character and importance of following heterocyclic rings: Pyrrole, Pyrazole, Imidazole, Oxazole, Thiazole, Isoxazole and condensed heterocycles: Benzofuran, Indole and Benzoxazole and Benzothiazole.

Unit-II Some special reactions in hetero cyclic compounds


- a) Five and six membered heterocycles with more than two hetero atoms: Synthesis, reactivity, aromatic character and importance of following heterocycles: 1,2,3-triazole, 1,2,4-triazole, 1,2,4-oxadiazole, 1,3,4-oxadiazole and tetrazole.
- b) Bioactive Synthesis of 2-phenylbenzo[d]thiazole analogous by using oxidative catalyst and their biological activity.

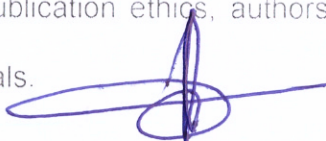
Unit-III: Philosophy and Ethics of Research and Scientific Conduct

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.


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Unit-IV 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.


Unit-V 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.

Books and References:

- Hetero cyclic chemistry by **V.K. Ahluwalia**
- Heterocyclic Chemistry by R.R.Gupta, M.Kumar, V.Gupta
- March: Advanced Organic chemistry: 6th edition, Wiley, madras
- Research Methodology- A Step-By-Step Guide for Beginners by Ranjit Kumar.


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DEPARTMENT OF CHEMISTRY

Pre-PhD Examination Model Question Paper

PAPER-II: Synthesis of some novel hetero cyclic compounds and study of their biological activity and research methodology.

Time: 3 hrs

Max.Marks:100

Answer any Five of the following
All questions carry equal marks

1.(a) Write the preparation of Pyrrole and explain electrophilic substitution reactions

(OR)

(b) Write the preparation of Thiazole and explain the chemical reactions of Benzoxazole and benzothiazole.

2.(a) Write about the synthesis, reactivity, aromatic character and importance of following heterocycles:

i) 1,2,3-triazole ii) tetrazole

(OR)

(b). Write about the bioactive synthesis of 2-phenylbenzo[d]thiazole analogously using oxidative catalyst.

3.(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:

a) Types of research
b) Formulation of a research problem

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

(OR)

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


5. (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?


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DEPARTMENT OF CHEMISTRY

SYLLABUS FOR Pre-PhD WRITTEN EXAMINATION


Paper-III

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

Name of the Candidate: SURESH GOWD VEERINA (Part time)

Title of the Research: Synthesis of some novel hetero cyclic compounds and study of their biological activity.

• ORALPRESENTATION (Seminar)



Research Supervisor

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SCHOOL OF CHEMICAL SCIENCES

SYLLABUS FOR Pre-Ph.D. WRITTEN EXAMINATION

Name of the Research Guide : Dr. B. Jagan Mohan Reddy

Name of the Research Scholar: P. Sivakumar (Part Time)

Title of the Research: STABILITY INDICATING METHODS FOR THE ESTIMATION OF VARIOUS DRUGS IN BULK AND PHARMACEUTICAL DOSAGE FORMS BY USING ADVANCED CHROMATOGRAPHIC TECHNIQUES.

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 dihydroxylation.

Unit -II: Organic reagents and their applications

1. NBS 2. NaBH₄ 3. LiAlH₄ 4. MnO₂ 5. LTA 6. SeO₂ 7. OsO₄ 8. HIO₄ 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.



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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.

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).

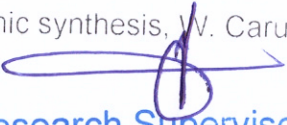
UNIT-V: Chromatography

History, classification, definition of terms, principles, basic theory of chromatographic techniques and sample handling. Band broadening and column efficiency. Plate theory and rate theory of chromatographic techniques, their limitations and applications. Preparation of TLC plates, basic principle, instrumentation of HPTLC, applications of HPTLC. Principle of HPLC, instrumentation of HPLC, types of columns, types of detectors used in HPLC, differences between HPLC and UPLC, applications of HPLC. Basic principle of GC, difference between GLC and GSC, instrumentation of GC, types of columns, types of detectors used in GC, applications of GC. Theory, working and applications of GC-MS, LC-MS.

Reference Books:

- 1) Advances in Organic chemistry: Jerry March, Wiley Eastern Limited.
- 2) Some modern methodologies in organic synthesis, W. Caruthers, Cambridge.

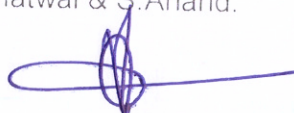

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- 3) Spectroscopic identification of organic molecules by R. M. Silverstein and F. X. Webster, John Wiley & Sons, New York.
4. Organic Spectroscopy by William Kemp, 3rd Edition, Palgrave publishers (2002).
5. Instrumental Methods of Chemical Analysis by B.K. Sharma.
6. Instrumental Methods of Chemical Analysis" by G.Chatwal & S.Anand.



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ADIKAVI NANNAYA UNIVERSITY - RAJAMAHENDRAVARM
SCHOOL OF CHEMICAL SCIENCES
Pre-Ph.D. Examination Model Question Paper
PAPER-1: RECENT ADVANCES IN CHEMICAL SCIENCES

Time: 3 Hours

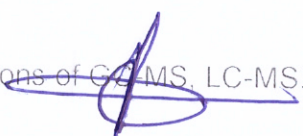
Max. Marks: 100

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) NaBH₄ (iii) OsO₄ (iv) PCC
(OR)
(b) Write the synthetic applications of the following reagents.
(i) LiAlH₄ (ii) LTA (iii) SeO₂ (iv) MnO₂
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) Give detailed explanation of principle and applications of Thin layer chromatography and HPLC.
(OR)
(b) Discuss the theory, working and applications of GC-MS, LC-MS.


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ADIKAVI NANNAYA UNIVERSITY - RAJAMAHENDRAVARAM

SCHOOL OF CHEMICAL SCIENCES

SYLLABUS FOR Pre-Ph.D. WRITTEN EXAMINATION

Paper-II: STABILITY INDICATING METHODS FOR THE ESTIMATION OF VARIOUS DRUGS IN BULK AND PHARMACEUTICAL DOSAGE FORMS BY USING ADVANCED CHROMATOGRAPHIC TECHNIQUES AND RESEARCH METHODOLOGY

Name of the Research Guide : Dr.B.Jagan Mohan Reddy

Name of the Candidate : P. Sivakumar (Part Time)

Unit-I: Chromatography Techniques

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

Thin layer chromatography (TLC): Principle, activation of adsorbent, development of chromatoplate, visualization methods and applications.

Column Chromatography (CC): Principle, classification, experimental procedure and applications of column chromatography.

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

Unit-II: Estimation of various drugs in bulk and pharmaceutical dosage forms by using advanced Chromatographic techniques

High Pressure Liquid Chromatography(HPLC): Principle, instrumentation-block diagram, peak shapes, capacity factor, selectivity, plate number, plate height,


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resolution, band broadening, pumps, injector, detectors, columns, column problems, gradient HPLC, HPLC solvents, trouble shooting, sample preparation, method development and applications of HPLC in pharmaceutical industry.

Gas Chromatography (GC): Basic principles involved in Gas Chromatography, instrumentation-block diagram, applications of Gas Chromatography in pharmaceutical industry and various methods for the estimation of drugs in bulk and pharmaceutical dosage forms by using the advanced techniques LC-MS and GC-MS.

Unit-III: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.

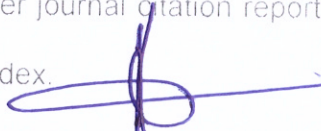
Ethics: Definition, moral philosophy, nature of moral judgments and reactions.

