

## RESEARCH METHODOLOGY SYLLABUS

The research methodology paper in a Ph.D. program is a mandatory component that outlines the systematic approach a doctoral candidate will employ to conduct their research in Thiruvalluvar University. This paper typically includes a detailed discussion on the chosen research design, methods of data collection, and analytical techniques. The methodology section highlights the researcher's understanding of various research paradigms, ethical considerations, and justifications for the chosen methodologies.

### Research and Publication Ethics

Course Title:

- Research and Publication Ethics (RPE)-Course for awareness about the publication ethics and publication misconducts.

Course Level:

e 2 Credit course (30 hrs.)

Eligibility:

- M.Phil., Ph.D. students and interested faculty members (It will be made available to post graduate students at later date)

Fees:

- As per University Rules Faculty:
- Interdisciplinary Studies

Qualifications of faculty members of the course:

- Ph.D. in relevant subject areas having more than 10 years' of teaching experience

### About the course

Course Code: CPE- RPE

Overview

- This course has total 6 units focusing on basics of philosophy of science and ethics, research integrity, publication ethics. Hands-on-sessions are designed to identify research misconduct and predatory publications. Indexing and citation databases, open access publications, research metrics (citations, h-index, Impact Factor, etc.) and plagiarism tools will be introduced in this course.

### **Pedagogy:**

- Class room teaching, guest lectures, group discussions, and practical sessions.

Evaluation

- Continuous assessment will be done through tutorials, assignments, quizzes, and group discussions. Weightage will be given for active participation. Final written examination will be conducted at the end of the course.

## Course structure

- The course comprises of six modules listed in table below. Each module has 4-5 units.

Modules	Unit title	Teaching hours
Theo		
RPE 01	Philosophy and Ethics	4
RPE 02	Scientific Conduct	4
RPE 03	Publication Ethics	7
Practice		
RPE 04	Open Access Publishing	4
RPE 05	Publication Misconduct	4
RPE 06	Databases and Research Metrics	7
	Total	30

## Syllabus in detail

### THEORY

- RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)
  1. Introduction to philosophy: definition, nature and scope, concept, branches
  2. Ethics: definition, moral philosophy, nature of moral judgements and reactions
- RPE 02: SCIENTIFIC CONDUCT (4 hrs.)
  1. Ethics with respect to science and research
  2. Intellectual honesty and research integrity
  3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
  4. Redundant publications: duplicate and overlapping publications, salami slicing
  5. Selective reporting and misrepresentation of data
- RPE 03: PUBLICATION ETHICS (7 hrs.)
  1. Publication ethics: definition, introduction and importance
  2. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
  3. Conflicts of interest
  4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
  5. Violation of publication ethics, authorship and contributorship
  6. Identification of publication misconduct, complaints and appeals
  7. Predatory publishers and journals

## PRACTICE

- R.PE 04: OPEN ACCESS PUBLISHING(4 hrs.)

1. Open access publications and initiatives
2. SHERPA/RohvEEO online resource to check publisher copyright & self-archiving policies
3. Software tool to identify predatory publications developed by SPPU
4. Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

- RPE 05: PUBLICATION MISCONDUCT (4hrs.)

- A. Group Discussions (2 hrs.)

1. Subject specific ethical issues, FFP, authorship
2. Conflicts of interest
3. Complaints and appeals: examples and fraud from India and abroad

- B. Software tools (2 hrs.)

Use of plagiarism software like Turnitin, Urkund and other open source software tools

- RPE 06: DATABASES AND RESEARCH METRICS ('hrs.)

- A. Databases (4 hrs.)

1. Indexing databases
2. Citation databases: Web of Science, Scopus, etc.

- B. Research Metrics (3 hrs.)

1. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score
2. Metrics: h-index, g index, i10 index, altnetrics

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**Course structure of M.Phil Economics Effective from 2017-18**  
*Total Number of Credits for the Programme – 30 Credits*

Code	Paper	Title of the Paper	Marks		Hours	Credits
			CIA	Sem		
<b>Part – I</b>						
	1	Modern Economics Theory for Research	40	60	6	6
	2	Research Methodology and Statistical Techniques	40	60	6	6
	3	Research Specific Paper	40	60	6	6
<b>Part – II</b>						
	1	Dissertation	Dissertation	Viva - Voce	12	12
			80	20		
		<b>Total</b>			<b>30</b>	30

**Objective**

- To enable the researchers to introduce some research topics on economic theory.
- To understand the various growth theories and models.
- To know the economic concepts in feminism.
- To learn different theories on moral hazard and environment.

***Unit - I: Neoclassical theory***

Fundamental Assumption of neoclassical theory – Policy implications of neoclassical theory – the “fundamental theorems” of welfare economics – applications of neoclassical economics to environment, health and gender issues.

***Unit - II: Development and growth theory***

Growth accounting – total factor productivity and economic growth – externalities and growth – Lucas model “new growth theory” – Romer model. – Inter-temporal choices – (Ramsey theorem). – Theories on livelihood strategies – Trickle up Vs tickle down.

***Unit - III: Feminist economic theory***

The methodological assumptions of feminist economics – “Conjunctive economics” and gender – Androcentric bias in neoclassical assumptions – Conceptualizing women’s well-being – sen’s capability paradigm; nussbaum’s “basic capabilities” approach.

***Unit - IV: New institutional economics***

The Coase theorem asymmetric information – adverse selection, Moral hazard – contract theory.

***Unit - V: Economic theory of globalization***

Marxian theory – dependency theory and regulation theory of development – product life cycle theory – globalization of production multinational corporations – Dunning’s Eclectic paradigm “Porter Hypothesis” on environmental regulation and competitiveness.

**Text Book**

1. Todd Sandler, Economic concepts for the social sciences, Cambridge University Press, Cambridge. 2001

**References**

1. Sen, Amartya, Resources, Value and Development, Oxford University Press, New Delhi, 2004. (Unit - I)
2. Friedman, Lee, Micro Economic Policy Analysis. New Yark: McGraw Hill,1985. (For Unit II)
3. Helpman, Elhaman, The Mystery of Economic Growth. Cambridge, Massachussets: Harvard University press, 2005. (For Unit II)
4. Nussbaum, Martha, Women and Human Development: The Capabilities Approach, Keeli for Women, New Delhi, 2000. (Unit - III)
5. Neelakandan. S, New Institutional Economics and Agrarian Change: A Premier, IEA Trust for Research, New Delhi, 1992. (Unit - IV)
6. Cooter, Robert and Thomas ulen, Law and Economics. New Delhi: Pearson Education, 2004. (For Unit V)

7. Gridge, Nigel, International trade. London and New York: Routledge, 2003. (For Unit V)
8. Gray, Peter, Global Economic Involvement. New Delhi: vivid. 2000 (For Unit V)

**Course Outcomes (Cos):**

Upon Completion of this course, the Students will be able

No.	Course Outcomes	K-Levels
CO1	To illustrate and analyse the theories of consumer behavior	K1, K2, K4
CO2	To illustrate and identify the choice under uncertainty.	K2, K3
CO3	To compare how price and output is determined in different market situations and evaluate the market structures	K2, K4, K5
CO4	To identify and examine the alternative theories of firms.	K3, K4
CO5	To define, explain, and compare the theory of distribution.	K1, K2, K4

K<sub>1</sub> – Knowledge, K<sub>2</sub> - Understand, K<sub>3</sub> – Apply, K<sub>4</sub> – Analyse, K<sub>5</sub> – Evaluate, K<sub>6</sub> – Create.

**CO-PO Mapping (Course Articulation Matrix)**

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weighted percentage of Course Contribution to Pos</b>	3.0	3.0	3.0	3.0	3.0

**Level of Correlation between PSO's and CO's**

(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)

Assign the value

**1 – Low**

**2 – Medium**

**3 – High**

**0 – No Correlation**

**Course Objectives**

1. To describe the ethical issues in social science research and the present position of economic research.
2. To understand data collection methods and different types of research design.
3. To discuss about qualities of a good research report.
4. To Develop and equip quality research culture among students.

**Unit - I: Introduction**

Philosophy of economics: Induction and deduction in economics – Karl Popper’s Falsification criterion – covering law model – The Methodology of scientific Research Programmes (Lakatos) – Kuhn’s concept of paradigms and paradigm shifts. Stages in the research process – scientific methods of research – Formulation of a research problem.. Formulation and verification of Hypotheses – Function, Criteria sources of hypotheses theory and scientific law. Types of research – survey research – Longitudinal research – Experimental research – survey research – case study research – participatory rural appraisal and Evaluation research.

**Unit - II: Field Research and Sampling Design**

Primary data – Questionnaire – types and Criteria – Schedules as aids in social exploration – Interview Method – Postal Enquiry. Secondary data – Types and Sources – Advantages and disadvantages – evaluation of secondary data – probability sampling – simple, stratified, Systematic and Cluster (area) Random sampling. Non-probability sampling – accidental, Convenience and purposive – Quota sampling and snowball sampling – choices of sample size.

**Unit - III: Research Design**

Types and components of research design – Review of the literature – Research Diaries. Writing research Proposal – Mechanics of thesis Writing – The Purpose statement – Research Questions – Use of theory.

**Unit - IV: Analysis of Data**

Quantifying data – coding – classification and tabulation – descriptive statistical Measures – Averages, Dispersion, Correlation and Regression – Analysis of times series – Association of attributes (simple problems) Analyzing Quantative data – Scaling Techniques – Univariate Inferences – point and interval estimation. Large Sample z – test (simple problems) small sample tests – t, F and  $\chi^2$  – Assumptions, Properties & Uses (simple problems). Factor analysis – path analysis – Multiple regression – Discriminate Function Analysis – application

**Unit - V: Report Writing**

Introduction- Types of report: Decision oriented, survey based, algorithmic- Guidelines for reviewing draft- Report format: cover page, introductory page, text, Bibliography, Appendices- Typing instructions-Oral presentations

**Text Book**

1. Kothari C.R., Research Methodology: Methods and techniques, New Age International Publishers, New Delhi, 2005.

**References**

1. Babbie & Earl.R, The Practice of Social Research, Wordsworth publishing company, California 1995.
2. Laljain & Gopal, Research Methodology: Methods Tools and Techniques, Mangal Deep Publications, Jaipur, 1998.
3. Gupta & Santosh., Research Methodology and Statical techniques., Deep and Deep publications, New Delhi, 2003.
4. Kate L. & Turabian, A Manual for Writers of Term papers, Theses and Dissertations, The University of Chicago press, Chicago, 2002.
5. R.Panneerselvam : PHI Learning Private Ltd. Delhi ,2004. ISBN -978-81-203-2452-7.

### Course Outcomes (Cos):

Upon Completion of this course, the students will be able

No.	Course Outcomes	K-Levels
CO1	To understand what are all the basic concepts in Research and explain means of data collection.	K1, K2
CO2	To explain and distinguish various sources of primary and secondary data and to apply it in data collection.	K2, K3, K4
CO3	To demonstrate, construct, and explain the functions of presenting data in different methods.	K2, K4, K5, K6
CO4	To develop the statistical inference and to explain the errors that can happen during data analysis.	K3, K4, K5, K6
CO5	To illustrate, identify, evaluate and create new models and evaluate the data	K2, K3, K4, K5, K6

K1 – Knowledge, K2 - Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, K6 – Create.

### CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	3	2	3
CO2	2	3	2	3	3
CO3	2	3	3	3	3
CO4	3	3	3	2	2
CO5	3	3	3	3	3
Weightage	12	15	14	13	14
Weighted percentage of Course Contribution to Pos	2.4	3	2.8	2.6	2.8

### Level of Correlation between PSO's and CO's

(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)

Assign the value

**1 – Low**

**2 – Medium**

**3 – High**

**0 – No Correlation**



**PG & Research Department of Commerce**

**Course structure of M.Phil. Commerce Effective from 2017-18**

*Total Number of Credits for the Programme – 30 Credits*

Code	Paper	Title of the Paper	Marks		Hours	Credits
			CIA	Sem		
<b>Part – I</b>						
	1	Research Methodology	40	60	6	6
	2	General Skills on Teaching and Learning	40	60	6	6
	3	Research Specific Paper	40	60	6	6
<b>Part – II</b>						
	1	Dissertation	Dissertation	Viva - Voce	12	12
			80	20		
		<b>Total</b>			30	30

### Paper - I: Research Methodology

<b>Course Code</b>		<b>Credit</b>	<b>6</b>
<b>Instruction Hours per Week</b>	<b>6</b>	<b>Marks</b>	<b>100 (25 + 75)</b>
<b>Course Objective</b>	<ul style="list-style-type: none"><li>• To introduce to the student the basic concept of Research Methodology.</li><li>• To highlight the need for Research in the Social Science.</li><li>• To equip the student with tools for doing Research.</li></ul>		

#### **Unit-I: Introduction and planning of Research**

Meaning, Purpose, Types of Research, Methods of research- Survey method, Case study- Planning Process- Selection of the problem for research- Formulation of selected problem- Hypothesis- Research design.

#### **Unit-II: Methods of Data collection and Tools for data collection**

Sources of data- Primary and Secondary- Methods of collecting Primary data- Survey method, personal interview, Telephone interview, Mail survey, Observation and questionnaire- Scaling technique- Nature- Ratio Scales- Ranking Scales- Scale construction- Pilot Study and Pre-test.

#### **Unit-III: Sampling Technique**

Probability and Non-Probability Sampling technique- Sampling design- Sample size- Sampling and Non- Sampling Errors.

#### **Unit-IV: Processing of Data**

Editing, Coding, Tabulation, Interpretation and Research Report writing. Types of Reports- Styles of reporting- Steps in drafting reports- Contents of research report- SPSS Package.

#### **Unit-V: Statistical Tools**

Measure of Central Value- Measure of Dispersion- Correlation and Regression- Analysis of Time Series- Testing of Hypothesis (Z-test, T-Test, F-Test and  $X^2$  Test). Factor Analysis, Cluster Analysis.

#### **Text Book**

1. Kothari C.R., Research Methodology, Prentice Hall of India, New Delhi.

#### **Reference Books**

1. Amar Chand A, Research Methodology in Commerce, Himalaya Publishing House, 2000, Mumbai.
2. Sadhu A M & Singh A, Research Methodology in Social Science, S. Chand Publications, New Delhi
3. Gupta S.P, Business Statistics, Sultan. Chand & Co, New Delhi

**Note: Latest Edition of Text Books may be used.**

## Paper - II: General Skills on Teaching and Learning

<b>Course Code</b>		<b>Credit</b>	<b>6</b>
<b>Instruction Hours per Week</b>	<b>6</b>	<b>Marks</b>	<b>100 (25 + 75)</b>
<b>Course Objective</b>	<ul style="list-style-type: none"><li>• To enhance the employability of Student-Teachers by empowering them with soft Skills.</li><li>• To help them understand method of instructions, class room management and Professional Development.</li></ul>		

### Unit – I: Soft Skills

Communication skills – Oral – Written-Verbal – Non-verbal – Aids and blocks – Intrapersonal and Interpersonal Communication – Effective communication. Behavioral skills- Attitude – Time management – Leadership – Team Building.