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-IV: 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.



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Unit-V: 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.

Reference Books:

1. Instrumental Methods of Chemical Analysis by B.K. Sharma.
2. Instrumental Methods of Chemical Analysis” by G.Chatwal & S.Anand.
3. A Text book of Pharmaceutical Analysis by Kerrenth A.Connors.
4. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi.
5. Research Methodology – Methods and Techniques by C.R. Kothari.
6. Research Methodology by Dr.S.Sachdeva.



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ADIKAVI NANNAYA UNIVERSITY - RAJAMAHENDRAVARM

SCHOOL OF CHEMICAL SCIENCES

Pre-Ph.D. Examination Model Question Paper

PAPER-II: STABILITY INDICATING METHODS FOR ESTIMATION OF VARIOUS DRUGS IN BULK AND PHARMACEUTICAL DOSAGE FORMS BY USING ADVANCED CHROMATOGRAPHIC TECHNIQUES and RESEARCH METHODOLOGY

Time: 3 Hours

Max. Marks: 100

Answer all questions

Each question carries 20 marks

1. (a) Explain the principle of Thin layer chromatography. Write about various methods of visualization in TLC and applications of TLC.

(OR)

(b) Write about the principle of paper chromatography. Write about two-dimensional and circular paper chromatography. Write about the factors affecting R_f value.

2. (a) Explain the principle of HPLC and its instrumentation. Write about gradient HPLC and method development by using HPLC.

(OR)

(b) Write about various methods for the estimation of drugs in bulk and pharmaceutical dosage forms by using advanced techniques LC-MS and GC-MS.

3. (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

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

(OR)

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

5. (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.

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SCHOOL OF CHEMICAL SCIENCES

DEPARTMENT OF CHEMISTRY

SYLLABUS FOR Pre-Ph.D. WRITTEN EXAMINATION

Paper-III

Name of the Research Guide : Dr.B.Jagan Mohan Reddy
Name of the Candidate : P. Sivakumar (Part Time)
Title of the Research: : STABILITY INDICATING METHODS FOR
THE ESTIMATION OF VARIOUS DRUGS IN BULK AND PHARMACEUTICAL
DOSAGE FORMS BY USING ADVANCED CHROMATOGRAPHIC TECHNIQUES

ORALPRESENTATION: (Seminar)

Research Supervisor

Research Supervisor
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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 : VENKAT NARAYANA V (UGC-NSQF)

Title of the Research: A STUDY ON THE SYNTHESIS OF IMPURITIES AND DEGRADATION STUDIES OF PHARMACEUTICAL SUBSTANCES IN PHARMA INDUSTRY FOR RAPID AND CONVENIENT PRODUCTION.

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 dihydroxylation.

Unit - II. Organic reagents and their applications:

1. NBS 2. NaBH₄ 3. LiAlH₄ 4. MnO₂ 5. LTA 6. SeO₂ 7. OsO₄ 8. HIO₄ 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.

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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).



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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

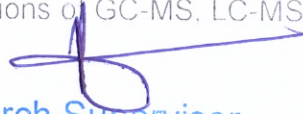
Max. Marks: 100

Answer any Five of the following

All questions carry equal marks

1. (a) Explain the following reactions with 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) NaBH₄ (iii) OsO₄ (iv) PCC
(OR)
(b) Write the synthetic applications of the following reagents.
(i) LiAlH₄ (ii) LTA (iii) SeO₂ (iv) MnO₂
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) Give detailed explanation of principle and applications of Thin layer chromatography and HPLC.
(OR)
(b) Discuss the theory, working and applications of GC-MS, LC-MS.


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DEPARTMENT OF CHEMISTRY

SYLLABUS FOR Pre-PhD WRITTEN EXAMINATION

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

Name of the Candidate : VENKAT VENKAT NARAYANA V (UGC-NSQF)

PAPER-II: A STUDY ON THE SYNTHESIS OF IMPURITIES AND DEGRADATION STUDIES OF PHARMACEUTICAL SUBSTANCES IN PHARMA INDUSTRY FOR RAPID AND CONVENIENT PRODUCTION and Research Methodology.

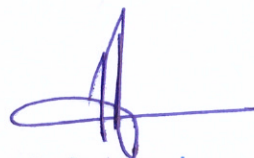
Unit-I: Process Chemistry and impurities

Introduction, Definition and classification of drugs, quality of drugs, sources of impurities in pharmaceutical chemicals and raw materials, different types of impurities in pharmaceuticals, impurities in new drug substances, standard impurities, tests for purity and identity, effect of impurities on the melting point. Synthetic strategy stages of scale up process: Bench, pilot and large-scale process In-process control and validation of large-scale process, case studies of some scale up process of APIs, Impurities in API, types and their sources including genotoxic impurities, guidelines for residual solvents.

Unit-II: Impurity Profiling

Impurity profiling, classification of impurities, dissolution techniques of drugs, significance of stability studies, types of stability studies, quantification of impurities. Basic concept of ICH guidelines for impurity profiling and stability studies, determination of impurities in bulk drugs: Isolation, characterization and analytical methods, crystallization related impurities, advance approaches for the impurity profiling of pharmaceutical drugs.

ICH and WHO guidelines for impurity and related substances in the drugs. Critical factors affecting the quality of bulk drugs.



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Unit-III Philosophy and 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-IV 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.

Unit-V 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.


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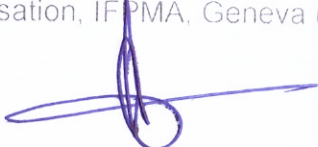

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Books and References:

- Ahuja S, Alsante KM. Handbook of isolation and characterization of impurities in pharmaceuticals. Academic press, California, 2003.
- Ahuja , S. (2007), Assuring quality of drugs by monitoring impurities , Adv. Drug Deliv. Rev. , 59 , 3 – 11.
- Görög S. Identification and determination of impurities in drugs: Elsevier, volume 4, 2000.
- March: Advanced Organic chemistry : 6th edition ,wiley, Madras
- Research Methodology- A Step- Jerry By-Step Guide for Beginners by Ranjit Kumar.
- Guideline ICH, Impurities Guideline for residual solvents Q3C (R5), in: International Conference on Harmonisation, IFPMA, Geneva (Switzerland), 2011.
- Guideline ICH, Assessment and control of DNA reactive (mutagenic) impurities in pharmaceuticals to limit potential carcinogenic risk (final concept paper) M7, in: International Conference on Harmonisation, IFPMA, Geneva (Switzerland), 2010.



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DEPARTMENT OF CHEMISTRY

Pre-PhD Examination Model Question Paper

PAPER-II: A STUDY ON THE SYNTHESIS OF IMPURITIES OF PHARMACEUTICAL SUBSTANCES AND THEIR DEGRADATION STUDIES IN PHARMA INDUSTRY FOR RAPID AND CONVENIENT PRODUCTION and Research Methodology.

Time: 3 hrs


Max.Marks:100

Answer any Five of the following

All questions carry equal marks

1. (a) Write the types of impurities in API drug preparation with suitable examples.
(OR)
(b) Write a short note on the following:
i) Force degradation studies ii) Critical factors affecting the quality of bulk drugs.
2. (a) What are the Characterization methods to identify the impurities during the API Drug synthesis?
(OR)
(b) What are the ICH regulatory guidelines on impurities in API & formulation. Explain?
3. 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
4. (a) How to collect literature through different sources?
(OR)
(b) How to develop a theoretical & conceptual framework and write a review?
5. (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.


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ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM
SCHOOL OF CHEMICAL SCIENCES

DEPARTMENT OF CHEMISTRY

SYLLABUS FOR Pre-PhD WRITTEN EXAMINATION

Paper-III

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

Name of the Candidate : VENKAT NARAYANA V (UGC-NSQF)

Title of the Research : A STUDY ON THE SYNTHESIS OF IMPURITIES
AND DEGRADATION STUDIES OF PHARMACEUTICAL SUBSTANCES IN
PHARMA INDUSTRY FOR RAPID AND CONVENIENT PRODUCTION.

ORALPRESENTATION: (Seminar)



Research Supervisor

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DEPARTMENT OF CHEMISTRY
SYLLABUS FOR Pre-PhD WRITTEN EXAMINATION

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

Name of the Candidate : D. Nirmala Jyothi (UGC-NSQF)

Title of the Research: A STUDY ON THE SYNTHESIS OF SOME BIOLOGICALLY ACTIVE
HETEROCYCLIC COMPOUNDS.

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 dihydroxylation.

Unit - II. Organic reagents and their applications:

1. NBS 2. NaBH₄ 3. LiAlH₄ 4. MnO₂ 5. LTA 6. SeO₂ 7. OsO₄ 8. HIO₄ 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. IR: Infrared radiation and types of molecular vibrations, sampling techniques, characteristic frequencies of organic molecules, fingerprint region and interpretation of spectra.

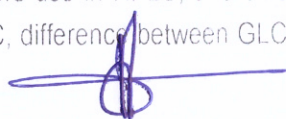
NMR: Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals - spin-spin coupling, the separation of chemical shift and coupling on to different axes (2D- NMR, cosy).

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,



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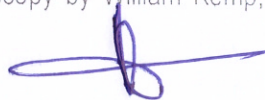


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Types of column, Types of detectors use in GC. Application of GC. GC-MS, LC-MS theory working and applications.

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).



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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) NaBH₄ iii) OsO₄ iv) PCC

(OR)

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

i) LiAlH₄ ii) LTA iii) SeO₂ iv) MnO₂

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

i) Beckmann rearrangement with mechanism ii) Hoffmann rearrangement with mechanism

(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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DEPARTMENT OF CHEMISTRY
SYLLABUS FOR Pre-PhD WRITTEN EXAMINATION

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

Name of the Candidate : D. Nirmala Jyothi (UGC-NSQF)

Paper II: A STUDY ON THE SYNTHESIS OF SOME BIOLOGICALLY ACTIVE HETEROCYCLIC COMPOUNDS and research methodology.

Unit- I Hetero cyclic compounds

Introduction and definition: Simple five membered ring compounds with one hetero atom, Furan, Thiophene and Pyrrole - aromatic character - aromatic character – preparation from 1,4,-dicarbonyl compounds, Paul-Knorr synthesis. Properties : Acidic character of pyrrole - electrophilic substitution at 2 or 5 position, halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan. Pyridine - basicity - comparison with pyrrole - one method of preparation and properties - reactivity towards nucleophilic substitution reaction.

Unit-II Some special reactions in hetero cyclic compounds

Pyridopyrimidine derivatives: Synthesis of Piromidic acid and Pipemidic acid and their biological significance, Synthesis of N-Substituted 2-Methyl sulfanyl-8-Oxo-5,8-dihydro pyrido(3,2-d) pyrimidine-7-Carboxylic acid, its derivatives and Synthesis of N-substituted 2-Methyl-8-Oxo-5,8-dihydro-pyrido(3,2-d) pyrimidine-7-Carboxylic acid, its derivatives.

Unit-III Philosophy and 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-IV 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


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collection from Library, usage of E-library, collection of literature from web, collection of literature from Scopus, Science direct, Scifinder etc.,

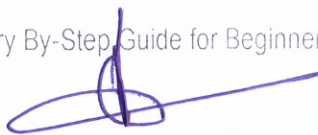
Research Metrics, Impact factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score, Metrics: h-index, g-index, i-10 index.

Unit-V 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.

Books and References:

- Hetero cyclic chemistry by V.K. Ahluwalia
- Heterocyclic Chemistry by R.R.Gupta, M.kumar, V.Gupta
- March: Advanced Organic chemistry : 6th edition ,Wiley, Madras
- Research Methodology- A Step- Jerry By-Step Guide for Beginners by Ranjit Kumar.



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ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM
SCHOOL OF CHEMICAL SCIENCES
DEPARTMENT OF CHEMISTRY

Pre-PhD Examination Model Question Paper

PAPER-II: A STUDY ON THE SYNTHESIS OF SOME BIOLOGICALLY ACTIVE HETEROCYCLIC COMPOUNDS and research methodology.

Time: 3 hrs

Max.Marks:100

Answer any Five of the following

All questions carry equal marks

1.(a) Write the preparation of Pyrrole and explain electrophilic substitution reactions

(OR)

(b)Write the preparation of Pyridine and explain nucleophilic substitution reactions.

2. (a)Write the Synthesis of N-Substituted 2-Methyl sulfanyl-8-Oxo-5,8-dihydro pyrido(3,2-d) pyrimidine-7-Carboxylic acid and its derivatives. Discuss about its biological significance.

(OR)

(b)Write the Synthesis of N-substituted 2-Methyl-8-Oxo-5,8-dihydro-pyrido(3,2-d) pyrimidine-7-Carboxylic acid, its derivatives and write their biological significance.

3. (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) Formulating a research problem

ii) Formulation of a research problem, formulation of objectives.

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

(OR)

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

5. (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?


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DEPARTMENT OF CHEMISTRY

SYLLABUS FOR Pre-PhD WRITTEN EXAMINATION

Paper-III

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

Name of the Candidate : D. Nirmala Jyothi (UGC-NSQF)

Title of the Research : A STUDY ON THE SYNTHESIS OF SOME BIOLOGICALLY ACTIVE
HETEROCYCLIC COMPOUNDS.

• ORALPRESENTATION (Seminar)

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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 : K. SRINIVASU (UGC-NSQF)

Title of the Research: A STUDY ON THE SYNTHESIS OF NOVEL IMPURITIES OF PHARMACEUTICAL SUBSTANCES AND ITS UTILITY IN PHARMACEUTICAL INDUSTRY.

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 dihydroxylation.

Unit - II. Organic reagents and their applications:

1. NBS 2. NaBH₄ 3. LiAlH₄ 4. MnO₂.LTA 6. SeO₂ 7. OsO₄ 8. HIO₄ 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) Pinacolpinacolone 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.


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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.

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).

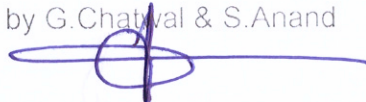
UNIT-V: Chromatography

History, classification, definition of terms, principles, basic theory of chromatographic techniques and sample handling. Band broadening and column efficiency. Plate theory and rate theory of chromatographic techniques, their limitations and applications. Preparation of TLC plates, basic principle, instrumentation of HPTLC, applications of HPTLC. Principle of HPLC, instrumentation of HPLC, types of columns, types of detectors used in HPLC, differences between HPLC and UPLC, applications of HPLC. Basic principle of GC, difference between GLC and GSC, instrumentation of GC, types of columns, types of detectors used in GC, applications of GC. Theory, working and applications of GC-MS, LC-MS.

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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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 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) NaBH₄ (iii) OsO₄ (iv) PCC
(OR)
(b) Write the synthetic applications of the following reagents.
(i) LiAlH₄ (ii) LTA (iii) SeO₂ (iv) MnO₂
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) Give detailed explanation of principle and applications of Thin layer chromatography and HPLC.
(OR)
(b) Discuss the theory, working and applications of GC-MS, LC-MS.