### Unit – II: Modern Approach in Teaching

Lateral Thinking – Conventional teacher and Lateral teacher – Creativity and Innovation. Facing Interviews – Different types of Interviews – Dress Code – Do’s and Don’ts – Frequently asked questions – Preparing a Resume – Mock Interviews, Group Dynamics – Knowledge – Leadership Thinking – Listening – Mock GD’s.

### Unit – III: Elements of Technology of Teaching and Learning

Psychology – Meaning – Branches – Scope and Methods – Emerging areas of Educational Psychology – Kinds and Levels of Learning Different theories of Learning – Factors affecting Learning – Intrinsic and extrinsic of Motivation – Motivation – Memory and Forgetting – Approaches to Learning (Pavlov, Skinner) Creative Thinking – Theories of Intelligence.

### Unit – IV: Education Technology in Commerce Education

Computer Application in Commerce Education – Computer Assisted Instructions: Internet, Meaning, Uses and equipments of internet. Multimedia – Meaning, Scope, Components – Different types of AV materials and their uses – Development of an instructional system – use of media in classroom teaching – Development of ICT – ICT enabled teaching.

### Unit – V: Classroom Instructions and Management

Lecture Method – Descriptive method – Objective based method – Demonstration method – Lecture cum demonstration method – Problem method – Project method – Inductive method – Deductive method. Classroom management – factors influencing classroom management. Classroom interaction analysis – classroom climate – types of teachers based on leadership styles. Qualities required for a good teacher – Ethics of teacher – Social and Environmental responsibilities of the commerce teacher – Problems faced by the commerce teachers.

### Suggested Reference Books

1. Alex (2009), Success through Soft Skills, 1<sup>st</sup> Edition, S.Chand and Company Ltd. New Delhi.
2. Ravindran et al. (2007), Success through Soft Skills, Published by Institute for Communication and Technology, Trichy.
3. Mohanty J (1988) Indian Education in the Emerging Indian Society, Bangalore.
4. Singh, Y.K. (2009), Teaching of Commerce, New Delhi: APH Publishing Corporation.
5. Khan, M.S. (1982), Commerce Education, New Delhi: Sterling Publishers Private Ltd.

6. Sharma, R.N. (2008), Principles and Techniques of Education, New Delhi: Surjeet Publications.

**PG and Research Department of Mathematics**  
**Sacred Heart College (Autonomous), Tirupattur – 635 601**

**M.Phil. Mathematics (2017 – 19 Onwards)**

**COURSE STRUCTURE**

Semester	Course Title	Credits	Marks		
			Int	SE	Total
<b>I</b>	<b>Analysis and Differential Equations</b>	8	40	60	100
	<b>Algebra and Topology</b>	8	40	60	100
	<b>Research Specific Paper</b>	8	40	60	100
<b>II</b>	<b>Dissertation</b>	16	80		100
	<b>Viva – Voce Examination</b>		20		

The structure of the M. Phil Curriculum is as follows:

Course Type		Credits
<b>Paper - I</b>	<b>Analysis and Differential Equations</b>	<b>8</b>
<b>Paper - II</b>	<b>Algebra and Topology</b>	<b>8</b>
<b>Research Specific Paper</b>		<b>8</b>
<b>Dissertation</b>		<b>16</b>
<b>NPTEL Certificate Course – I /or any other</b>		<b>2*</b>
<b>NPTEL Certificate Course – II /or any other</b>		<b>2*</b>
<b>Total</b>		<b>40 + 4*</b>

\* Refers to additional credits

## SYLLABUS

### Paper I - Analysis and Differential Equations

**Semester: I**

**Code: MAR 110 Credits: 8**

**Objective:** To impart the Research Level Knowledge of the concept of the  $L^p$ - space and Banach algebra of  $L^1$ . To solve the system of differential equations and study the Stability Properties of Dynamical Systems.

#### **UNIT - I : Abstract Integration**

The Concept of Measurability – Simple Functions – Elementary Properties of Measures – Arithmetic in  $[0, \infty)$  – Integration of Positive Functions – Integration of Complex Functions – The Role played by Sets of Measure Zero.  $L^p$ -spaces Convex Functions and Inequalities – the  $L^p$ -spaces – Approximations by Continuous Functions.

**Text Book 1:** Chapter 1, pp. 5–32; Chapter 3, pp. 61–75.

#### **UNIT - II: Fourier Transforms**

Formal properties – The Inversion Theorem – the Plancherel Theorem – The Banach algebra of  $L^1$ .

**Text Book 1:** Chapter 9, pp. 178–195.

#### **UNIT - III: Holomorphic Fourier Transforms**

Introduction – Two Theorems of Paley and Wiener – Quasi Analytic Classes – the Denjoy-Carleman theorem.

**Text Book 1:** Chapter 19, pp 371–385.

#### **UNIT - IV : Linear Systems**

Uncoupled Linear Systems – Diagonalization – Exponentials of Operators – the Fundamental theorem of Linear Systems – Linear Systems in  $\mathbb{R}^2$  – Non homogeneous Linear Systems.

**Text Book 2:**Chapter 1, Sections 1.1 to 1.5 and 1.10

## UNIT – V: Non-linear systems

Local Theory: Some preliminary concepts and definitions – the Fundamental Existence Uniqueness Theorem – Dependence on Initial Condition and Parameters – the maximal interval of existence – the flow defined by a differential equation – Linearization - the Stable Manifold Theorem.

Global Theory: Dynamical systems and Global Existence Theorems.

**Text Book 2:** Chapter 2 & 3, Sections 2.1 to 2.7 & 3.1

### Content and Treatment as in:

#### Text Books:

1. **Walter Rudin**, Real & Complex Analysis, 3/e McGraw- Hill Book Company, New Delhi 1987.
2. **Lawrence Perko**, Differential Equations & Dynamical Systems, 3/e, Springer Verlag, New York Inc., 2001.

#### Books for Reference:

1. Richard R. Goldberg, *Methods of Real Analysis*, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi, 1970.
2. Robert G. Bartle and Donald R. Sherbert, *Introduction to Real Analysis*, 2-e, John Wiley and Sons, 2000.
3. Kathleen T. Alligood, Tim D. Sauer, James A. Yorke, *CHAOS, An Introduction to Dynamical Systems*, Springer-Verlag, New York, Inc, 1996.
4. Morris W. Hirsch, Stephen Smale, Robert L. Devaney, *Differential Equations, Dynamical Systems, And An Introduction To Chaos*, Academic Press, USA, 2004.

#### Learning Outcomes:

Upon completing the course, students are able to

- Produce rigorous proofs of results that arise in the context of  $L^p$  – spaces,  $L^p$ - space Convex functions and Inequalities, Approximations by Continuous Functions, Fourier Transforms and Holomorphic Fourier Transforms.
- Prove a selection of theorems concerning Denjoy-Carleman theorem, Paley and Wiener theorem, the Inversion Theorem, the Plancherel theorem.
- Solve System of Differential Equations of first order using Phase portraits and methods of Linear Algebra.
- Solve and apply stability properties of Non Linear Differential Equations.

## Paper II - Algebra and Topology

**Semester: I**

**Code: MAR111**

**Credits: 8**

**Objective:** To impart the nuances of the Research Level Knowledge of the concept of Rings and Ideals, Modules, Modules of Fractions, Primary decomposition, Noetherian and Artin Rings. To become familiar with Homotopy, Covering spaces, Geometry of Simplicial Complexes and Bary Centric Subdivisions.

### **Unit – I: Rings & Modules**

Rings and Ideals; Modules.

**Text Book – 1:** Chapters 1 and 2

### **Unit – II: Primary Decomposition**

Rings and Modules of Fractions; Primary decompositions.

**Text Book – 1:** Chapters 3 and 4

### **Unit – III: Noetherian & Artin Rings**

Chain Conditions; Noetherian Rings; Artin Rings.

**Text Book – 1:** Chapters 6, 7 and 8

### **Unit – IV: Fundamental Group & Covering spaces**

Homotopy – Fundamental Group – Covering spaces.

**Text Book – 2:** Chapter 3: Sections 3.1 to 3.3

### **Unit – V: Simplicial Complexes**

Geometry of Simplicial Complexes – Bary Centric Subdivisions – Simplicial Approximation Theorem.

**Text Book – 2:** Chapter 4: Sections 4.1 to 4.3.



## **Content and Treatment as in:**

### **Text Books:**

1. **M.F. Atiyah, FRS, and I.G. Macdonald**, *Introduction to Commutative Algebra*, University of Oxford, Addison – Wesley Publishing Company, Inc, 1969.
2. **I.M. Singer and J.A. Thorpe**, *Lecture Notes on Elementary Topology and Geometry*, Springer Verlag, New York, 1967.

### **Books for Reference:**

1. **D. M. Burton**, *A First Course in Rings and Ideals*, Addison-Wesley Publishing Company, London, 1970.
2. **James Dugundji**, *Topology*, Prentice Hall of India Pvt. Ltd. 1975.
3. **J.L. Kelly**, *General Topology*, Springer - Verlag, 1961.
4. **T.Y. Lam**, *Lectures on Modules and Rings*, Graduate Texts in Mathematics, Vol.189, Springer – Verlag, New York, 1999.
5. **N. H. McCoy**, *The Theory of Rings*, Chelsea Publishing Company, Bronx, New York, 1973.
6. **L.H. Rowen**, *Ring Theory*, Vol I, II, Academic Press, New York, 1988.

### **Learning Outcomes:**

Upon completing the course students are able to

- understand and illustrate the concepts of Rings and Modules, Primary Decomposition, Noetherian and Artin Rings.
- understand and illustrate the concepts of Algebraic Topology.

### **Paper III - Research Specific Paper**

Syllabus for ***Paper III - Research Specific Paper*** shall be framed by the supervisor, get a approval from the Head of the Department and provided to the candidates under his supervision. The Syllabus shall contain five units with specific books for study. ***Research Specific Paper*** Syllabus shall be sent to the Controller's Office through Head of the Department.

#### **EXAMINATION PATTERN**

There shall be two components for Paper I and Paper II namely CA and Semester Examination. Total marks for each paper I and II shall be as follows.

<b>CA</b>	<b>40 Marks</b>
<b>Semester Examination</b>	<b>60 Marks</b>

The Components of CA and the distribution of marks shall be as follows.

There shall be two tests which carries 20 (10 + 10) marks. If any student is absent for valid reason during the test, a repeat CA may be conducted in consultation with the Course Teachers.

The question paper shall contain two sections. Section A shall contain 4 **either or type** questions. Each question carries 5 marks. Section B shall contain four questions and the students are required to answer any three questions. Each question carries 10 marks. The duration of the examination shall be 2 hours.

There shall be two problem solving sessions which carry 10 marks. The third component of CA is seminar which carries 10 marks. Guide paper (Paper III) has no internal components.

#### **Question Paper Pattern for Papers I and II (Semester)**

The question paper shall have two sections with the maximum of 60 marks for three hours with the following break-up.

##### **Section-A** (Answer all Questions)

Section – A shall contain *five* “EITHER OR” type questions drawn from all the five units. (one “EITHER OR” type question from each unit).

Each question shall carry 6 marks. (5 x 6 = 30).

##### **Section-B** (Answer any Three questions)

Section – B shall contain *five* questions drawn one each from the 5 units. Three questions out of 5 are to be answered. Each question shall carry ten marks. (3 x 10 = 30).

## **RESEARCH SPECIFIC PAPER**

Time: Three Hours

Maximum Marks: 60

**Section – A ( $5 \times 6 = 30$  Marks)**

Answer ALL Questions

(Two questions from each unit with internal choice)

**Section – B ( $3 \times 10 = 30$  Marks)**

Answer any THREE questions

(One question from each unit)

The question paper pattern for *Paper III* shall be according to the choice of the Supervisor. The duration of the Examination shall be 3 hours. The question paper shall be prepared for 100 marks and the answer scripts shall be valued for 100 marks.

### **Regulations for M.Phil Dissertation**

- All the M.Phil., Research scholars shall present at least one Research paper in a conference/seminar or publication in a UGC Approved Journal before the submission of the Dissertation and produce evidence for the same in the form of presentation certificates and/or reprints/acceptance by the Journal.
- The dissertation carries 100 marks for which the dissertation shall be evaluated for 80 marks and the Viva Voce carries 20 marks.
- There shall be two valuations of the dissertation, one by the Supervisor and the other by the External Examiner. The average of the two valuations shall be the marks for the evaluation of the dissertation.
- The Thesis Monitoring committee (TMC) will conduct two reviews to monitor the progress of the M.Phil., Research scholar.
- The Thesis Monitoring committee (TMC) will include the Head of the Department with all the approved M.Phil., Research Supervisors of the Department.
- All the M.Phil., Dissertation has to be checked for Plagiarism using the Turnitin tool. The acceptable level of similarity would be 30% for the whole Thesis.
- The dissertation shall be submitted during the last week of July and viva shall be conducted in the month of August.

**Department of Physics**  
**M.Phil. Syllabus**

**Programme Structure**

Semester	Paper	Title of the Paper	Credits	Marks	
				CA	SEM
I	Core – 1	Scientific Research Methodology	6	40	60
	Core – 2	Advanced Material Science	6	40	60
	Research Specific Paper	1) Advances in Crystal growth and Characterization 2) Nanomaterials and Nanostructured Thin Films 3) Spectroscopy	6	40	60
II		Dissertation	12	20	80 (20+60)
<b>Total</b>			<b>30</b>		

**Evaluation Pattern**

**(1) For theory papers**

Component	Marks
CA	40
End semester exam	60
<b>Total</b>	<b>100</b>

**CA components**

Component	Marks
2 CA tests	20
Assignment/ Problem solving/ Quiz/ Open book test /Seminar	20
<b>Total</b>	<b>40</b>

**(2) For Dissertation**

Component	Marks
CA	20
Dissertation evaluation	60
Viva	20
<b>Total</b>	<b>100</b>

**CA components**

Component	Marks
Review 1	10
Review 2	10

Total	20
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- The CA marks for the dissertation shall be awarded by the guide by conducting two review seminars. Candidate shall submit the dissertation to the college in the last week of July. If a candidate is not able to submit his/her dissertation within the period stated above, he/she shall be given two extensions of 3 months each with penalty fees. If a candidate does not submit his/her dissertation even after the two extensions, his/her registration shall be treated as cancelled and he/she has to re-register for the course.
- The dissertation carries 100 marks, out of which 20 marks shall be for CA, 20 marks for viva voce and the dissertation shall be evaluated for 60 marks. There shall be two valuations of the dissertations, one by the supervisor and the other by an external examiner who shall be one of the three names suggested by the department. The average of the two valuations shall be the marks for the evaluation of the dissertation.
- The viva voce examination shall be conducted by the respective supervisor and one external member chosen from a panel of three members suggested by the Department. The average of the marks awarded by the two examiners shall be taken as the marks for the viva-voce.

### **Question Paper Pattern**

#### **(1) For Core Papers**

##### **Section A (5 x 2 = 10 Marks)**

Answer any Five out of Seven short answer type questions. Each question carries 2 marks. There should be at least one question from each unit.

##### **Section B (5 x 4 = 20 Marks)**

Five either or type questions. There should be one question from each unit. Each question carries 4 marks.

##### **Section C (3 x 10 = 30 Marks)**

Answer any Three out of Five essay type questions, one from each unit. Each question carries 10 Marks.

#### **(2) For Research specific paper**

The question paper pattern may be left to the discretion of the project guide.

### **Question Paper Pattern for CA** **Maximum marks : 50**

#### **Section A (4 x 2 = 8 Marks)**

Answer any Four out of Five short answer type questions. Each question carries 2 marks.

#### **Section B (3 x 6 = 18 Marks)**

Three either or type questions. Each question carries 6 marks.

#### **Section C (2 x 12 = 24 Marks)**

Answer any Two out of Three essay type questions. Each question carries 12 marks.

## **Core - I: Scientific Research Methodology**

### **Objectives**

- To inculcate a flair for scientific research with moral, ethical and social values.
- To provide an overview of scientific paper presentation in seminars and conferences and writing articles to journals.
- To expose the students to the foundations of various numerical and statistical methods and to introduce them to the basics of C programming.

### **Unit – I: Principles of Scientific Research**

Identification of the problem – Literature survey – Reference collection – Familiarity with ideas and concept of investigation – Internet browsing – Methodology – Qualitative and Quantitative analysis – Drawing inferences from data – Results and Conclusions.

Seminar – Power Point presentation – Poster presentation – Synopsis writing – Writing a Thesis – Art of writing a research paper – Art of writing a review paper – Writing a research report – Writing a research project proposals.

### **Unit – II: Computer Oriented Numerical Methods**

Solution of equations – Simple iterative Method – Newton–Raphson Method – Numerical integration–Simpson’s rule –Runge–Kutta Method–Solution of simultaneous equations – Gauss Elimination method – Gauss–Jordan elimination method – Eigen values and Eigen vectors by matrix diagonalisation (Jacobian Method) – Interpolation – Lagrange’s and Newton’s (Forward & Backward) interpolation.

### **Unit – III: Statistical Methods**

Least square curve fitting – Normal equations for curve fitting – Orthogonal polynomials – First order Chebychev polynomials – Errors – Mean, Standard deviation, moments, Variance –Skewness – Distribution models – propagation errors.

### **Unit – IV: Introduction to C Programming**

Introduction – Importance of C – Basic structure of ‘C’ programs – Character set – C Tokens – Keywords and Identifiers – Constants and variables – Data types and sizes – Declaration of variables: primary type declaration and User defined type declaration – Assigning values to variables – Defining symbolic constants – Operators: Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional, Bitwise, Special operators – Expressions – Evaluation of expressions – Types of conversion in expressions – Input/output operations – Control / decision making statements – Decision making with If statement: Simple If statement, If–else statement, Nested If–else statement, else–If ladder – Switch statement: Go To statement – Loops: While statement, Do statement, For statement – Jumps in Loops.

### **Unit – V: Arrays, Strings, Functions and Programming**

Arrays: One and two dimensional arrays – Strings – Declaring and initializing string variables – Reading and writing strings on the screen – String handling functions.

Functions – Library and User defined functions – Function declaration – Actual and formal arguments – Return values and their types – Calling functions – Categories of functions – Roots of a quadratic equation – Matrix addition and multiplication – Trapezoidal rule – Curve fitting –Gauss elimination for solving simultaneous equations.

### **Books for Study**

1. C. R. Kothari, Research Methodology Methods and Techniques, New Delhi, New Age publishers, 2004.
2. A. Singaravelu, Numerical Methods, Chennai, Meenakshi Agency, 2009.
3. E. Balaguruamy, Programming in ANSI C, New Delhi, Tata McGraw–Hill, 2005.
4. Sukhendu Dey, Debobrata Dutta, Complete knowledge in C, Narosa publishing, 2013.

### Books for Reference

1. V. Rajaraman, Computer oriented Numerical Methods, New Delhi, Prentice –Hall Pvt. Ltd., 2001.
2. Ranjitkumar, Research Methodology, New Delhi, Pearson Education, 2006.
3. K. Sankara Rao, Numerical methods for scientists and engineers, New Delhi, PHI learning Pvt. Ltd., 2011.
4. P. B. Patil, U. P. Verma, Numerical computational methods, New Delhi, Narosa Publishing house, 2006.
5. John F Monahan, Numerical methods of statistics, Noida, Cambridge University press, 2011.
6. P. R. Vittal, Mathematical statistics, Chennai, Margham Publications, 2002.
7. P. S. V. Srinivas Rao, C Programming and Data structures, Chennai, Scitech Publications (India) Pvt. Ltd., 2006.
8. Ashok N. Kamthane, Programming with ANSI and Turbo C, New Delhi, Pearson Education Ltd, 2002.
9. John E Freund, Mathematical statistics, New Delhi, Prentice –Hall Pvt. Ltd., 1999.
10. Arumugam S, Thangapandi Isaac A, Somasundaram A, Numerical methods, Chennai, SCITECH publications Pvt. Ltd., 2002.

### Websites

1. [http://www.seasite.niu.edu/cs240/lecture\\_notes\\_toc.htm](http://www.seasite.niu.edu/cs240/lecture_notes_toc.htm)
2. <http://www.mini.pw.edu.pl/~marcinbo/strona/download/c.pdf>
3. <http://pages.cs.wisc.edu/~cs354-1/cs354/karen.notes/C.basics.html>
4. <http://www.damtp.cam.ac.uk/lab/people/sd/lectures/nummeth98/roots.htm>
5. <http://www.cs.auckland.ac.nz/compsci705s1c/lectures/literature-review.pdf>
6. <http://www.cs.swan.ac.uk/~csetzer/lectures/researchmethodology/11/masterlecture1ForPrinting.pdf>
7. <http://www.math.ubc.ca/~anstee/math184/184newtonmethod.pdf>
8. <http://www.youtube.com/watch?v=cZJKXVKI2X4>
9. <http://classes.mst.edu/ide120/lessons/springs/spreadsheets/squares/index.html>
10. <https://notesolution.com/#notes/1101>
11. <http://www.writing.utoronto.ca/advice/specific-types-of-writing/literature-review>
12. <http://www.phys.unsw.edu.au/~jw/thesis.html>
13. [http://www.ldeo.columbia.edu/~martins/sen\\_sem/thesis\\_org.html](http://www.ldeo.columbia.edu/~martins/sen_sem/thesis_org.html)
14. [http://dwb4.unl.edu/Chem/CHEM869Y/CHEM869YMats/Least\\_Squares.html](http://dwb4.unl.edu/Chem/CHEM869Y/CHEM869YMats/Least_Squares.html)
15. [http://en.wikipedia.org/wiki/Runge%E2%80%93Kutta\\_methods](http://en.wikipedia.org/wiki/Runge%E2%80%93Kutta_methods)
16. [http://www.math.iit.edu/~fass/478578\\_Chapter\\_3.pdf](http://www.math.iit.edu/~fass/478578_Chapter_3.pdf)
17. [http://wiki.answers.com/Q/What\\_is\\_a\\_basic\\_structure\\_of\\_a\\_c\\_program](http://wiki.answers.com/Q/What_is_a_basic_structure_of_a_c_program)
18. <http://www.scribd.com/doc/31376502/Basic-Structure-of-C-Program>
19. [http://en.wikipedia.org/wiki/Type\\_conversion](http://en.wikipedia.org/wiki/Type_conversion)
20. <http://dev.mysql.com/doc/refman/5.0/en/type-conversion.html>

## Core - II: Advanced Material Science

### Objectives

- To introduce the rapidly developing field of nanoscience and technology with special focus on the methods of synthesis, characterization techniques and applications of nanomaterials with interdisciplinary approach.
- To provide an understanding of the fundamental aspects of thin film deposition, the concepts of phase diagram and optical properties of materials.
- To introduce the students to the various characterization techniques.

### Unit– I: Introduction to Nanoscience and Technology

Nanoscience and technology: basics and difference, Size effects in smaller systems – Classification of nanomaterials, Top–Down Vs Bottom–Up Techniques – Principle and working of Sol–gel, Precipitation, hydrothermal, Reflux, Ball milling Techniques – Composite structure of nanomaterials – controlling the shape and size of nanomaterials – basic idea of Diamond like carbon (DLC) – Carbon nanotubes: Types and preparation by chemical method – Dilute magnetic semiconductors: Basic principle and preparation by chemical method – Bio–nanocapsules: drug delivery and gene delivery.

### Unit – II: Thin Films and Phase Diagrams

Thin films - Preparation of thin films: Physical methods – thermal evaporation – sputtering – reactive sputtering – RF sputtering – Pulsed laser deposition – Chemical methods: chemical vapour deposition – Electrochemical deposition – Spray pyrolysis deposition – LPE – VPE – MOCVD.

Phase diagrams: General Principles – solid solutions – the phase rule – phase diagram of single component systems – phase diagram of double component systems.

### Unit– III: X–Ray Diffraction Analysis and Thermal Analysis

X–Rays – X–ray diffraction (Bragg's law) – X–Ray powder diffraction – diffraction of X–Rays by crystalline powder – diffraction from amorphous materials – the powder diffractometer – Qualitative phase analysis and crystal structure determination – indexing the pattern – identification of the Bravais lattice – Calculation of the lattice parameter for cubic structures – Grain size / crystallite size of polycrystalline aggregates – Debye Scherer formula – wavelength dispersive X–Ray fluorescence analysis ( Basic principles) – Energy dispersive X–Ray fluorescence analysis (Basic principles).

Thermal Analysis: Principle and instrumentation of TGA- Interpretation of TGA curve – Principle and instrumentation of DTA- Interpretation of DTA curve – Principle and instrumentation of DSC- Interpretation of DSC curve.

### Unit – IV: Surface Analysis and SHG Studies

Electron Microscopy: Electron beams as waves – Lenses for electron beams – Electron diffraction (Fundamentals) – comparison with X–ray diffraction – resolution and focusing – electron beam – specimen interactions – elastic and inelastic scattering – backscattered electrons – signals from inelastic scattering – secondary electron emission – Scanning Electron Microscopy: basics SEM imaging – Specimen preparation – Transmission Electron Microscopy – Specimen preparation – Mechanism of image formation (the origin of contrast).



Wave propagation and momentum conservation – Second Harmonic generation – Phase Matching – Sum and Difference frequency generation – Parametric oscillations – Self focusing of light – Nonlinear optical phenomenon (qualitative) – Kurtz powder SHG method.

### **Unit – V: Spectroscopic Analysis**

IR spectroscopy: Fourier Transform spectroscopy – FTIR spectrometer – advantages of FT technique – applications of IR spectroscopy – IR spectra of aliphatic and aromatic compounds– Raman spectroscopy: basic principles – instrumentation – comparison of Raman and IR spectroscopy – Raman effect in crystalline material, organic chemistry, inorganic chemistry, physical chemistry, biology – Surface Enhanced Raman Spectroscopy (SERS) – Coherent Anti Stoke Raman Spectroscopy (CARS) – application of Vibrational spectroscopy in structure determination.

### **Books for Study**

1. K. K. Chattopadhyay, A. N. Banerjee, Introduction to Nanoscience and Technology, New Delhi, PHI learning Pvt. Ltd., 2009.
2. D. P. Woodruff, T. A. Delchar, Modern Techniques of Surface Science, Cambridge Solid State Science Series, 1994.
3. A. Goswami, Thin Film Fundamentals, New Delhi, New Age International (P) Ltd., 1996.
4. B. Viswanathan, Structure and properties of solid state materials, New Delhi, Narosa publishing House, 2006.

### **Books for Reference**

1. Masuo Hosokawa, Kiyoshi Nogi, Makio Naito, Toyokazu Yokoyama, Nanoparticle Technology Handbook, Linacre House, Jordan Hill, 2007.
2. D. Callister, Materials Science and Engineering An Introduction, Singapore, John Wiley & Sons (Asia) Pte. Ltd., 2007.
3. D. Kealey & P. J. Haines, Analytical Chemistry, Viva Books Private Ltd, New Delhi, 2002.
4. Clive Whiston, X-Ray Methods, New Delhi, Wiley India Pvt. Ltd., 2008.
5. H. Kaur, Spectroscopy, Meerut, Pragathi Prakashan Publication, 2012.
6. Valentin G. Dmitriev, Gagik G. Gurzadyan, David N. Nikogosyan, Handbook of Nonlinear Optical Crystals, 3<sup>rd</sup> Edition, Springer, 2010.
7. William F Smith, Javad Hashemi, Foundations of Materials Science and Engineering, New Delhi, Tata McGraw Hill, 2005.
8. Charles. P. Poole, Frank. J. Owens, Introduction to Nanotechnology, New Jersey, A John Wiley & Sons publications, 2003.
9. Joseph Goldstein, Scanning Electron Microscopy and X-ray microanalysis, London, Springer, 2003.
10. S. Shanmugam, Nanotechnology, Chennai, MJP Publishers, 2010.
11. Bernard Dennis Cullity, Stuart R Stock, Elements of x-ray diffraction, Prentice Hall, 2001.
12. C. N. Banwell. E. M. McCash, Fundamentals of Molecular Spectroscopy, 4<sup>th</sup> Edition, Twelfth Reprint, New Delhi, Tata McGraw-Hill Publication, 2002.
13. N. V. Joshi, Photoconductivity: Art, Science, and Technology, Marcel Dekker, 1990.