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DEPARTMENT OF CHEMISTRY
SYLLABUS FOR Pre-PhD WRITTEN EXAMINATION

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

Name of the Candidate : K. SRINIVASU (UGC-NSQF)

PAPER-II: A STUDY ON THE SYNTHESIS OF NOVEL IMPURITIES OF PHARMACEUTICAL SUBSTANCES AND ITS UTILITY IN PHARMACEUTICAL INDUSTRY.

Unit- I:Synthesis of impurities related to pharmaceutical drugs


Introduction, Definition and classification of drugs, quality of drugs, sources of impurities in pharmaceutical chemicals and raw materials, different types of impurities in pharmaceuticals, impurities in new drug substances, standard impurities, formation of impurities in API drugs, regulatory guidelines on impurities in an API or in formulation, terms used for impurities by regulatory authorities, studies to evaluate drug compounds and their impurities, force degradation studies, ICH and WHO guidelines for impurity and related substances in the drugs, Critical factors affecting the quality of bulk drugs.

UNIT-II:

Impurity Profiling and Identification and characterization techniques of impurities in API drugs

Impurity profiling, dissolution techniques of drugs, quantification of impurities. Basic concept of ICH guidelines for impurity profiling and determination of impurities in bulk drugs: Isolation, characterization and analytical techniques of impurities in API drugs, crystallization related impurities and advance approaches for the impurity profiling of pharmaceutical drugs: 1. TLC, 2. Gas chromatography, 3. Flash chromatography, 4. Column chromatography, 5. HPTLC, 6. HPLC, 7. LC-MS, 8. GC, 9. GC-MS


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Unit-III:Philosophy and 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-IV: 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.

Unit-V: 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.


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Books and References:

1. Instrumental methods of chemical analysis B.K. Sharma
2. Research Methodology- A Step- Jerry By-Step Guide for Beginners by Ranjit Kumar.
3. U.S. Food and Drug Administration. Guidance for Industry, Q3A Impurities in New Drug Substances. February 2003.
4. Gorog S (Ed.), Identification and Determination of Impurities in Drugs, Elsevier Science B.V, Amsterdam, 2000.
5. Ahuja S. Impurities Evaluation of Pharmaceuticals, Marcel Dekker, New York, NY, 1998.



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Pre-PhD Examination Model Question Paper

PAPER-II: A STUDY ON THE SYNTHESIS OF NOVEL IMPURITIES OF PHARMACEUTICAL SUBSTANCES AND ITS UTILITY IN PHARMACEUTICAL INDUSTRY and research methodology.

Time: 3 hrs

Max.Marks:100

Answer any Five of the following
All questions carry equal marks

1. (a) Write the types of impurities in API drug preparation with suitable examples.

(OR)

(b) Write a short note on the the following:

i) Force degradation studies ii) Critical factors affecting the quality of bulk drugs.

- 2.(a) What are the Characterization methods to identify the impurities during the API Drug synthesis?

(OR)

(b) What are the ICH regulatory guidelines on impurities in API & formulation? Explain?

3.(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) Formulating a research problem
(ii) Types of research

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

(OR)

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

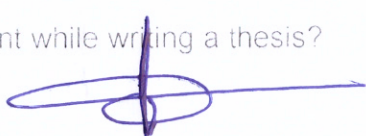
5.(a) Write short note on the following:

(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?


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SCHOOL OF CHEMICAL SCIENCES

DEPARTMENT OF CHEMISTRY

SYLLABUS FOR Pre-PhD WRITTEN EXAMINATION

Paper-III

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

Name of the Candidate : SRINIVASU. K (UGC-NSQF)

Title of the Research : A STUDY ON THE SYNTHESIS OF NOVEL
IMPURITIES OF PHARMACEUTICAL SUBSTANCES AND ITS UTILITY IN
PHARMACEUTICAL INDUSTRY.

• ORALPRESENTATION (Seminar)


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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 ANALYSIS 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 dihydroxylation.

Unit - II. Organic reagents and their applications:

1. NBS 2. NaBH₄ 3. LiAlH₄ 4. MnO₂ 5. PCC 6. SeO₂ 7. OsO₄ 8. HIO₄ 9. PDC 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.


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

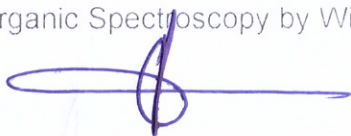
NMR: Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals - spin-spin coupling, the separation of chemical shift and coupling on to different axes (2D-NMR, cosy).

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
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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) NaBH₄ iii) OsO₄ iv) PCC

(OR)

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

i) LiAlH₄ ii) LTA iii) SeO₂ iv) MnO₂

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

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 ANALYSIS OF BIOLOGICALLY POTENT HETEROCYCLIC COMPOUNDS BY USING VARIOUS ANALYTICAL TECHNIQUES and research methodology.

Unit-I Chromatography 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-II HPLC 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 using Gas chromatography, HPLC,


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LC-MS, GC-MS, Validation of analytical methods for heterocyclic compounds by using high performance liquid chromatography. New HPLC method developments for the analysis of oxygen containing heterocycles.

Unit-III Philosophy and 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-IV 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.

Unit-V 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


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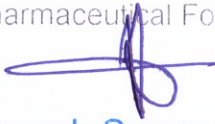
references. Literature cited, publications by the candidate and setting, text processing and printing.

Books and References:

- March: Advanced Organic chemistry : 6th edition ,wiley, Madras
- Research Methodology- A Step- Jerry By-Step Guide for Beginners by Ranjit Kumar.
- Instrumental Methods of Chemical Analysis by B.K. Sharma.
- "Instrumental Methods of Chemical Analysis" by G.Chatwal & S.Anand.
- A Text book of Pharmaceutical Analysis by Kerrenth A.Connors.
- Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi.



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DEPARTMENT OF CHEMISTRY

Pre-PhD Examination Model Question Paper

PAPER-II: A STUDY ON THE ANALYSIS OF BIOLOGICALLY
POTENT HETEROCYCLIC COMPOUNDS BY USING VARIOUS ANALYTICAL
TECHNIQUES

Time: 3 hrs

Max.Marks:100

Answer any Five of the following
All questions carry equal marks

1.(a) Write about the principle of Thin Layer Chromatography. Write about various methods of visualization in TLC. Write the applications of TLC.

(OR)

(b). Write about the principle of paper chromatography. Write about two-dimensional and circular paper chromatography. Write about the factors effecting Rf value.

2.(a) Explain the principle of HPLC and write its instrumentation. Write about gradient HPLC and method development by using HPLC.

(OR)

(b). Write about new HPLC method developments for the analysis of brinzolamide, timolol maleate.

3.(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) Types of research
- ii) Formulation of a research problem

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

(OR)

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

5.(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?

Research Supervisor

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Department of Chemistry

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ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM

SCHOOL OF CHEMICAL SCIENCES

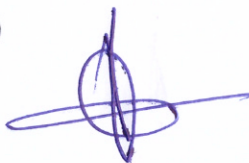
DEPARTMENT OF CHEMISTRY

SYLLABUS FOR Pre-PhD WRITTEN EXAMINATION

Paper-III

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 ANALYSIS OF
BIOLOGICALLY POTENT HETEROCYCLIC
COMPOUNDS BY USING VARIOUS
ANALYTICAL TECHNIQUES

• ORALPRESENTATION (Seminar)



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Adikavi Nannaya University :: Rajahmundry
Department of Chemistry
Syllabus for Pre-Ph. D. written examination

Name of the research guide: Dr. K. Deepthi

Name of the candidate: Mrs. M. Lakshmi Prasanna

Title of the proposed research: *Thermoacoustic molecular interactions studies on binary liquid mixtures*

Paper-I Recent advances in chemical sciences

Unit – 1

Treatment of analytical data: Errors, types of errors, methods to minimize errors - accuracy and precision - gaussian distribution of random errors - calculation of mean, median, standard deviation, relative standard deviation, variance, coefficient of variance, standard error of the mean - criteria for rejection of an observation, *Q-test* and *4d rule* - confidence level, confidence interval and confidence limit - comparison of results, *t-test* and *f-test*.