### **Websites**

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2. [http://www.plastemart.com/upload/Literature/Nanomaterials\\_nanotechnology\\_ppmain.asp](http://www.plastemart.com/upload/Literature/Nanomaterials_nanotechnology_ppmain.asp)

3. <http://lib.semi.ac.cn:8080/tsh/dzy/wsok/AIP-conference/809/CP809-326.pdf>
4. <http://www.azonano.com/article.aspx?ArticleID=1872>
5. <http://www.nanocyl.com/CNT-Expertise-Centre/Carbon-Nanotubes>
6. [http://serc.carleton.edu/research\\_education/geochemsheets/techniques/SEM.html](http://serc.carleton.edu/research_education/geochemsheets/techniques/SEM.html)
7. [http://en.wikipedia.org/wiki/Scanning\\_electron\\_microscope](http://en.wikipedia.org/wiki/Scanning_electron_microscope)
8. <http://www.purdue.edu/rem/rs/sem.htm>
9. [http://content.piacton.com/Uploads/Princeton/Documents/Library/UpdatedLibrary/Raman\\_Spectroscopy\\_Basics.pdf](http://content.piacton.com/Uploads/Princeton/Documents/Library/UpdatedLibrary/Raman_Spectroscopy_Basics.pdf)
10. [http://books.google.co.in/books?id=TE6Q8SQ7WAC&pg=PA41&source=gbs\\_toc\\_r&cad=4#v=onepage&q&f=false](http://books.google.co.in/books?id=TE6Q8SQ7WAC&pg=PA41&source=gbs_toc_r&cad=4#v=onepage&q&f=false)
11. <http://www.life.illinois.edu/govindjee/biochem494/Abs.html>

**SACRED HEART COLLEGE (AUTONOMOUS), TIRUPATTUR**

**Department of Chemistry  
M.Phil. Chemistry Syllabus**

<b>Part – I</b>						
<b>Code</b>	<b>Paper</b>	<b>Title of the Paper</b>	<b>Marks</b>		<b>Hours</b>	<b>Credits</b>
			<b>CIA</b>	<b>Sem</b>		
<b>Part - I</b>						
	1	Research Methodology	25	75	6	6
	2	Instrumental Methods of Analysis	25	75	6	6
	3	Research Specific Paper	25	75	6	6
<b>Part – II</b>						
	1	Dissertation	Dissertation	Viva - Voce	12	12
			80	20		
		<b>Total</b>			<b>30</b>	30

## Paper-I - Research Methodology

Course Code	Type	Total Hours	Lecture	Tutorial	Practical
CHR110	Theory	90	75	15	0
		Course Name		Max Marks	Credits
		RESEARCH METHODOLOGY		100	6

### Objectives:

- To assist students in planning and carrying out research projects.
- To impart the knowledge for the students in principles, procedures and techniques of implementing a research project.
- To study the interpretation of knowledge of e-sources in literature search
- **Course Outcomes**
- At the end of this course, the students will be able to

CO. No.	Course Outcome Statement	Cognitive Level
CO 1	Understanding the significance of the research and exhibiting the highest ethical standards.	<b>K1, K6</b>
CO 2	Apply a different approach to carry out a literature review	<b>K3</b>
CO 3	Identifying the specific problem through literature survey	<b>K4, K5</b>
CO 4	Integrating various level of hypothesis in analyzing and interpret the data obtained during the research work	<b>K4</b>
CO 5	Organizing and interpreting the data using various software and technical tools	<b>K2, K4</b>
CO 6	Compile the research findings using the art of technical writing and publishing the results in journals.	<b>K6</b>

### Unit - I: Survey of Literature

Primary sources – Journals, Papers, reviews, communications, notes, patents, Journals of different fields of Chemistry (Organic, Inorganic, Physical, Polymer, Pharmaceutical, Industrial and Analytical) Secondary Sources –Titles, importance of categorization and their importance, Abbreviations of names, Nomenclature of compounds and their usage.

Abstracts –Types (Chemical, Physical, Analytical), Survey of abstract indexes (substance index, author index, general technique index, collective and comprehensive indices), Beilstein compounds and tables of information. Chemical abstract search through loaded CDS. Aids of Computer devices in literature survey.

Selection of topic and facilities - Selection of specific topics of research laboratory and instrumental facilities –location of journals, e-mail address, specific articles of science citation cards and indices, summarisation of works already done and published in the chosen field.

## **Unit -II: Statistical Analysis of Data**

Various types of errors – precision and accuracy – significant figures, various statistical tests on the accuracy of results, positive and negative deviation from accurate results - the Gaussian distribution – the normal distribution of random errors, mean value, variance and standard deviation, reliability interval, deviations from the Gaussian law of error distribution, t-tests-comparison of the mean with the expected value, comparison of the results of two different methods, comparison of the precision of two methods by F-test, Gross errors and elimination of outlying results, graphical methods – Linear regression, regression line, standard deviation, correlation coefficient – Multiple Linear regression (one variable with two other variables)

## **Unit - III Good Practices in Chemical Laboratory**

Safe working procedure and protective environment, protective apparel, emergency procedure and first aid, laboratory ventilation, Safe storage and use of hazardous chemicals, procedure for working with substances that pose hazards, flammable or explosive hazards, procedures for working with gases at pressures above or below atmospheric – safe storage and disposal of waste chemicals , recovery , recycling and reuse of laboratory chemicals, procedure for laboratory disposal of explosives , identification , verification and segregation of laboratory waste , disposal of chemicals in the sanitary sewer system , in incineration and transportation of hazardous chemicals, Green Chemistry concepts.

## **Unit – IV - Electronics and Computer Packages**

Basic fundamentals of electronic circuits and their components used in circuits common instruments like spectrophotometers, typical circuits involving operational amplifiers for electrochemical instruments. Elementary aspects of digital electronics. Applications of some computer packages like MS-Excel, Origin, Chem draw, Sciplot, ISIS draw, Chems sketch.

## **Unit -V Thesis Writing**

Assignments and test papers, Thesis and dissertations, style and conventions in writing, selection of topic.

Rough drafting of the article – Title, Abstract, Introduction, Literature review problem and time limitation, Experimental methods, Results and discussions, Foot notes, Figures, Data presentations, Tables, Sign convention followed – Bibliography, Conclusions and recommendations.

The general format – page and chapter format – use of quotations – foot note – tables and figures. Results and discussions – applicability of the findings to common usage – referencing – abbreviations used etc.

## **References**

1. J. R. Dean, A. M. Jones, D. Holmes, R. Reed, J. Weyers and A Jones, *Practical Skills in Chemistry*, Pearson Education Ltd. [ Prentice Hall], 2002.
2. OSU safety Manual 1.01.
3. C. R. Kothari, *Research Methodology. Methods and Techniques*, New Age International, 2004.
4. A. K.Singh, *Tests, Measurements and Research Methods in Behavioural Sciences*,
5. Chawla Deepak, Sodhi Neena, *Research Methodology: Concepts and Cases*, 2<sup>nd</sup> Edition, Vikas Publishing House, 2016.

## Paper -II Instrumental Methods of Analysis

Course Code	Type	Total Hours	Lecture	Tutorial	Practical
CHR111	Theory	90	75	15	0
		<b>Course Name</b>		<b>Max Marks</b>	<b>Credits</b>
		<b>Instrumental Methods of Analysis</b>		100	6

### Objectives:

- To learn the recent developments in Nano chemistry.
- To Learn the Principle and applications of Spectroscopic Techniques.
- To understand the principle and applications of Electroanalytical techniques.

### Course Outcomes

At the end of the course, the students will be able to:

S. NO	Course Outcomes Statement	Cognitive level
CO1	Understanding the principles and importance of the various spectroscopic techniques.	K1 & K2
CO2	Interpret the morphology of Nano materials using various characterization techniques of SEM and TEM.	K2, K3 & K4
CO3	Illustrate the principle involved in NMR, ESR and EPR Spectroscopy and distinguish chemical species using these spectroscopy	K1 & K3
CO4	Apply various spectroscopy techniques (XRD, XPS & PES) to analyse the composition of chemical compounds	K2 & K4
CO5	Apply various elemental analysis techniques (GC - MS, LC - MS & ICP) to analyse the elements present in chemical compounds	K3, K4 & K6
CO6	Explain and evaluate the theory and principle of electro analytical techniques, various factors involved in analysis and its applications.	K5

### Unit - I: Characterisation of Nanomaterial

Electron Microscopy, Transmission electron microscope (TEM), general design, resolution, electron source, TEM grids, electron lenses, electron – sample interactions-Scanning transmission electron microscope (STEM) Scanning probe microscopy - Atomic and molecular force microscopes (AFM and MFM), Scanning tunneling Microscope (STM); Scanning near-field and far-field optical microscope (SNOM and SFOM) - Fluorescence microscopy, single-molecule fluorescence imaging, single molecule FRET (Fluorescence energy transfer) techniques, Confocal microscopy.

### Unit - II: Spectroscopy - I

<sup>1</sup>H NMR: Long-range coupling – Homotopic, enantiotopic and diastereotopic systems - Conformationally mobile, open-chain systems, Virtual coupling – Coupling of proton to

fluorine, phosphorus - Nuclear Overhauser effect.  $^{13}\text{C}$  NMR: Off resonance decoupling – Coupling of carbon to deuterium, fluorine, phosphorus – DEPT – Application of proton 5 and carbon data in identifying small organic compounds. 2D NMR: Principles of 2D NMR spectroscopy -  $^1\text{H}$ - $^1\text{H}$  COSY,  $^1\text{H}$ - $^{13}\text{C}$  COSY, HMBC and HSQC.

Basic concepts of ESR spectroscopy – g tensor- Factors affecting the magnitude of g and A tensors in metal complexes – Anisotropy in g and A values -Zero-field splitting and Kramers degeneracy - Applications of EPR to some simple systems like methyl radical, p-benzoquinone and naphthalene anion, Cu(II), Fe(II), Mn(II) and Ni(II) complexes – Spin-trapping.

Basic principles of ENDOR spectroscopy and its applications in inorganic chemistry

### **Unit - III: Spectroscopy - II**

Atomic absorption Spectroscopy –Theory, Forbidden transitions and Selections, space quantisation, Zeeman effect, the Paschen-Back effect, the Stark effect, spectral line width, the Back-Goudsmith effect, applications.

Electronic and Photoelectron Spectroscopy – Excitation and ejection of electrons, electronic energy levels, core n level PES, Symmetry of molecular orbitals, valence levels PES, Applications - transition metal complexes. X-ray Spectroscopy – Principles, instrumentation, X-rays fluorescence, absorption and diffraction methods. The electron microscope – non-dispersive X-ray absorption. X-rays diffraction methods – Polymerization characteristics, Particle size determination.

### **Unit - IV: Spectroscopy - III**

Basic Instrumentation - Resolution, EI, CI and APCI methods - base peak, isotopic peaks, metastable peak, parent peak - determination of molecular formula Techniques in Instrumentation - Soft Ionization Methods - Fast Atom-Ion Bombardment-Electron spray Ionization - Matrix-Assisted Laser Desorption/Ionization - Mass Analyzers – Detectors- Hyphenated techniques, GC-MS, LC-MS and tandem Mass spectrometry- Applications to Biomolecules - Molecular weight Determination - Protein Identification - Protein-Peptide Sequencing - Nuclei Acid Applications.

### **Unit - V: Electroanalytical Techniques**

Potentiometric sensors- criteria for choosing these sensors, selective electrodes- primary ion-selective electrodes encompassing crystalline and non-crystalline electrodes- membrane ion-selective electrodes including gas-sensing and enzyme substrate electrodes- all solid state ion-selective electrodes – Voltammetric sensors, chronoamperometry- potential sweep techniques (cyclic voltammetry including study of reaction mechanisms)- step and pulse techniques- Normal pulse and differential pulse voltammetry- square wave voltammetry- AC techniques- stripping voltammetry (anodic and cathodic)- stripping analysis.

### **Reference Books:**

1. Acc. Chem. Res. July 2005
2. Bengt Nolfing, „Methods in Modern Biophysics“, Springer, 2004.
3. T. Pradeep, Nano: The Essentials, Mc Graw-Hill Edn, New Delhi, 2007.
4. P.M. Silverstein, F.X. Wester, Spectroscopic Identification of Organic Compounds, 6th Ed., Wiley 1998.
5. J. Mohan, Organic Spectroscopy Principles and Applications, CRC; 2nd Ed., 2004.
6. W. Kemp, Organic Spectroscopy, 3rd Ed., MacMillon, 1994.
7. D.L. Pavia, G.M. Lampman and G.S. Kriz, Introduction to Spectroscopy, Brooks Cole, 3rd Ed., 2000.

8. H. Gunther, NMR spectroscopy, basic principles, concepts and application in chemistry, John Wiley & Sons, 2nd Ed., 1995.
9. R. S. Drago, Physical Methods in Chemistry, Saunders, 1977.
10. J. A. Weil, J. R. Bolton and J. E. Wertz, Electron Paramagnetic Resonance: Elementary Theory and Practical Applications, John Wiley and sons, 1994.
11. Christopher M.A Brett and Ana Maria Oliveira Brett, "Electroanalysis" Oxford University Press, Oxford, 1998.
12. Daniel C. Harris, "Quantitative Chemical Analysis", Third Edn., W.H. Freeman and Company New York, 1996.
13. A.J. Bard L.F. Faulkner, Electrochemical methods – Fundamentals and Applications, Second Edn., Wiley-VCH, 1998.
14. Journal of Chemical Education, "State of Art Symposium:Electrochemistry" Vol.60, issue No.4, 1983.
15. J. Janata, "Principles of Chemical Sensor", Plenum Press, New York, 1989.
16. Joseph Wang, "Analytical Electrochemistry", Second Edn., Wiley-VCH, 2001

### Scheme of Valuation

#### Part-I: For Theory Papers

Component	Marks
CA	25
End Semester	75
Total	100

#### For Theory Papers, the CA component

Component	Marks
Two CA	15
Assignment	05
Seminar	05
Total	25



**Question Paper Pattern:**

**Part-I**

**Paper I and II**

**Section - A ( $5 \times 5 = 25$  Marks)**

Five either/or type questions. There should be one question from each unit.

**Section - B ( $5 \times 10 = 50$  Marks)**

Five questions out of eight questions.

**For Paper III**

It is an internal paper, related to the topic of the project work. The Syllabus and question paper pattern may be left to the discretion of the project supervisor.

**Part-II**

**Dissertation**

<b>Component</b>	<b>Marks</b>
Dissertation Evaluation	80
Viva	20
Total	100

There shall be two valuation of the dissertation one by the supervisor and the other by the external examiner. The average mark of the two valuations will be taken.

## Master of Philosophy in Computer Science

### Regulations and Syllabus

(With effect from the Academic Year 2013 onwards)

#### 1. Aim of the Programme

Research Students of M.Phil programme are expected to acquire a broad knowledge in all areas of computer science, and an overall perspective of the field, its structure, and its problems. They are expected to study at least one sub field in considerable depth and to make substantial contributions to that sub field through creative research and serious scholarship.

Students should be able to advance the basic understanding of information processes and to contribute to the creation and consolidation of knowledge in computer science. In addition, they should be able to see and understand new problems between different areas within computer science and other fields, to find imaginative solutions for them and to carry them through.

#### 2. Eligibility of Admission

Candidate with Master's Degree in Computer Science/ Computer Applications / Information Technology with not less than 55% of marks. All candidates should have passed two year P.G. degree programme after three year degree programme and Higher Secondary of 12 years duration (12+3+2).

#### 3. Duration of the Programme (Minimum – 1 Year, Maximum – 2 Years)

The duration of the programme is one academic year consisting of two semesters (August to July). In order to be eligible for the award of the degree, the candidate should successfully complete the programme within two years considered from the date of enrollment in the first semester of the course.

#### 4. Programme Structure

S.No	Part	Code	Subject Title	Hrs	Credits
1	III		Research Methods in Computer Science	6	6
2	III		Frontier Research Areas in Computer Science	6	6
3	III		Ontological Engineering	6	6
			Semantic Web		
			Distrobuted Database System		
4	III		Dissertation	12	12
			<b>Total</b>	<b>30</b>	<b>30</b>

## 5. Detailed Syllabi

[Semester - I]

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### Research Methods in Computer Science

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#### Objective

- This course covers different approaches to conduct computer science research like feasibility study, case study, comparative study, literature survey. Understand the peer reviewing process inherent in academic research, including the implications it has for their own research

#### Unit – I: Overview of Research Methodology

Types Of Research, Research Process, Data Collection –Primary Data – Secondary Data. THESIS WRITING: Thesis at tertiary level– writing, planning the thesis-the General format, footnotes, tables & figures, reference & appendix – Research in Computer Science.