Unit – 2

Catalysis: Homogeneous and heterogeneous catalysis – advantages and disadvantages – Catalysis by Organometallic compounds – Alkene hydrogenation, Wilkinson's catalyst, Tolman catalytic loops – Hydroformylation – Photocatalysis – Properties of semiconductors- Kinetics of Photocatalysis - TiO₂ and its doped compounds as a versatile photocatalysts.

Unit – 3

Spectroscopic techniques for qualitative and quantitative analysis-I:

a) **IR and Raman spectroscopy** – Instrumentation, detectors- sampling techniques - characteristic frequencies of organic molecules - qualitative and quantitative analysis - Principle of FTIR spectroscopy – Theory of Raman effect – comparison of Raman and IR spectra - instrumentation, applications.

b) **UV-visible spectroscopy** - laws of absorption - deviation from Beer's law - single and double beam spectrophotometers-instrumentation, sources of radiation, detectors - qualitative analysis by absorption measurements

Unit – 4

Spectroscopic techniques for qualitative and quantitative analysis-II:

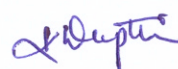
Fluorescence and Phosphorescence Spectrophotometry – Theory of fluorescence, phosphorescence - factors affecting - quenching - relation between intensity of fluorescence and concentration, Beers's law – Instrumentation of double beam fluorescence spectroscopy - Instrumentation for phosphorescence measurements - applications - Room temperature phosphorescence – comparison between fluorescence and phosphorescence.

Unit – 5

Spectroscopic techniques for qualitative and quantitative analysis-III:

a) **X-ray spectroscopy**- Production of X-rays and X-ray spectra, instrumentation, Detectors, X-ray diffraction, Bragg's law, Powder techniques, Chemical analysis by X-ray diffraction techniques.


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b) Scanning electron microscopy (SEM), Transmission electron microscopy (TEM)- Instrumentation, Signal detectors, and applications.

Reference/Textbooks

1. "Instrumental methods of Analysis", 7th edition, Willard, Merritt, Dean, Settle, CBS Publishers and Distributors, New Delhi.
2. "Vogel's Textbook of quantitative Chemical Analysis", 5th edition, G.H. Jeffery, J Bassett, J. Mendham, R C Denney, Longman Scientific & Technical publishers, New York.
3. "Inorganic Chemistry: Principle of Structure and Reactivity", 5th edition, Huheey, Keiter, Keiter, Medhi, Pearson Publishers, New Delhi.
4. "Basics of X-ray diffraction and its applications", K Ramakanth Hebbar, I.K. International Publishing House, New Delhi.
5. "Analytical Transmission Electron Microscopy", A.D. Romig, Sandia National Laboratories,
6. "Scanning Electron Microscopy", John D. Verhoeven, Department of Metallurgy, Iowa State University
7. "Heterogeneous photocatalysis", Vittorio Loddo, Maraiana Bellardita, University of Palermo, Palermo, Italy, Research Gate Publishers.



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Adikavi Nannaya University :: Rajahmundry
Department of Chemistry
Pre-Ph.D. Examinations
Model question paper
Paper – I: Recent advances in chemical sciences
Name the guide : Dr. K. Deepthi
Name of the scholar : Mrs. M. Lakshmi Prasanna

Time: 3 hrs

Maximum marks: 100

Answer ALL questions

UNIT – 1

1. A) i) What are determinate and indeterminate errors? Explain the methods to minimize determinate errors. (15M)
ii) Discuss the distribution of random errors by Gaussian distribution. (5M)
OR
B. i) Explain how t-test and f-test are useful in comparing results. (10 M)
ii) Write the criteria for rejection of an observation. (10 M)

UNIT – 2

2. A. i). What are homogeneous and heterogeneous catalysis? Give their advantages and disadvantages. (10 M)
ii) Explain the role of Wilkinson's catalyst in the hydrogenation of alkene. (10 M)
OR
B. i) What is photocatalysis? Which type of materials are suitable as photocatalysts? (10 M)
ii) Explain how TiO_2 and its related materials are versatile photocatalysts. (10 M)

UNIT – 3

3. A. i) Explain the theory of Fluorescence and phosphorescence. What are the factors affecting? (15 M)
ii) Discuss Quenching in Fluorescence and phosphorescence (5 M)
OR
B. Explain in detail the instrumentation of double beam spectrofluorometer and the components in it. (20 M)

UNIT – 4

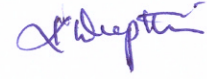
4. A. i) What are the factors affecting absorption frequencies in IR spectrum. (10 M)
ii) What is Raman effect? Give the applications of Raman spectroscopy. (10 M)
OR
B. i) How Beer's law forms the basis for spectrophotometry? (5M)
ii) Discuss the instrumentation of double beam spectrophotometer with a focus on detectors. (15 M)

UNIT – 5

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Dr. K. Deepthi

5. A. i). Give the construction of X-ray tube for the generation of X-rays. (5 M)
ii) Explain the instrumentation of X-ray spectroscopy and role of the components in it. (15 M)
- OR
- B. i) Explain the principle and instrumentation of Scanning Electron Microscopy with diagram. (15 M)
ii) What are the applications of Transmission Electron Microscopy. (5 M)



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Adikavi Nannaya University :: Rajahmundry
Department of Chemistry
Syllabus for Pre-Ph.D. written examination

Name of the research guide: Dr. K. Deepthi

Name of the candidate: Mrs. M. Lakshmi Prasanna

Title of the proposed research: Thermoacoustic molecular interactions studies on binary liquid mixtures"

Paper-II Research Methodology and Applied Chemistry

Unit – 1

Philosophy and 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 – 2

Thesis and report writing

General format, title page, dedication, abstract, table of contents, Introduction, background 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 – 3

Polymers

General study of natural and synthetic High polymers, concepts and characterization and structure of High polymers, Manufacture of typical high polymers like polyethylene, polystyrene, PVC, Nylon, Terylene, Teflon, Phenolic Resins, and Bakelite, Degradation of polymers.

Unit – 4

Petroleum and Petrochemicals and High Polymers

Fabrication of Petroleum and product stripping, Thermal decomposition processes, Stabilization and gas recovery, Cracking and reforming, Alkylation, Light oil treatment, blending, Manufacture and properties of Lubricating oils, Petrochemicals, phenols, acetone, xylenes, ethylene oxide, ethylene glycol, acrylic compounds like methyl methacrylate, vinyl chloride, vinyl acetate, styrene, maleic anhydride and phthalic anhydride.

Unit – 5

Oils, Fats, Waxes, Soaps, and Detergents

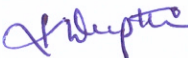
Classification of Oils, Vegetable, Animal and Mineral oils, manufacture of oils, Chemical properties and uses, Hydrogenation-interesterification and isomerization of oils, Preparation, properties and uses of fats and waxes.

Theory of Detergents- Natural and Synthetic detergents, Detergent raw materials, Classification of surfactants, Manufacture of detergents, additives, builders and regulators, Biodegradation of detergents.