#### Unit – II: Sampling Methods and Distributions

Sampling Methods, Sampling Distribution of Variance, Proportion, Confidence Interval estimation, Determination of sample size. Statistical Hypothesis Simple and Composite- Test of statistical Hypothesis, Null Hypothesis, Alternate Hypothesis, Critical region, Two types of errors, Level of Significance, Power of the Test, Steps in Solving Testing of Hypothesis Problem. Chi Square Test, Goodness Of Fit Test, NON-PARAMETRIC TESTS: One Sample Tests, Two Sample Tests, K-Sample tests

#### Unit – III: Advanced Multivariate Analysis

Discriminate analysis, Factor analysis- Methods of factor Analysis-Centroid Method, Principal Components Method, Principal Component Method (Alternate Method), Varimax Method of factor rotation, Cluster Analysis-Concept of Clustering, Similarity Measures, Clustering Techniques, Hierarchical Clustering Algorithm and Rank Order Clustering Algorithm (ROC) for Groupings Based on Attributes – K-means Clustering

#### Unit – IV: Operation Research Models

Introduction to Linear Programming – Two-Variable LP Model, Graphical LP Solution - Minimal Spanning Tree Algorithm, Shortest-Route Problem, Maximal Flow - CPM and PERT Transportation Models- Determination of the starting solution, Iterative Computations of the Transportation Algorithm. The Assignment Model- The Hungarian Method.

#### Unit – V: Algorithm Research

Algorithmic Research Problems- Types of Solution Procedure – Steps of Development of Algorithms –Steps Of Algorithm Research – Design of Experiments and Comparison of Algorithm – Meta Heuristic for Combinatorial Problems.

## **Text**

1. Thesis & Assignment writing – By Anderson, Berny H. Dujrston H. Poole, Wiley Eastern Ltd., New Delhi, 1970
2. Research Methodology – R. Panneerselvam. PHI, New Delhi, 2005.
3. Fundamental of Mathematical Statistics – S.C. Gupta, V.K. Kapoor Sultan Chand & Sons
4. Operations Research an Introduction – Hamdy A. Taha Seventh Edition Prentice-Hall India

## **Web References**

<http://www.scribd.com/doc/14707204/Research-in-Organizations-Foundations-and-Methods-in-Inquiry>

<http://ece.uprm.edu/~nayda/Courses/grad/Orientation.ppt>

<http://www.scribd.com/doc/75622343/Research-Methods-Overview>

<http://www.cpe.ku.ac.th/~aphirak/myweb/wp/wp-content/uploads/2009/09/AllLectures.pdf>

<http://www.mrtc.mdh.se/publications/0446.pdf>

## **[Semester - I]**

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### **Frontier Research Areas in Computer Science**

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#### **Objective**

- The objective of this course is to know all the introduction of the research areas. This will help the students to do their project work

#### **Unit – I: Cloud Computing**

Cloud Computing – History – Cloud Architecture – Storage – Advantages – Disadvantages – Companies in Cloud – Web-Based Application – Development – Types – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering and Development – Amazon Ec2 – Google App Engine – IBM Clouds - Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation.

#### **Unit – II: Grid Computing**

Grid Computing: Applications & Benefits - Types, Topologies, Components, and Layers - Comparison - Standards. Benefits and Status of Technology: Motivations - History - Technology - Suppliers and Vendors - Economic Value – Challenges. Components of Grid

Computing Systems and Architectures: Basic Constituent Elements - Physical View - Service View.

### **Unit – III: Knowledge Management**

Today's Web – Semantic Web – Technologies – Layered Approach. Ontological Engineering – Manual Construction – Reusing existing Ontologies – Semiautomatic Ontology acquisition  
0 Ontology Mapping – On-To-Knowledge Semantic web architecture.

### **Unit – IV: Parallel Computing**

Introduction to Parallel Computing – Parallel Programming Platforms – Principles of Parallel Algorithm Design – Basic Communications Operations – Analytical Modeling of Parallel Programs – Hadoop.

### **Unit – V: Security**

Database Security: Introduction to Database – Security Requirements – Reliability and Integrity – Sensitive Data – Inference – Multilevel Databases – Proposal for Multilevel Security. Security in Networks: Network concepts – Threats in Networks – Network Security Controls – Firewalls – Intrusion Detection System – Secure E-mail.

### **Text**

1. Michael Miller, “Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online”, Que Publishing, August 2008.
2. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.
3. Daniel Minoli, “A Networking Approach to Grid Computing” , Wiley Publication.
4. Grigoris Antoniou, Frank van Harmelen, “A Semantic Web Primer”, The MIT Press, 2004
5. Ananth Crama, Anshul Gupta, George Karypis and Vipul kumar, “ Introduction to Parallel Computing”, Pearson education, New Delhi, January 2003.
6. Tom White, “Hadoop – The Definitive Guide”, OReilly Media, Inc., 2009.
7. Charles P. Pfleeger, Shari Lawrence Pfleeger, “Security in Computing”, Third Edition, , PH PTR, 2002

### **Web References**

<http://peter23.net/ictwpbits/o1-2.pdf>

<http://www.scribd.com/doc/13178823/Cloud-Computing-What-the-Enterprise-Needs-to-Know-About-Cloud-Computing>

<http://www.scribd.com/doc/54138441/Advanced-Cloud-Computing-Report-What-To-Do-Now>

<http://www.scribd.com/doc/45661494/Cloud-Computing-Bible>

<http://www.scribd.com/doc/104416033/Cloud-Computing-Security>

<http://www.scribd.com/doc/104416019/Cloud-Computing-Technologies>

[\*http://www.engineering.ucsb.edu/~hpscicom/p1.pdf\*](http://www.engineering.ucsb.edu/~hpscicom/p1.pdf)

<http://www-users.cs.umn.edu/~karypis/parbook/>

**Objective**

- This course covers the set of activities that concern the ontology development process, the ontology life cycle, the methods and methodologies for building ontologies, and the tool suites and languages that support them.

**Unit – I: Theoretical Foundations of Ontologies**

From ontology towards ontological engineering – Definition of ontology – Main components of an ontology – Modeling heavyweight ontologies using frames and first order logic, Description logics, software engineering techniques, Database technology – Types of ontologies – Categorization of ontologies – Ontological Commitments – Principles for the Design of ontologies

**Unit – II: The Most Outstanding Ontologies**

Knowledge representation ontologies –The Frame Ontology and the OKBC Ontology, RDF and RDF Schema, OIL, DAML+OIL , OWL Top-level ontologies – Top-level ontologies of universal and particulars – Sow’s top-level ontology – Cyc’s upper ontology – The Standard Upper Ontology – Linguistic ontologies – WordNet – Euro WordNet – The Generalized Upper Model – The Mikrokosmos ontology – SENSUS – Domain Ontologies Languages for building ontologies – Ontology language evolution – Selection of an ontology language.

**Unit – III: Methodologies and Methods for Building Ontologies**

Ontology development process – Ontology methodology evolution – Ontology development methods and methodologies - Method for Re-engineering ontologies – Ontology learning methods – Ontology merging methods and methodologies – Methods for evaluating ontologies.

**Unit – IV: Languages for Building Ontologies**

Ontology Language Evolution – The selection of an ontology – Traditional ontology Languages - Ontolingua and KIF – LOOM – OKBC – OCML – Flogic – Ontology markup languages – SHOE – XOL – RDF (S) – OIL – DAML + OIL – OWL.

**Unit – V: Ontology Tools**

Ontology Tools Evolution – Ontology development tools and tool suites – Language-dependent ontology development tools – Extensible language-independent ontology development tools and tool suites – Ontology merge tools.

**Text**

Asuncion Gomez-Perez, Mariano Fernandez-Lopez and Oscar Corcho, “Ontological Engineering with examples from the area of knowledge Management, e-commerce and the Semantic Web”, Springer, London, Second printing,2006.

**Web References**

[http://en.wikipedia.org/wiki/Ontology\\_engineering](http://en.wikipedia.org/wiki/Ontology_engineering)

<http://mayor2.dia.fi.upm.es/oeg-upm/index.php/en/researchareas/2-ontologicalengineering>

<http://icc.mpei.ru/documents/00000823.pdf>

[Semester- I]

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## Semantic Web

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### Objective

- The main objective of this course is to apply Semantic Web techniques in building online end-user applications that integrate, combine and deduce information needed to assist users in performing tasks.

### Unit – I: Internet, Ontology and Knowledge Representation

The Syntactic Web - Semantic Web – How the semantic web will work – What the Semantic web is not – Side effects of the semantic web – Definition of ontology – Differences among Taxonomies, Thesauri and Ontologies – Classifying Ontologies – Web Ontology Description Languages – Ontologies, categories, and Intelligence - An informal Example – The family of Attribute Languages – Concept Description – Terminologies – Assertions - Inference Problems - Inference problems for Concept Descriptions – Inference problems for Assertions

### Unit – II: RDF (S) and OWL

– RDF and RDF Schema: XML Essentials – Elements and Attributes – URI and Namespaces – RDF – RDF Statements and Vocabularies – RDF Triples and Graphs – RDF/XML – RDF Schema – Classes – properties – Individuals – Requirements for OWL – Header, Versioning, and Annotation Properties – Datatype and Object properties – Property Characteristics – Classes – Class Description – Class Axioms – Individuals – Datatypes

### Unit – III: Rule Languages and Semantic Web Services

Usage Scenarios for Rule Languages – DataLog – RuleML – SWRL – TRIPLE – Web Service Essentials – Basic components of web services – web Service security standards – Web service standardization organization – Potential benefits and Criticisms – OWL-S Service Ontology – Service profile – service model – Service Grounding – OWL-S Sample – Scenario Description – Informal Process Definition – OWL-S process Definition

### Unit – IV: Technologies

Uschold and Kind ontology development method – Toronto Virtual Enterprise Method – Methontology – KACTUS – Lexicon- Based ontology – Simplified Methods – Ontology Development 101 – Horrocks Ontology Development Method – Metadata – Dublin Core – Warwick Framework – PICS – vCards – FOAF – Upper Ontology – SUMO – KR – CYC- WordNET – Dublin Core metadata editor – OilEd – OntoEdit – Protégé – Reasoners – Other tools.



## **Unit – V: Applications**

Software Agents – Agent forms – Agent Architecture – agent in Semantic web Context - Semantic Desktop – Semantic Desktop metadata, Ontologies, Architecture, Related Applications - Ontology applications in Art – Ontologies for the description of Works of Art – Metadata schemas for the description of works of art - Geospatial Semantic web - Basic Geospatial concepts – Classifying Geospatial Concepts – Gazetteers – Geospatial metadata – The OGC Catalogue specification – Geospatial web services – Examples of spatial data infrastructures – Examples of a metadata catalogue for earth Science data.

### **Text**

K.K. Breitman, M.A. Casanova and W. Truszkowski, “Semantic Web: Concepts, Technologies and Applications”, Springer-Verlag London Limited 2007

### **References**

1. Michael C. Daconta, Leo J. Obrst, Kevin T. Smith, “A Guide to the Future of XML, Web Services, and Knowledge Management”, Wiley Publication, 2003.
2. Toby Segaran, Colin Evans and Jamie Taylor, “Programming the Semantic Web”, O’Reilly Media .Inc, First Edition, 2009.

### **Web Reference**

<http://www.jiffysolutions.com/Process/semanticwebservice.htm>

[Semester- I]

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## Distributed Database Systems

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### Objective

- This course covers the autonomous processing elements that are interconnected by a computer network and that cooperate in performing their assigned tasks.

### Unit – I: Introduction

Distributed Data Processing – Promises of Distributed Database Systems – Complicating Factors – Problem Areas – Overview of Relational DBMS : Relational Database Concepts – Normalization – Integrity Rules – Relational DBMS – Overview of Computer Networks : Data Communication Concepts – Types of Networks – Wireless Networks – Internet.

### Unit – II: Distributed Dbms Architecture and Database Design

DBMS Standardization – Architectural Models – Distributed DBMS Architecture – Alternative Design Strategies – Distribution Design Issues – Fragmentation – Allocation.

### Unit – III: Query Processing, Decomposition and Optimization

Query Processing Problem – Objectives of Query Processing - Characterization of Query Processors – Layers of Query Processing – Query Decomposition – Localization of Distributed Data – Query Optimization – Centralized Query Optimization – Join Ordering in Fragment Queries – Distributed Query optimization Algorithms

### Unit – IV: Transaction, Concurrency Control and Reliability

Definition – Properties of Transaction – Types of Transactions – Serializability Theory – Taxonomy of Concurrency Control Mechanisms – Locking – Based Concurrency Control Algorithms – Timestamp – Based and Optimistic Concurrency Control Algorithms – Deadlock Management – relaxed concurrency control – Reliability concepts and measures – Failures and Fault Tolerance in Distributed Systems - Failures in Distributed DBMS – Local Reliability Protocols – Distributed Reliability Protocols – Dealing with Site Failures – Network Partitioning.

### Unit – V: Distributed Object Database Management Systems

Fundamental object Concepts and object Models – Object distribution design – Architectural Issues – Object Management – Distributed Object Storage – Object Query Processing – Transaction Management.

## **References**

1. Tamer ozsu, Patrick Valduriez, S.Sridhar, "Principles of Distributed Database Systems", Pearson Education Publications, New Delhi, 2006
2. Stefano Ceri, Giuseppe Pelgatti, "Distributed Database Principles & Systems", Mc-Graw Hill International Editions, New Delhi, 1985

## **Web References**

<http://www.scribd.com/doc/34905958/Distributed-Database-Systems>

<http://www.scribd.com/doc/69615793/Distributed-Database-Systems-Chap-9>

[http://www.cs.nyu.edu/research/techdocs/TR005\\_Carolyn\\_Mitchell.pdf](http://www.cs.nyu.edu/research/techdocs/TR005_Carolyn_Mitchell.pdf)

## **6. Evaluation and Certification**

### **6.1 Part I**

Each paper in part I shall have 75 marks for the End Semester Examination (SE) and 25 marks for Continuous Assessment (CA). There is no passing minimum for CA. The duration for each written examination shall be three hours. A candidate shall be declared to have passed if s (he) secures not less than 50% of the marks in the End semester Examination (CA) and the End Semester (SE) Examination taken together in each of the course.

### **6.2 Continuous Assessment (CA)**

The components for CA are as follows;

2 CA tests (December & March)	-	15 marks
Paper work	-	5 marks
Seminar / Review / Technical reports	-	5 marks

The pattern of the Question Paper for the courses in the part I for CA tests is as follows:

Time: 2Hrs

Max.Marks : 75

Part – A (3 x 9=27 Marks)

[THREE Questions – internal choice]

Part-B (3 x 16=48 Marks)

[Answer any THREE Questions – Out of FIVE questions THREE shall be answered]

### **6.3. End Semester Examinations (SE)**

The Pattern of the Question Paper for the courses in part I is as follows:

Time : 3 hrs Max.Marks : 75

Part – A (5 x 5= 25 marks)

(FIVE Questions-internal choice, one question from each unit]

Part – B (5 x 10= 50 marks)

[Answer any FIVE Questions-at least one question from each unit but not more than two questions from one unit. Out of Eight questions FIVE shall be answered]

#### **6.4. Passing Requirement and Grade Classification**

a) The candidate who passes all examinations in first attempt shall be classified as follows :

<b>Total Marks Secured (Average of all subjects)</b>	<b>Classification</b>
75% and above	DISTINCTION
60% to 74%	FIRST CLASS
50% to 59%	SECOND CLASS

b) A candidate who passes in more than one attempt shall not be eligible for the classification of distinction or first class. S(h)e shall be declared to have passed in Second class.