Reference/Textbooks

1. "Thesis and Assignment writing", Anderson. J., Durston. B.H., and People. M, Wiley Easter. 1977.
2. "Preparing thesis and other manuscripts", Billet. R.O., Wiley Easter 1966.
3. "The use of Chemical literature", Bottle. R.T. Butterworths, 1960.
4. "Quantitative Chemical Analysis" Fischer. R.B. and Peters. D.G.
5. "Industrial methods of analysis", Willard, H.H. Merritt, L.L. Jr. and Dean J.A., Affiliated East West.


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Department of Chemistry

Pre-Ph.D. Examinations

Model question paper

Paper – II: Research methodology and Applied Chemistry

Name the guide: **Dr. K. Deepthi**

Name of the scholar: **Mrs. M. Lakshmi Prasanna**

Time: 3 hrs

Maximum marks: 100

Answer ALL questions

UNIT – 1

1. A) Define philosophy. How to set aims and ambitions for a good research work? Also explain the steps involved in it. (20 M)

OR

B. i) What is scientific conduct? How to achieve a good scientific conduct? (10 M)

ii) How to be aware of predatory publishers and journals? (10 M)

UNIT – 2

2. A. Write note on the following:

i) General format for thesis writing

ii) Tables, figures and bibliography

iii) Abbreviations and symbols

OR

B. i) Explain various factors to be considered while writing a thesis or publishing a paper.

UNIT – 3

3. A. i) Discuss different types of polymerization reactions. (10 M)

ii) Discuss the manufacture of Teflon, Polystyrene and PVC. (10 M)

OR

B. What is degradation of polymers? What are the factors affecting them? Explain about biodegradable polymers. (20 M)

UNIT – 4

4. A. i) Discuss fractionation of petroleum and product stripping. (10 M)

ii) Write a brief note on Cracking and reforming. (10 M)

OR

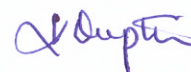
B. i) Explain the manufacture, chemical properties and uses of lubricating oils. (15 M)

ii) Write a note on light oil treatment. (5 M)

UNIT – 5



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5. A. i) Discuss preparation, properties and uses of waxes. (10 M)

ii) Explain hydrogenation of oils. (10 M)

OR

B. i) What are meant by detergents? Explain classification of detergents. (10 M)

ii) Explain biodegradation of detergents. (5 M)

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Adikavi Nannaya University :: Rajahmundry
Department of Chemistry
Syllabus for Pre-Ph.D. written examination

Name of the research guide: Dr. K. Deepthi

Name of the candidate: Mrs. M. Lakshmi Prasanna

Title of the proposed research: Thermoacoustic molecular interactions studies on binary liquid mixtures

Paper-III Seminar on proposed research work

“Thermoacoustic molecular interactions studies on binary liquid mixtures”

Dr. Deepthi


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Adikavi Nannaya University :: Rajahmundry

Department of Chemistry

Syllabus for Pre-Ph.D. written examination

Name of the research guide: Dr. K. Deepthi

Name of the candidate: Mr. J. Suri Babu

Title of the proposed research: "*Green synthesis and characterization of metallic carbon nano dots and nano composites for photocatalytic degradation of organic pollutants*"

Paper-I Recent advances in chemical sciences

Unit – 1

Treatment of analytical data: Errors, types of errors, methods to minimize errors - accuracy and precision - gaussian distribution of random errors - calculation of mean, median, standard deviation, relative standard deviation, variance, coefficient of variance, standard error of the mean - criteria for rejection of an observation, *Q-test* and *4d rule* - confidence level, confidence interval and confidence limit - comparison of results, *t-test* and *f-test*.

Unit – 2

Catalysis: Homogeneous and heterogeneous catalysis – advantages and disadvantages – Catalysis by Organometallic compounds – Alkene hydrogenation, Wilkinson's catalyst, Tolman catalytic loops – Hydroformylation – Photocatalysis – Properties of semiconductors- Kinetics of Photocatalysis - TiO₂ and its doped compounds as a versatile photocatalysts.

Unit – 3

Spectroscopic techniques for qualitative and quantitative analysis-I:

a) **IR and Raman spectroscopy** – Instrumentation, detectors- sampling techniques - characteristic frequencies of organic molecules - qualitative and quantitative analysis - Principle of FTIR spectroscopy – Theory of Raman effect – comparison of Raman and IR spectra - instrumentation, applications.

b) **UV-visible spectroscopy** - laws of absorption - deviation from Beer's law - single and double beam spectrophotometers-instrumentation, sources of radiation, detectors - qualitative analysis by absorption measurements

Unit – 4

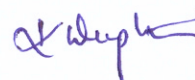
Spectroscopic techniques for qualitative and quantitative analysis-II:

Fluorescence and Phosphorescence Spectrophotometry – Theory of fluorescence, phosphorescence - factors affecting - quenching - relation between intensity of fluorescence and concentration, Beers's law – Instrumentation of double beam fluorescence spectroscopy - Instrumentation for phosphorescence measurements - applications - Room temperature phosphorescence – comparison between fluorescence and phosphorescence.

Unit – 5

Spectroscopic techniques for qualitative and quantitative analysis-III:

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a) **X-ray spectroscopy**- Production of X-rays and X-ray spectra, instrumentation, Detectors, X-ray diffraction, Bragg's law, Powder techniques, Chemical analysis by X-ray diffraction techniques.

b) **Scanning electron microscopy (SEM), Transmission electron microscopy (TEM)**- Instrumentation, Signal detectors, and applications.

Reference/Textbooks

1. "*Instrumental methods of Analysis*", 7th edition, Willard, Merritt, Dean, Settle, CBS Publishers and Distributors, New Delhi.
2. "*Vogel's Textbook of quantitative Chemical Analysis*", 5th edition, G.H. Jeffery, J Bassett, J. Mendham, R C Denney, Longman Scientific & Technical publishers, New York.
3. "*Inorganic Chemistry: Principle of Structure and Reactivity*", 5th edition, Huheey, Keiter, Keiter, Medhi, Pearson Publishers, New Delhi.
4. "*Basics of X-ray diffraction and its applications*", K Ramakanth Hebbar, I.K. International Publishing House, New Delhi.
5. "*Analytical Transmission Electron Microscopy*", A.D. Romig, Sandia National Laboratories,
6. "*Scanning Electron Microscopy*", John D. Verhoeven, Department of Metallurgy, Iowa State University
7. "*Heterogeneous photocatalysis*", Vittorio Loddo, Maraiana Bellardita, University of Palermo, Palermo, Italy, Research Gate Publishers.