#### **6.5. Dissertation**

Regular Candidates shall submit the Dissertation to the department at the end of the second semester. If a candidate is not able to submit his/her dissertation within the period stated above. S(he) will be given two extensions of 3 months each with penalty fee.

If a candidate does not submit his/her dissertation even after two extensions, his/her registration shall be treated as cancelled and s(h)e has to re-register for the course.

The external examiner shall be selected u the Controller of Examinations from a panel of three experts suggested by the department. The dissertation will be evaluated both by the external examiner and the research advisor for a maximum of 80 marks each and the average shall be taken.

##### **6.5.1. Revision of Dissertation**

If the examiner who values the dissertation makes a qualified recommendation such as revision of dissertation then the candidate is advised to revise the dissertation in the light of the suggestions made by the examiner and re-submit his/her dissertation.

##### **6.5.2. Viva-Voce**

There shall be a Viva-Voce examination, which shall be conducted by two examiners. One is the research advisor and the other is one who evaluated the dissertation. The Viva-Voce will be evaluated both by the external examiner and the research advisor for a maximum of 20 marks each and the average shall be taken.

A candidate shall be declared to have passed in dissertation if s(h)e secures not less than 50% of the marks prescribed for the Viva-Voce Examinations.

**P.G. & RESEARCH DEPARTMENT OF SOCIAL WORK  
SACRED HEART COLLEGE (AUTONOMOUS),  
TIRUPATTUR, VELLORE DIST – 635601**

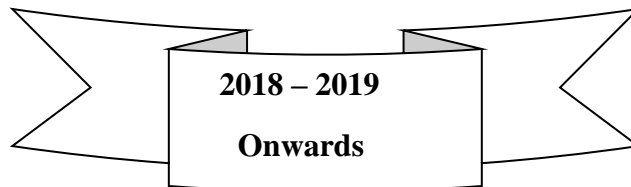
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**M.PHIL – ACADEMIC CATALOGUE**



<b>S. N</b>	<b>Content</b>	<b>Page No.</b>
1.	Eligibility criteria for admission	
2.	Selection process	
3.	Duration of the course	
4.	Attendance	
5.	Scheme of examination	
6.	Question paper pattern	
7.	Course structure	
8.	Evaluation criteria	
9.	Semester end examinations	
10.	Course requirements	
11.	Paper 1: research methodology for social work	
12.	Paper 2: Social work theories and practice	
13.	Paper 3: Guide paper	
14.	Field work practicum	
15.	Dissertation work	

### 1. ELIGIBILITY CRITERIA FOR ADMISSION

Master's Degree in Social Work (any specialization) with a minimum of 50% marks.

The basis of selection shall be the marks secured in the entrance examination conducted by Sacred Heart College and Selection Interview.

### 2. SELECTION PROCESS

Process	Particulars
Entrance Test	Analytical Skills, and Subject Knowledge
Personal interview	Personal interview for each candidate by an expert panel

### 3. DURATION OF THE COURSE:

The course of study shall be for duration of ONE academic year with TWO semesters. The first semester consists of three theory papers and Field Work Practicum for 30 days. In the second semester, a research study has to be carried out and a dissertation has to be submitted.

### 4. ATTENDANCE

A candidate will be permitted to appear for the examination only if he/she secures not less than 75% of attendance in each subject during the semester.

### 5. SCHEME OF EXAMINATION

All the course (Theory papers/Field work/Dissertation) comprises of internal and external examination. The examination for the papers shall be divided into two seasonal tests and one end-semester examination. Internal marks consists of 40 marks and end-semester examination consists of 60 marks (Total 100 marks for each paper)

### QUESTION PAPER PATTERN

Duration of Exam: **3 Hrs**

Max. Marks: **60**

#### SECTION - A

Answer **Any Eight** questions. Each question carries 2 marks. Each answer is limited to 50 words. (8X2 =16 Marks)

Type of Questions: Knowledge Oriented

1 to 10 Questions.

**SECTION – B:** Answer **ALL** (Five) questions. Each question carries 4 marks. Each answer is limited to 300 words. (5X4=20 Marks)

Type of Questions: Understanding oriented



11. (A.) or (B)
12. (A.) or (B)
13. (A.) or (B)
14. (A.) or (B)
15. (A.) or (B)

**SECTION – C:** Answer any **THREE** questions. Each question carries 8 marks. Each answer is limited to 800 words. (3X8 = 24 Marks)

Type of Questions: Application Oriented

16 to 17 questions.

**6. M.Phil. COURSE in Social Work (Restructured) – 2018-2019 Batch Onwards**

<b>SEMESTER I</b>							
<b>Code</b>	<b>Title of the subject</b>	<b>Contact Hrs</b>	<b>Credit</b>	<b>E-hrs</b>	<b>CA</b>	<b>SE</b>	<b>Total</b>
	Research Methodology for Social Work	60	4	3	40	60	100
	Social Work Theories and Practice	60	4	3	40	60	100
	Guide Paper	-	4	3	40	60	100
	Field Practicum	30 Days	6	Viva/ Report	40	60	400
<b>SEMESTER TOTAL</b>			<b>18</b>				<b>400</b>
<b>SEMESTER II</b>							
	<b>Research Project</b>	-	12	Viva/ Report	40	60	100
	Publication of one Article in a UGC Approved Journal	-	-	Required for Submission of Research Thesis			
<b>SEMESTER TOTAL</b>			<b>12</b>				<b>100</b>
<b>Total</b>			<b>18+12=30</b>				<b>500</b>

## **7. EVALUATION CRITERIA**

### **Continuous Internal Assessment**

CIA : 20 Marks

Assignment : 5 Marks

Participation/ Paper presentation in workshops and conferences: 5 Marks

Participatory Learning : 10 Marks

For participatory learning, one activity per subject will be selected from the following;

1. Assisting slow/advanced learners
2. Taking sessions/trainings in campus and outside campus
3. Activities within /outside campus
4. Developing a training/learning module
5. Undertaking Mini Research
6. Writing a grant seeking proposal
7. Organizing workshop and conferences
8. Book reviews

**Total: 40 Marks**

## **9. SEMESTER END EXAMINATIONS**

Written examination will take place for three papers in the first semester. Viva Voce will be conducted for the Field Work.

## **10. COURSE REQUIREMENTS**

Every research scholar will publish one paper in a UGC approved journal before the submission of the research thesis.

## 11. PAPER I: **RESEARCH METHODOLOGY FOR SOCIAL WORK**

### **Learning Objectives**

1. To provide the students with knowledge of social work research methodology and statistics to conceptualize and execute a research study relevant in the discipline of social work
2. To equip the students with the necessary skills in applying research and statistical methods in social work research and practice.

### **Unit-1: Concept of Social Work Research**

Concept of Social Work Research. Definitions, Process and Ethics. Social Work research in India and Abroad. Types of Social Work Research – Mixed Method Research and Interdisciplinary researches. Elements of research. Variables - relation and association. Hypotheses: Concept, Types and testing. Use of theories and models in research – Conceptualization and Operationalization. Developing Theoretic Framework for research. Inductive and Deductive Reasoning. Quality aspects of Research Work - Plagiarism, Bibliography/Referencing (APA/MLA/Anderson et al. Model) and Footnote.

### **Unit-2: Research Designs and Sampling Techniques**

Descriptive designs - Survey, Exploratory – non experimental, diagnostic and evaluative research. Quasi experimental and Experimental designs. Participatory and action research. Types of data collection: Primary and secondary. Interviews, questionnaires. Steps in preparing research tools. Issues of validation and reliability, Sampling: Probability and Non probability samples - Universe, population and Sampling. Sampling error.

**Qualitative Research:** Objectives, theories, principles, application in social work, types and process. Approaches: Ethnography, Ethology, Phenomenology, Field Research and Grounded Theory. Methods: Participant Observation, Focus Group Discussion, Direct Observation, Unstructured Interviewing, In-depth interviewing, Participatory Rural Appraisal and Case Studies. Scales: Rating Scales, Attitude Scales – Likert, Thurstone and Guttman.

### **Unit-3: Use of Statistics in Research**

Use of statistics in social work research, Measures of Central Tendency: Nominal, ordinal, Interval and Ratio. Variance, dispersion and Normal Distribution. Descriptive: Mean, Median, standard Deviation, Range and inferential statistics in Research: One sample t-test, Independent Sample t-test, Paired Sample t-test, One Way and Two way ANOVA, ANCOVA, MANOVA, Discriminate Analysis, Factor Analysis, Path Analysis, Correlation and Regression – Simple and multiple linear regression. Parametric and Non parametric tests. Interpretation and analysis of statistical tests.

### **Unit-4: Application of Software in Research**

**SPSS:** Application of Statistical Package for Social Science for Quantitative Data Analysis - Data scrutiny, recoding, computing, tabulation and presentation of data. Using diagrams in research.

**NVivo:** Application of NVivo for Qualitative Data Analysis - Use of Nodes, Audio recording, interview notes, video recording, posters, story writing, conceptual mapping for theory building and report.

## **Unit-5: Research Outcome and Applications**

Theory building, model creation, module development and policy brief. Writing conceptual and empirical papers. Purpose and guidelines for academic writing and publication. Reporting format for research and articles.

### **Reference Books:**

1. Alston and Bowles (2003). Research for social workers, An introduction to methods, Rawat publications
2. B.N. Ghosh (1992). Scientific method and social research, Sterling publishers,
3. Babbie and Rubin (2000). Research methods for social work, Brooks and Cole publishing company.
4. Bryman, A. (1999). Qualitative research. London [u.a.: SAGE.
5. D.K.Laldas (2005), Designs for social research, Rawat publishers.
6. D'cruz and Jones, (2006) Social work research – Ethical and political contexts. Sage publishers.
7. Davies, M. (2007). Doing a successful research project: Using qualitative or quantitative methods. Basingstoke [England: Palgrave Macmillan.
8. Denzin, N. (2005). The SAGE handbook of qualitative research (3rd ed.). Thousand Oaks: Sage Publications.
9. Glaser, B., & Strauss, A. (1967). The discovery of grounded theory: Strategies for qualitative research. Chicago: Aldine Pub.
10. Grosf and Sardy, (1985) A Research primer for the Social and behavioral sciences, Academic Press Inc.
11. Laldas. Bhaskaran Ed, (2008) Research methods for social work, Rawat Publishers,
12. Marshall, C., & Rossman, G. (1989). Designing qualitative research. Newbury Park, Calif.: Sage Publications.
13. Monette, Sullivan, Dejong , (1990) Applied social research- Tool for human services, Holt, Rinehart and Winston, Inc
14. Norman A. Polansky (ed) 1975 Social work research – Methods for the helping professions, The University of Chicago Press.
15. Shaw and Gould, (2001) Qualitative research in social work, Sage publishers,
16. Teresa Morris, (2006) Social work research methods, four alternative paradigms, Sage publications.
17. The sage dictionary of social science methods, Edited by Victor Jupp, Publishers 2006.
18. Wilkinson and Bhandarkar, (1983) Methods and techniques of social research, Himalaya publishing house.
19. Willam, Unran, Grinell, (1998) Social work research. F.E. Peacock publishers.

## **12. PAPER 2: SOCIAL WORK THEORIES AND PRACTICE**

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### **Learning Outcome**

1. Provide the students with advance theoretical knowledge, theoretical perspectives in the discipline of social work
2. Facilitate opportunities for the students to articulate personal and professional values and equip with skills required for practice trans-disciplinary and international settings

**UNIT I: Social Work** – Concept, Principles, Ethics and Values in Professional Social Work, Social Realities and Responsibilities of Professional Social Work. Professional Social Work Associations.

### **Ideological and Theoretical Perspectives in Social Work:**

**Ideologies:** Existentialism, Eclecticism, Humanitarianism, Welfarism, Socialism, Democracy, Marxism, Gandhianism, Feminism, Environmentalism, Philanthropy, Human rights, equality, equity and social justice, post-modernism.

### **Theoretical Perspectives:**

**Clinical perspectives:** Psychodynamic approach (Hollis and Woods), Behavioural Approach (Fisher and Gochros). Crisis intervention (Naomi Golan) Task centered approach (Reid and Epstein). **Developmental Perspectives:** Anti-discriminatory practices (Thompson), radical and Marxist approach (Corrigan and Leonard). Feminist social work (Dominelli) Empowerment and advocacy approached (Barbara Solomon), Rights based approaches. **Systems Perspectives:** Basic concepts, integrated/Generalist/ Systems theory application in Social Work (Pincus and Minahan), Ecological systems theory: the life model networking and social support systems, Indigenous Models.

### **UNIT II: Methods and Skills in Social Work Practice:**

**Methods:** Primary Methods – Case Work, Group Work and Community Organization and Secondary Methods – Social Action, Social Welfare Administration and Social Work Research. **Skills:** Critical thinking, policy analysis, needs assessment, research skills, networking and collaboration, communication, cultural competencies, counselling and training, project writing and fund raising, program planning, implementation and evaluation, reporting and documentation and use of ICT.

**UNIT III: Fields of Social Work:** Application of social work in different settings: Industrial settings, Correctional settings, Medical and Psychiatric settings, Rural, urban and tribal development settings, environment promotion, School social work, Family and Child welfare, Working with elders, Youth welfare, Women welfare and Welfare of the Persons with Disabilities.

**Models of Social Work Interventions:** Problem solving/Remedial, Crisis intervention, Therapeutic model and Development model. Issue based interventions in Social work – Migration, Addiction, women trafficking, environment degradation and gender issues. Social entrepreneurship.

**UNIT IV: Emerging Trends in Social Work:** Social planning and Social development: Concept, Importance, Traditional Social Work, Voluntary Social Work. Social Audit, social entrepreneurship, Corporate Social Responsibilities, Institutional Social Responsibilities, Institution Building, Evidence Based Social Work practice, Technology in Social Work  
**International Social Work:** International Association for Social Work Practice, International and transnational practice models, global agenda for social work, global competencies and international social welfare policies. Sustainable Development Goals and Social Work.  
**UNIT V: Contributions of National and International Agencies:** Development Planning in India - programmes/Institutions/Schemes of State and Central: poverty alleviation, children, women, youth and aged. International Social Work Organizations: UN Agencies - UNICEF, UNHCR, UNFPA. Govt. and Non Govt. Agencies: DFID. Action Aid, World Vision, Restless Development International and Amnesty International.

#### **REFERENCE:**

1. Bradford S W & Others (1988): Techniques and Guidelines for social work practice. Allyn and Bacon Inc., Massachusetts.
2. Briscoe C and Thomas D.N (1977) community work: Learning and Supervision, George Allen and Unwin Ltd., London.
3. Butrym Z T (1979) The Nature of Social work. The MacMillan Press Ltd., London.
4. Clark H I (1947) Principles and practices of social work. D Appleton century-crofts Inc. New York.
5. Donald B and others (1975) Contemporary Social Work. McGraw Hill Book Company, New York.
6. Fink A.E (1971) The Field of social work. Holt Rinehart and Winston, Inc., New York.
7. Friedlander W A (1958) Introduction to Social Work, Prentice Hall Inc, New Jersey.
8. Friedlander W A (1961) Introduction to Social Welfare, Prentice Hall Inc, New Jersey.
9. Gangrade K D (1986) Social Work and Development, Northern Book Centre, New Delhi-2.
10. Goel and Jain (1988) Social Welfare Administration, Northern Book center, New Delhi.
11. Goldberg (1972) Social Work in General Practice, George Allen and Unwin Ltd, London.
12. Gore M S (1965) Social Work and Social Work Education, National Printing House, New Delhi. Govt. of India: Indian Constitution.
12. Guens (1965) Careers in Social Work, The Bodley Head Ltd., London.
13. Herand B J (1970) Sociology and Social Work (Perspectives and Problems) Pergamon press ltd, Oxford.
14. Jacob K K (1994) Social Work Education in India, Himanshu Publications, Delhi.
15. Johnson L C (1986) Social Work Practice Generalist Approach, Allen and Bacon Inc., London.
16. Krammer R M and Specht H (1975): Readings in Community Organization Practice, Prentice Hall, New Jersey.

### **13. PAPER 3: GUIDE PAPER**

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Syllabus for this paper will be prepared by Research guide based on the broader interest of the scholar. The paper will have five units.

### **14. FIELD WORK PRACTICUM**

The candidate will be placed for 30 days (inclusive of Sundays) under the supervision of the field work supervisor. The candidate will use the Social Work theories and skills to demonstrate intervention (Intervention is a compulsory component). The selection of field for practicum need not be based on any specializations.

#### **Internal:**

Pre-practicum presentation: 10 Marks

Assessment by Supervisor: 30 Marks

#### **External:**

Record Quality: 20 Marks

Viva-Voce: 40 Marks

Viva Voce will be conducted by an external examiner along with the supervisor within the department.

### **SECOND SEMESTER**

#### **15. DISSERTATION WORK:**

Dissertation provides an opportunity for the scholars to collect data in field, under the guidance of a faculty supervisor and to familiarize themselves with the methods of research. In the second semester the students should select a research problem in the selected field of social work and finalize their research design with faculty supervisor. The dissertation shall be submitted along with the plagiarism report before appearing for research Viva Voce. The acceptable ratio between plagiarism and originality should be at least 30:70.

#### **VIVA VOCE:**

A viva-voce examination of the dissertation will be conducted by an external examiner along with the guide for the final award of the degree.

## M.Phil. MBA

### RESEARCH METHODOLOGY

**SUBJECT CODE: MPM101**

**Exam Duration: 3 Hours**

L	T	P	C
6	0	0	6

**Unit I: Introduction to research:** Meaning and importance of research – process of Research – Types of research – Research in Finance – Defining research problem Formulation of hypothesis – Research design.

**Unit II: Sampling Methods :** Sampling and sampling design – Nature – Process of sampling – Sampling Techniques – simple random sampling – stratified sampling systematic sampling – cluster sampling – multistage sampling – convenience sampling – judgement sampling – Quota sampling – Advantages and Limitations of Sampling – Sampling Errors – Sample Size estimation and its determinants - Sampling of Companies – Corporate Events.

**Unit III: Data Collection:** Primary and secondary data – Merits and limitations – Interviewing Questionnaire – Questionnaire design – Secondary sources of data collection.

**Unit IV: Data Analysis – Through SPSS:** Editing, Coding and Classification of data – Tabulation – Cross tabulation – Chi – Square test. Analysis of Variance – Factor analysis – Cluster analysis – Discriminant analysis – Multiple regression and Correlation – canonical correlation.

**Unit V: Report Writing:** The Report in context – Types of research report – Guidelines for Writing a report – Presentation of report – Printing and binding of report – Use of Visual aids – Essential elements of survey report.

#### Reference:

1. Donald R.Cooper and Pamela S.Schindler, 2000.6<sup>th</sup> Ed.. **Business Research Methods**, Tata McGraw Hill Publishing Company Limited.
2. D.K.Bhattacharyya, 2003, 1<sup>st</sup> Ed.. **Research Methodology**. Excel Books.
3. C.R.Kothari. 2001. **Research Methodology**, Wishva Prakashan Publication.
4. William G.Zikmund. 7<sup>th</sup> Ed.. **Business Research Methods**. Thomson – south – western.
5. William M.K.Trochim, 2<sup>nd</sup> Ed.. **Research Methods**. BIZTANTRA.



## SKILLS SET FOR MANAGEMENT TEACHING

**SUBJECT CODE: MPM102**

L	T	P	C
6	0	0	6

**Exam Duration: 3 Hours**

**Unit I: Case Study:** Case study method – Types of cases – Reading a case properly – case analysis approaches – Analysing the case – The Written report – Do's and Dont's for case preparation – diseasing and presenting a case study.

**Unit II: Case Analytical Skill :** Developing Case Analytical Skill – cases in Management Cases in Cost Management – Cases in Marketing.

**Unit III: Computing Skill:** MS Excel – Basic operation – Modifying the worksheet layout printing the workbook – Working with functions – what –if Analysis – Introduction of Charts.

**MS Power Point:** Creating a presentation slide – Design Templates and Blank presentation Working with the text in a slide – Moving the frame and inserting clip art – Formatting the slide design – Auto content Wizard – Using existing slides – power point standard tool bar buttons.

**Unit IV: Communication Skills:** Email – Business letters – Memos – Faxes – Voice Mail Formatting business letters, memos, Email, agendas, minutes, envelopes and labels.

**Verbal Communication Skills:** Informal Speech – Feed back – Meetings. Agendas and Round table discussions presentation.

**Unit V: Educational Skill:** Educational Foundation – Domains of learning – Concept of Teaching – Basic Psychology of learning – lesions form psychology of learning – Basic Physiological of Learning – Role of Learning Objectives.

**Curriculum Development:** History and Patterns of curriculum development and review Aims, Goals, Objectives – Curriculum and assessment theories and models – curriculum planning & designing – Need for review and revision of curriculum.

### Reference:

1. Pratapsingh Chaudhan. Daxa Gohil. P.C.Sehgal. 2009. 1<sup>st</sup> Ed.. *Case Pedagogy in Management*, Shanti Prakasam.
2. The ICAI Business School, 2006, 1<sup>st</sup> Ed.. *Case Studies for Managers*.
3. Jolin K.Shank. 2<sup>nd</sup> Ed.. *Cases in Cost Management: A strategic emphasis* South Western Thomson Learning.
4. J.Fred Wearern 2002. 1<sup>st</sup> Ed.. *Cases in Dynamic Finance – Mergers and Restructuring*, Prentice Hall.
5. Suslala Madam, 2004, 4<sup>th</sup> Ed.. *Information technology*. Taxmann Publications.
6. Donald Young, 2006, 1<sup>st</sup> Ed.. *Foundation of Business Communication – An Integrative Approach*, Tata McGraw Hill Publications.
7. Kumar K.I.2008. 2<sup>nd</sup> Ed.. *Educational Technology*, New Age International.

## தமிழ் இளம் ஆய்வியல் (எம்.ஃபில்)

பாடத்திட்டம் (2017)

ஆய்வியல் நிறைஞர் பாடத்திட்டத்தில் தாள் : 1 ஆய்வு நெறிமுறைகள் மற்றும் தாள் 2 – தமிழில் ஆய்வியல் வரலாறு பாடத்தில் எவ்வித மாற்றமும் இன்றித் தொடர்கின்றன.

### தாள் : 1 ஆய்வு நெறிமுறைகள்

அலகு 1: ஆய்வு அறிமுகம்

1. ஆய்வின் இயல்பு – ஆய்வு சொல்லும் பொருளும், அகன்ற அறிவும் ஆழ்ந்த அறிவும் , நெறிப்படா அறிவும் , நெறிப்பட்ட அறிவும் (ஆய்வு எது? ஏன்? எப்படி? க. நாராயணன் பக்- 17-31)
2. ஆய்வின் நோக்கம் – ஆய்வின் இலக்கணம், ஆய்வு எங்கே தோன்றுகிறது? ஆய்வு முடிவுகள், ஆய்வு மதிப்புண்மைகள், ஆய்வேடு. (ஆய்வியல் அறிமுகம், தமிழண்ணல், பக் 20-48)
3. ஆய்வுப் பொருள் அல்லது சிக்கல் – சிக்கலைத் தேரும் நோக்கம், தலைப்பைத் தேர்ந்தெடுத்தல், சிக்கல்களின் தோற்றுவாய்கள், நடைமுறை ஆலோசனைகள், சிக்கலை முறைப்படுத்தி விளக்குதல், எடுத்து மொழிதலும் பகுத்தாய்தலும்.( ஆய்வியல் அறிமுகம், தமிழண்ணல், பக் 49-62)

அலகு 2: ஆய்வு முறைகள்

1. மரபுவழி ஆய்வுமுறைகள், தத்துவ முறை, நிறுவன அமைப்பு முறை, சட்ட அமைப்பு முறை, வரலாற்று முறை, புதிய ஆய்வு

முறைகளின் தோற்றம் (ஆய்வு எது? ஏன்? எப்படி? க. நாராயணன் பக்- 75-100)

2. அறிவியல் ஆய்வுமுறைகள் – முறைகள் இரண்டு : உற்று நோக்கல் முறையின் இயல்பு, திட்டமிடல், தகவல் பதிவு, பொருள் கோடல் – உற்று நோக்கல் வகை, கருவியில்லா நோக்கம், கருவி நோக்கம் முதலியன (ஆய்வு எது? ஏன்? எப்படி? க. நாராயணன் பக்- 75-100)

அலகு 3: நூலகமும் ஆய்வேடும்

1. நூலகப் பகுப்பு முறை – நூலகமும் ஆய்வேடும் (ஆய்வியல் அறிமுகம் , தமிழண்ணல் பக் 20-83)
2. துணை நூற்பட்டியல் உருவாக்கல் – துணைநூற்பட்டியல் உருவாக்கும் செயல்பாட்டுத்திட்டம், மேற்கோளின் வடிவம்
3. அடிக்குறிப்பு, மேற்கோள் – குறிப்பெடுத்தலின் அடிப்படை விதி (ஆய்வியல் அறிமுகம் , தமிழண்ணல் பக்: 100-144)

அலகு 4: ஆய்வறிக்கை எழுதும் முறை

1. முதற்படி – பொருளடக்கத்தில் கவனம் செலுத்துதல். செம்மையாக எழுதுதல், வரையறை செய்தல், மெய்மைகளை வரிசைப் படுத்தி எழுதுதல்.
2. இரண்டாம் படி – வடிவமும் மொழியும் பற்றிக் கருத்துச் செலுத்தும் நிலை, நடைச் சிறப்பு, சொல்லாட்சித் திறன், தொடராட்சித் திறன்.

4. மூன்றாம் படி - இறுதிப் படி, செம்மை செய்தல் (ஆய்வியல் அறிமுகம் , தமிழண்ணல் ப- 82, தமிழியல் ஆய்வு , தமிழண்ணல் பக்: 12-14)

#### **அலகு 5: ஆய்வு அறமும் குற்றங்களும்**

1. ஆய்வாளரின் பண்புகள் (ஆய்வு எது? ஏன்? எப்படி? க. நாராயணன் பக்- 31-44, தமிழியல் ஆய்வு , தமிழண்ணல், 14-15)
2. அளவைக் குற்றங்கள் (ஆய்வு எது? ஏன்? எப்படி? க. நாராயணன் பக்- 181-187)
3. பொருந்தாவாதம் (ஆய்வு எது? ஏன்? எப்படி? க. நாராயணன் பக்- 186-187)

## தாள் : 2 தமிழில் ஆய்வியல் வரலாறு

நோக்கம் : ஆசிரியர் வரலாறு, நூல் கட்டமைப்பு, ஆய்வுப் பொருண்மை, ஆய்வுப் போக்கு, வேறுபடும் இடங்கள் ஆகியவற்றை மாணவர்கள் அறிந்து கொள்ளல்.

### அலகு 1: தொடக்க காலம்

1. பண்டைத் தமிழிலக்கியமும் தமிழரும்
2. பண்டைத் தமிழ்ப்புலவரின் இலக்கியநோக்கு
3. பண்டைத் தமிழ்ப்புலவரும் இலக்கியவிமர்சனமும்  
(தமிழ் ஆராய்ச்சியின் வளர்ச்சி: ஏ.வி.சுப்பிரமணியன், பக் 17-98)

### அலகு 2: இடைக்காலம்

1. சமயப்பாடல்களின்தொகுப்பு; திருமுறைகள்,பிரபந்தம்
2. சமயத்தேவைகளில்விளைந்தமொழியும்உரைகளும்
3. இலக்கியஉரைகளும்நிகண்டுகளும்மற்றும்தொல்காப்பியஉரைகள்  
(தமிழ் ஆராய்ச்சியின் வளர்ச்சி, ஏ.வி. சுப்பிரமணியன், பக்: 99-237)

### அலகு 3: தற்காலம்

1. தமிழ் இலக்கியத் திறனாய்வு வரலாறு - க.பூரணச்சந்திரன்,  
தமிழ்ப்பல்கலைக்கழக வெளியீடு, தஞ்சாவூர்
2. தமிழியல் ஆய்வு வரலாறு - ம.மதியழகன், பிரீத் வெளியீட்டகம்,  
சென்னை.
3. இருபதாம் நூற்றாண்டுத் தமிழில் ஆய்வு வரலாறு  
முனைவர் கி.பார்த்திபராஜா ('இருபதாம் நூற்றாண்டுத் தமிழியல்  
ஆய்வு தெ.பொ.மீனாட்சிசுந்தரம்' என்ற முனைவர்பட்ட ஆய்வேட்டின்  
முதல் இயல்)

#### அலகு 4: இலக்கிய ஆய்வு

1. வ.சுப. மாணிக்கம் - தமிழ்க் காதல்
2. தி. சு. நடராசன் - சிலப்பதிகாரம் மறுவாசிப்பு
3. க.பஞ்சாங்கம் - புதிய கோட்பாட்டு நோக்கில் பழந்தமிழ் இலக்கியம்

#### வரலாற்று ஆய்வு:

1. தொ. மு. சி. ரகுநாதன் - பாரதி - காலமும் கருத்தும்
2. சி. மௌனகுரு - பண்டைத் தமிழர் வரலாறும் இலக்கியமும்
3. பொ. வேல்சாமி - பொற்காலங்களும் இருண்ட காலங்களும்

#### பண்பாட்டு ஆய்வுகள்:

1. தொ. பரமசிவம் - பண்பாட்டு அசைவுகள்
2. ஆ. தனஞ்செயன் - குலக்குறியியலும் மீனவர் வழக்காறுகளும்
3. பக்தவத்சல பாரதி - பாணர் இன வரைவியல்

#### அலகு - 5 மொழியியல் ஆய்வு

1. பொற்கோ - இலக்கண உலகில் புதிய பார்வை
2. கு. பரமசிவம் - இக்கால மொழியியல்
3. செ.வை. சண்முகம் - சங்ககால மொழிவளர்ச்சியும் மொழி உணர்வும்

#### நாட்டுப்புறவியல் ஆய்வு:

1. நா. வானமாமலை - தமிழர் வரலாறும் பண்பாடும்
2. தே. லார்து - நாட்டார் வழக்காற்றியல்
3. டி. தருமராஜன் (தொ.ஆ.) - சனங்களின் சாமிகள்

### **சமூகவியல்ஆய்வு:**

1. கா. சிவத்தம்பி – தமிழ் இலக்கியத்தில் மதமும் மானுடமும்
2. பெ.மாதையன் - சங்க இனக்குழுச் சமூகமும் அரசு உருவாக்கமும்
3. ராஜ் கௌதமன் - ஆகோளும் பெருங்கற்கால நாகரிகமும்

### **சமூகவியல் ஆய்வுகள்**

ஆய்வியல் நிறைஞர் பாடத்திட்டத்தில் ஏற்கனவே

ஏற்றுக்கொள்ளப்பட்ட தரக்குறியீடு, வினாத்தாள் அமைப்பு ,

மதிப்பெண் பகிர்வு ஆகியவற்றில் எந்த மாற்றமும்

செய்யப்படவில்லை.