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Department of Chemistry
Pre-Ph.D. Examinations
Model question paper
Paper – I: Recent advances in chemical sciences
Name the guide : Dr. K. Deepthi
Name of the scholar : Mr. J. Suri Babu

Time: 3 hrs

Maximum marks: 100

Answer ALL questions

UNIT – 1

1. A) i) What are determinate and indeterminate errors? Explain the methods to minimize determinate errors. (15M)
ii) Discuss the distribution of random errors by Gaussian distribution. (5M)
OR
B. i) Explain how t-test and f-test are useful in comparing results. (10 M)
ii) Write the criteria for rejection of an observation. (10 M)

UNIT – 2

2. A. i). What are homogeneous and heterogeneous catalysis? Give their advantages and disadvantages. (10 M)
ii) Explain the role of Wilkinson's catalyst in the hydrogenation of alkene. (10 M)
OR
B. i) What is photocatalysis? Which type of materials are suitable as photocatalysts? (10 M)
ii) Explain how TiO_2 and its related materials are versatile photocatalysts. (10 M)

UNIT – 3

3. A. i) Explain the theory of Fluorescence and phosphorescence. What are the factors affecting?
(15 M)
ii) Discuss Quenching in Fluorescence and phosphorescence (5 M)
OR
B. Explain in detail the instrumentation of double beam spectrofluorometer and the components in it. (20 M)

UNIT – 4

4. A. i) What are the factors affecting absorption frequencies in IR spectrum. (10 M)
ii) What is Raman effect? Give the applications of Raman spectroscopy. (10 M)
OR
B. i) How Beer's law forms the basis for spectrophotometry? (5M)
ii) Discuss the instrumentation of double beam spectrophotometer with a focus on detectors. (15 M)

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Dr. Deepthi

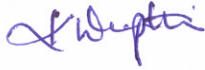
UNIT – 5

5. A. i). Give the construction of X-ray tube for the generation of X-rays. (5 M)
ii) Explain the instrumentation of X-ray spectroscopy and role of the components in it. (15 M)

OR

- B. i) Explain the principle and instrumentation of Scanning Electron Microscopy with diagram. (15 M)
ii) What are the applications of Transmission Electron Microscopy. (5 M)


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Adikavi Nannaya University :: Rajahmundry

Department of Chemistry

Syllabus for Pre-Ph.D. written examination

Name of the research guide: Dr. K. Deepthi

Name of the candidate: Mr. J. Suri Babu

Title of the proposed research: *Green synthesis and characterization of metallic carbon nano dots and nano composites for photocatalytic degradation of organic pollutants*

Paper-II Research methodology and applied Nanotechnology

Unit – 1

Philosophy and 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 – 2

Thesis and report writing

General format, title page, dedication, abstract, table of contents, Introduction, background 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 – 3

Introduction to nanomaterials

History, classification of nanomaterials- zero-, one-, two- and three-dimensional nanomaterials, Metal, metal oxide and polymer nanostructures.

Carbon based nanostructures: Carbon nanotubes (CNTs), Graphene, Fullerenes, Carbon clusters, Nanoporous carbon and Carbon aerogels.

Size dependent properties: mechanical, physical and chemical properties.

Unit – 4

Methods of synthesis of nanomaterials

Bottom-Up and Top-Down approaches with examples, Chemical precipitation methods, sol-gel method, chemical reduction, Sonochemical synthesis, Hydrothermal, Solvothermal and combustion processes.

Physical methods: Ball milling, Physical Vapour deposition (PVD), Chemical Vapour deposition (CVD), Sputter deposition, Electroless deposition.



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Green synthesis approach: Using microorganisms, plant extracts, amino acids, peptide and DNA templates, Synthesis in ionic liquids.

Unit – 5

Characterization techniques of nanomaterials and applications

X-ray diffraction: Principle of X-ray diffraction, powder diffraction, single crystal XRD, thin film analyses, determination of lattice parameters, phase identification, particle size determination using Scherer's formula.

Imaging Techniques: Scanning electron microscopy (SEM), Energy dispersive X-ray analysis (EDAX), Transmission electron microscopy (TEM).

Applications

Nanocatalysts, degradation and removal of waterborne pollutants, light emitting diodes, solar cells, nanofertilizers and nanofinishing smart textiles.

Nanomedicine: Diagnosis and therapeutic applications, targeted drug delivery systems (with reference to targeted gold nanoparticles for imaging therapy).

Reference books/Textbooks

1. "Thesis and Assignment writing", Anderson. J., Durston. B.H., and People. M, Wiley Easter. 1977.
2. "Preparing thesis and other manuscripts", Billet. R.O., Wiley Easter 1966.
3. "The use of Chemical literature", Bottle. R.T. Butterworths, 1960.
4. "Nano Materials" B. Viswanadhan, Narosa Publishing House, New Delhi.
5. "Nanostructures and Nanomaterials: Synthesis, Properties & Applications", Guozhong Cao, Imperial College Press, London.


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Adikavi Nannaya University :: Rajahmundry
Department of Chemistry
Pre-Ph.D. Examinations
Model question paper

Paper – II: Research methodology and Applied Nanotechnology

Name the guide: Dr. K. Deepthi

Name of the scholar: Mr. J. Suri Babu

Time: 3 hrs

Maximum marks: 100

Answer ALL questions

UNIT – 1

1. A) Define philosophy. How to set aims and ambitions for a good research work? Also explain the steps involved in it. (20 M)

OR

- B. i) What is scientific conduct? How to achieve a good scientific conduct? (10 M)
ii) How to be aware of predatory publishers and journals? (10 M)

UNIT – 2

2. A. Write note on the following: (20 M)

- i) General format for thesis writing
ii) Tables, figures and bibliography
iii) Abbreviations and symbols

OR

B. i) Explain various factors to be considered while writing a thesis or publishing a paper. (20 M)

UNIT – 3

3. A. i) Discuss classification of nanomaterials with example. (10 M)
ii) Write a note on Carbon based nanomaterials. (10 M)

OR

B. Explain how mechanical, chemical and physical properties of nanomaterials are affected by size of particles. (20 M)


UNIT – 4

4. A. Write a note on i) hydrothermal synthesis ii) Combustion method iii) Chemical vapour deposition for the synthesis of nanomaterials. (20 M)

OR

B. i) What is the difference between top-down and bottom-up approaches for the synthesis of nanomaterials. (10 M)

ii) Write an essay on green synthesis of nanomaterials. (10 M)


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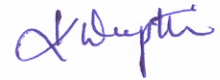


UNIT - 5

5. A. i) How X-ray diffraction technique is useful in phase identification of materials? (10 M)
ii) What are the applications of XRD technique? (10 M)

OR

- B. i) Explain the principle and applications of Scanning electron microscopy in analyzing nanomaterials. (20 M)



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Adikavi Nannaya University :: Rajahmundry

Department of Chemistry

Syllabus for Pre-Ph.D. written examination

Name of the research guide: Dr. K. Deepthi

Name of the candidate: Mr. M. Sudhakara Rao

Title of the proposed research: "Enhance visible light activated photocatalytic degradation of some organic pollutants using binary and ternary metal oxides"

Paper-I Recent advances in chemical sciences

Unit – 1

Treatment of analytical data: Errors, types of errors, methods to minimize errors - accuracy and precision - gaussian distribution of random errors - calculation of mean, median, standard deviation, relative standard deviation, variance, coefficient of variance, standard error of the mean - criteria for rejection of an observation, *Q-test* and *4d rule* - confidence level, confidence interval and confidence limit - comparison of results, *t-test* and *f-test*.

Unit – 2

Catalysis: Homogeneous and heterogeneous catalysis – advantages and disadvantages – Catalysis by Organometallic compounds – Alkene hydrogenation, Wilkinson's catalyst, Tolman catalytic loops – Hydroformylation – Photocatalysis – Properties of semiconductors- Kinetics of Photocatalysis - TiO₂ and its doped compounds as a versatile photocatalysts.

Unit – 3

Spectroscopic techniques for qualitative and quantitative analysis-I:

a) **IR and Raman spectroscopy** – Instrumentation, detectors- sampling techniques - characteristic frequencies of organic molecules - qualitative and quantitative analysis - Principle of FTIR spectroscopy – Theory of Raman effect – comparison of Raman and IR spectra - instrumentation, applications.

b) **UV-visible spectroscopy** - laws of absorption - deviation from Beer's law - single and double beam spectrophotometers-instrumentation, sources of radiation, detectors - qualitative analysis by absorption measurements

Unit – 4


Spectroscopic techniques for qualitative and quantitative analysis-II:

Fluorescence and Phosphorescence Spectrophotometry – Theory of fluorescence, phosphorescence - factors affecting - quenching - relation between intensity of fluorescence and concentration, Beers's law – Instrumentation of double beam fluorescence spectroscopy - Instrumentation for phosphorescence measurements - applications - Room temperature phosphorescence – comparison between fluorescence and phosphorescence.

Unit – 5

Spectroscopic techniques for qualitative and quantitative analysis-III:


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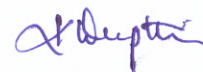


a) **X-ray spectroscopy**- Production of X-rays and X-ray spectra, instrumentation, Detectors, X-ray diffraction, Bragg's law, Powder techniques, Chemical analysis by X-ray diffraction techniques.

b) **Scanning electron microscopy (SEM), Transmission electron microscopy (TEM)**- Instrumentation, Signal detectors, and applications.

Reference/Textbooks

1. "*Instrumental methods of Analysis*", 7th edition, Willard, Merritt, Dean, Settle, CBS Publishers and Distributors, New Delhi.
2. "*Vogel's Textbook of quantitative Chemical Analysis*", 5th edition, G.H. Jeffery, J Bassett, J. Mendham, R C Denney, Longman Scientific & Technical publishers, New York.
3. "*Inorganic Chemistry: Principle of Structure and Reactivity*", 5th edition, Huheey, Keiter, Keiter, Medhi, Pearson Publishers, New Delhi.
4. "*Basics of X-ray diffraction and its applications*", K Ramakanth Hebbar, I.K. International Publishing House, New Delhi.
5. "*Analytical Transmission Electron Microscopy*", A.D. Romig, Sandia National Laboratories,
6. "*Scanning Electron Microscopy*", John D. Verhoeven, Department of Metallurgy, Iowa State University
7. "*Heterogeneous photocatalysis*", Vittorio Loddo, Maraiana Bellardita, University of Palermo, Palermo, Italy, Research Gate Publishers.



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Adikavi Nannaya University :: Rajahmundry
Department of Chemistry
Pre-Ph.D. Examinations
Model question paper
Paper – I: Recent advances in chemical sciences
Name the guide : Dr. K. Deepthi
Name of the scholar : Mr. M. Sudhakara Rao

Time: 3 hrs

Maximum marks: 100

Answer ALL questions

UNIT – 1

1. A) i) What are determinate and indeterminate errors? Explain the methods to minimize determinate errors. (15M)
ii) Discuss the distribution of random errors by Gaussian distribution. (5M)
OR
B. i) Explain how t-test and f-test are useful in comparing results. (10 M)
ii) Write the criteria for rejection of an observation. (10 M)

UNIT – 2

2. A. i). What are homogeneous and heterogeneous catalysis? Give their advantages and disadvantages. (10 M)
ii) Explain the role of Wilkinson's catalyst in the hydrogenation of alkene. (10 M)
OR
B. i) What is photocatalysis? Which type of materials are suitable as photocatalysts? (10 M)
ii) Explain how TiO_2 and its related materials are versatile photocatalysts. (10 M)

UNIT – 3

3. A. i) Explain the theory of Fluorescence and phosphorescence. What are the factors affecting? (15 M)
ii) Discuss Quenching in Fluorescence and phosphorescence (5 M)
OR
B. Explain in detail the instrumentation of double beam spectrofluorometer and the components in it. (20 M)

UNIT – 4

4. A. i) What are the factors affecting absorption frequencies in IR spectrum. (10 M)
ii) What is Raman effect? Give the applications of Raman spectroscopy. (10 M)
OR
B. i) How Beer's law forms the basis for spectrophotometry? (5M)
ii) Discuss the instrumentation of double beam spectrophotometer with a focus on

detectors. (15 M)

UNIT – 5

5. A. i). Give the construction of X-ray tube for the generation of X-rays. (5 M)
ii) Explain the instrumentation of X-ray spectroscopy and role of the components in it. (15 M)

OR

- B. i) Explain the principle and instrumentation of Scanning Electron Microscopy with diagram. (15 M)
ii) What are the applications of Transmission Electron Microscopy. (5 M)

Dr. Deepthi


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Department of Chemistry

Syllabus for Pre-Ph.D. written examination

Name of the research guide: Dr. K. Deepthi

Name of the candidate: Mr. M. Sudhakar Rao

Title of the proposed research: *"Enhance visible light activated photocatalytic degradation of some organic pollutants using binary and ternary metal oxides"*

Paper-II Research methodology and applied Nanotechnology

Unit – 1

Philosophy and 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 – 2

Thesis and report writing

General format, title page, dedication, abstract, table of contents, Introduction, background 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 – 3

Introduction to nanomaterials

History, classification of nanomaterials- zero-, one-, two- and three-dimensional nanomaterials, Metal, metal oxide and polymer nanostructures.

Carbon based nanostructures: Carbon nanotubes (CNTs), Graphene, Fullerenes, Carbon clusters, Nanoporous carbon and Carbon aerogels.

Size dependent properties: mechanical, physical and chemical properties.

Unit – 4

Methods of synthesis of nanomaterials

Bottom-Up and Top-Down approaches with examples, Chemical precipitation methods, sol-gel method, chemical reduction, Sonochemical synthesis, Hydrothermal, Solvothermal and combustion processes.

Physical methods: Ball milling, Physical Vapour deposition (PVD), Chemical Vapour deposition (CVD), Sputter deposition, electroless deposition.


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Green synthesis approach: Using microorganisms, plant extracts, amino acids, peptide and DNA templates, Synthesis in ionic liquids.

Unit – 5

Characterization techniques of nanomaterials and applications

X-ray diffraction: Principle of X-ray diffraction, powder diffraction, single crystal XRD, thin film analyses, determination of lattice parameters, phase identification, particle size determination using Scherer's formula.

Imaging Techniques: Scanning electron microscopy (SEM), Energy dispersive X-ray analysis (EDAX), Transmission electron microscopy (TEM).

Applications


Nanocatalysts, degradation and removal of waterborne pollutants, light emitting diodes, solar cells, nanofertilizers and nanofinishing smart textiles.

Nanomedicine: Diagnosis and therapeutic applications, targeted drug delivery systems (with reference to targeted gold nanoparticles for imaging therapy).

Reference books/Textbooks

1. "Thesis and Assignment writing", Anderson. J., Durston. B.H., and People. M, Wiley Easter. 1977.
2. "Preparing thesis and other manuscripts", Billet. R.O., Wiley Easter 1966.
3. "The use of Chemical literature", Bottle. R.T. Butterworths, 1960.
4. "Nano Materials" B. Viswanadhan, Narosa Publishing House, New Delhi.
5. "Nanostructures and Nanomaterials: Synthesis, Properties & Applications", Guozhong Cao, Imperial College Press, London.


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Adikavi Nannaya University :: Rajahmundry
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Model question paper

Paper – II: Research methodology and Applied Nanotechnology

Name the guide: Dr. K. Deepthi

Name of the scholar: Mr. M. Sudhakara Rao

Time: 3 hrs

Maximum marks: 100

Answer ALL questions

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1. A) Define philosophy. How to set aims and ambitions for a good research work? Also explain the steps involved in it. (20 M)

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i) General format for thesis writing

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OR

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A. W. Gupta


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Syllabus for Pre-Ph.D. written examination

Name of the research guide: Dr. K. Deepthi

Name of the candidate: Mr. M. Sudhakar Rao

Title of the proposed research: *Enhance visible light activated photocatalytic degradation of some organic pollutants using binary and ternary metal oxides*

Paper-III Seminar on proposed research work

"Enhance visible light activated photocatalytic degradation of some organic pollutants using binary and ternary metal oxides".

K. Deepthi

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