**PG & RESEARCH DEPARTMENT OF BIOCHEMISTRY**

**SACRED HEART COLLEGE (AUTONOMOUS)**

**TIRUPATTUR, VELLORE DT – 635 601**

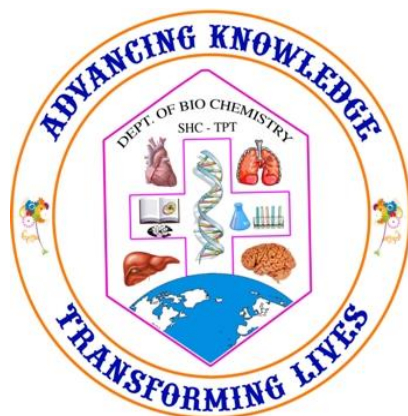
**Affiliated to Thiruvalluvar University**

**Accredited by NAAC (3<sup>rd</sup> cycle) with ‘A’ grade [3.43]**

**M.Phil. BIOCHEMISTRY**

**COURSE CATALOGUE**

*2017 – 2018*



**College** : [www.shcpt.edu](http://www.shcpt.edu)

**Dept email** : [biochemshcpt@rediffmail.com](mailto:biochemshcpt@rediffmail.com)

**Dept face book id** : [biodazzlers@gmail.com](mailto:biodazzlers@gmail.com)



## **PG & RESEARCH DEPARTMENT OF BIOCHEMISTRY**

### **M.Phil., BIOCHEMISTRY**

**[Effective from the Academic Year 2017-2018]**

#### **MILESTONES OF THE DEPARTMENT**

1. 2004-2005 : Inception of B.Sc., Biochemistry [University Mode]
2. 2006-2007 : Autonomy of B.Sc., Degree
3. 2007-2008 : CBCS Mode of B.Sc., Degree
4. 2008-2009 : Introduction of Intra-departmental Workshop
5. 2009-2010 : Introduction of State Level Seminar
6. 2012 -2013: Inception of PGDMLT Course (Autonomous)
7. 2012-2013: State Level Seminar sponsored by Tamil Nadu State Council for Science & Technology [TNSCST]
8. 2013 -2014: Separate B.Sc., Biochemistry Laboratory
9. 2014 -2015: Inception of M.Sc., Biochemistry
10. 2015-2016 : Separate M.Sc., Biochemistry Laboratory
11. 2015-2016 : Award of Major Research Project from DST-SERB
12. 2016 -2017: Award of Student Project Grant from TNSCST
13. 2017-2018: Restructured B.Sc and M.Sc., Biochemistry Syllabus
14. 2017-2018: Inception of B.Sc., Microbiology
15. 2017-2018: Inception of PGDMLT Course (University Certification)
16. 2017-2018: Inception of M.Phil & Ph.D., Biochemistry
17. 2017-2018: Two days Lecture Workshop sponsored by Science Academies of India

## Master of Philosophy in Biochemistry

### Regulations and Curriculum

(With effect from 2017-2018)

#### Program objectives

The aim of the Master of Philosophy in Biochemistry program is to provide an understanding of every aspect of the structure and function of living things at the molecular level. Acquiring knowledge in the related fields is advantageous to the students. The programme is structured in such a way to impart more knowledge in science, in particular in Biochemistry. It is one of the most fundamental scientific disciplines. The main goal is

- To provide state of art, knowledge and skills in the field of Biochemistry.
- To generate manpower trained in Biochemistry suited to meet the needs of research institutions/industry / academia.
- To have a positive impact on human and animal health, agriculture and environment in the region.

#### Duration of the Programme

The duration of the course is one academic year consisting of two semesters (August to July). In order to be eligible for the award of the degree, the candidate should successfully complete the course within two years considered from the date of enrollment for the first semester of the course.

#### Medium of Instruction

The medium of instruction is English.

#### Recognition

The M.Phil. Programme is offered by the Department of Biochemistry, Sacred Heart College (Autonomous) and is affiliated to Thiruvalluvar University, Vellore Dt, Tamil Nadu.

#### Programme Structure

Part	Paper	Course Title	Credits
I	I	Research Methodology	8
	II	Tools in Biochemistry	8
	III	Optional Paper (Based on Specialization)	8
II		Dissertation	16
		<b>Additional Credits</b> 1. NPTEL Certificate Course / other Certificate course/Publishing papers in Indexed Journals	<b>2*+ 2*</b>
<b>Total Credits</b>			<b>40 + 4*</b>

S.NO.	Titles of Optional Papers
1	Bioinformatics
2	Bionanotechnology
3	Clinical Biochemistry
4	Environmental Technology

### **CA Components [Total - 40 Marks]**

CA (2 CA x 10 Marks) - 20 Marks

Other innovative components - 20 Marks [Each 5 Marks]

- i. Seminar
- ii. Library Hours
- iii. MCQ Test
- iv. Research based Problem Solving

### **Semester Question Paper Pattern [Total - 60 Marks]**

#### **Part-I**

#### **Paper I and II**

**SECTION – A** (5 x 6 = 30 Marks) Either OR type of questions. One question from each unit.

(The either or component from the same unit.)

**SECTION – B** (3 x 10 = 30 Marks) Answer ANY THREE out of FIVE questions.

The duration of the Term End Examination shall be 3 hours.

#### **Paper III**

Paper III shall purely be an internal paper, related to the project work the student will be undertaking and the examination shall be conducted by the supervisor.

### **Question Paper Pattern (Theory) for CA [Total - 60 Marks]**

**Same as Semester Pattern**

#### **Part-II**

#### **Dissertation**

## **Pattern for Project**

**Total Marks: 100**

1. Dissertation Evaluation	:	80
2. Viva Voce	:	20

There shall be two valuation of the dissertation one by the supervisor and the other by the external examiner. The average mark of the two valuations will be taken.

### **Plagiarism Check:**

All the M.Phil Dissertation has to be checked for plagiarism using the Turnitin tool. The acceptable level of similarity would be 30% for the whole thesis.

**COURSEWORK**  
**SYLLABUS FOR BIOCHEMISTRY**

**1. RESEARCH METHODOLOGY**

**LEARNING OBJECTIVES:**

To learn about research designs, principles in scientific research, data collection and analysis of scientific data using softwares.

**LEARNING OUTCOME:**

This course will provide the importance and need for research, research designs, ethics in scientific research, data collection, statistics and analysis of scientific data using software along with research report writing like thesis and paper.

**UNIT-I: RESEARCH BASICS**

Meaning of research - Objectives of research - motivation of research - Types, approaches and significance - Methods versus methodology - Research in scientific methods - Research process - Criteria for good research - Problem encountered by research in India - Funding agencies.

**UNIT-II: RESEARCH DESIGN**

Research Problem: Selecting the problem - Necessity of defining the problem - Techniques involved in defining the problem - Research design - Needs and features of good design - Different research designs - Basic principles of experimental designs. Ethical issues in scientific research.

**UNIT-III: DATA COLLECTION AND DOCUMENTATION**

Data collection methods - Data types - Processing and presentation of data - Techniques of ordering data - Meaning of primary and secondary data - The uses of computers in research - The library and internet - Uses of search engines - virtual libraries - common software for documentation and presentation (SPSS), IPR, Patenting and Plagiarism.

**UNIT-IV: DATA AND ERROR ANALYSIS**

Statistical analysis of data - Standard deviation - Correlation - Comparison of sets of data - Chi squared analysis for data - Characteristics of probability distribution - Binomial, Poisson and normal distribution - Principle of least square fittings - Curve 2 fitting - Measurement of errors - Types and sources of errors - Determination and control of errors, ANOVA.

**UNIT-V: RESEARCH COMMUNICATION**

Preparation of research report - Logical format for writing thesis and paper - Essential of scientific report: abstract, introduction, review of literature, materials and methods and discussion - Write up steps in drafting report - Effective illustrations: tables and figures - Reference styles: Harvard and Vancouver systems. Definition and kinds of scientific

documents – research paper, review paper, book reviews, theses, conference and project reports (for the scientific community and for funding agencies).

**REFERENCES:**

1. Research Methodology, Methods and Techniques - C.R. Kothari(2005) - Wishwa Prakasam Publications, II Edition. India.
2. Research: An introduction - Robert Ross - Harper and Row Publications. India.
3. Research Methodology by N. Gurumani(2006), MJP publications. India.
4. Research methodology - P. Saravanel(2013) - Kitlab Mahal, Sixth Edition. India.
5. A Hand book of Methodology of Research - Rajammal P.A. Devadass (1976)- Vidyalaya Press . India.
6. Statistical methods - G.W. Snedecor and W. Cochran(1967) - Oxford and IBH, New Delhi. India.
7. [https:// www.bmcmedresmethodol.biomedcentral.com/](https://www.bmcmedresmethodol.biomedcentral.com/)
8. [https:// www.citethisforme.com/topic\\_ideas/other/Methodology](https://www.citethisforme.com/topic_ideas/other/Methodology)
9. [https:// www.infosecsa.co.za/files/Reference\\_Techniques.pdf](https://www.infosecsa.co.za/files/Reference_Techniques.pdf)
10. [https:// www.methods.sagepub.com/project-planner](https://www.methods.sagepub.com/project-planner)
11. [https:// www.inflibnet.ac.in/research methodology](https://www.inflibnet.ac.in/research%20methodology)

## **2. TOOLS IN BIOCHEMISTRY**

### **LEARNING OBJECTIVES**

To understand the basic principle, instrumentation and application of sophisticated analytical instruments.

### **LEARNING OUTCOMES:**

This course will provide a platform to know about working methodology and operational procedure of various analytical instruments.

### **UNIT-I: SEPARATION TECHNIQUES**

Centrifugation techniques: Preparative centrifugation, Low Speed, High Speed, Density gradient, Analysis of sub-cellular fractions, Determination of molecular weight of macromolecules, Analytical ultra centrifugation. Chromatography and its Applications: Adsorption chromatography, Partition chromatography, Ion exchange chromatography, Exclusion chromatography, Affinity chromatography, HPLC, HPTLC, GC-MS, FPLC and MS.

### **UNIT-II: ELECTROPHORETIC TECHNIQUES**

General Principles, Factors affecting electrophoretic mobility, Support media, Paper and Gel electrophoresis. Electrophoresis of Proteins – SDS-PAGE, DGGE, Gel Documentation, ASO, 2D PAGE, 3D PAGE Native gels. Detection, estimation and recovery of proteins in gels. Electrophoresis of Nucleic Acid–Agarose gel, Capillary and Pulse field gel electrophoresis. Isoelectric focusing and Immunoelectrophoresis. Types of Blotting–Southern, Northern, Western, Dot-blot and Slot-blot. Turbidimetry, Nephelometry,

### **UNIT-III: SPECTROSCOPIC TECHNIQUES**

Principle, instrumentation and application: UV-Visible Spectroscopy, FTIR, IR, Inductively coupled plasma atomic emission spectroscopy (ICP-AES), Atomic force microscopy, Circular Dichorism spectroscopy, Optical Rotatory Dispersion spectroscopy, X-ray diffraction Spectrophotometry, Fluorimetry, Flame photometry, Flameless Photometry, ESR, NMR and Mass Spectroscopy, Tandom Mass Nano Spectroscopy, Flow cytometry and Facs Flow cytometry.

### **UNIT-IV: IMMUNOLOGICAL TECHNIQUES**

Introduction, Production of antisera and precipitation reaction, Precipitation in free solution. Precipitation in gel immuno diffusion, RIA, ELISA, Immuno fluorescence, Chemi luminescence, Nano fluorescence and G protein array.

### **UNIT-V: MICROSCOPIC AND MOLECULAR TECHNIQUES**

Microscopy –History, Simple and Compound Microscope. Principle, Instrumentation and Applications - Bright field, Dark field, Fluorescent, Phase contrast, Confocal, and Electron microscopy (SEM and TEM).

Cloning Techniques-PCR, Immuno histo chemistry, RFLP, SSCP and RAPD

Cell Lines- Cell culture and sub culturing, Aseptic Techniques and Histopathology.

#### **REFERENCES:**

1. Biochemistry Laboratory: Modern Theory and Techniques (2nd Edition) by Rodney F. Boyer
2. Introduction to Medical Laboratory Techniques by Mukherjee, Volume I, II and III, Oxford University Press (1976).
3. Physical Biochemistry by David Friefielder, W.H. Freeman 2<sup>nd</sup> Edition (1982).
4. Introductory Practical Biochemistry by K. Shawney and Randhir Singh (2000).
5. Practical Biochemistry by K. Wilson and J. Walker. 5<sup>th</sup> Edition Cambridge Univ. (2005).
6. Introduction to instrumental analysis by Robert D. Brown, Pharma Book Syndicate (2006)
7. <https://archive.org/details/AnalyticalBiochemistry3rdEdDavidHolmeHazelPeck>
8. [www.freebookcentre.net](http://www.freebookcentre.net) › Chemistry Books
9. [www.springer.com/in/book/9781441997845](http://www.springer.com/in/book/9781441997845)
10. [www.cuchd.in/e-library/.../Fundamentals%20of%20Biochemistry/Chap-35.pdf](http://www.cuchd.in/e-library/.../Fundamentals%20of%20Biochemistry/Chap-35.pdf)
11. [bookboon.com/en/biology-ebooks](http://bookboon.com/en/biology-ebooks)



## **OPTIONAL PAPER (BASED ON SPECIALIZATION)**

### **1. BIOINFORMATICS**

#### **LEARNING OBJECTIVES**

To analyse human genome, identification of targets for drug discovery, development of algorithms and analysis methods and to study the structural and functional relationships and molecular evolution.

#### **LEARNING OUTCOMES**

To facilitate biological data analysis and to conduct basic bioinformatics research using existing software.

#### **UNIT- I: BIOLOGICAL DATABASES**

Genomes DNA sequences databases: GeneBank, European Molecular Biology Laboratory (EMBL) Nucleotide sequence databank, DNA Data Bank of Japan (DDBJ). Protein databases: primary databases and secondary databases and database formats. Structural databases: Protein Data bank (PDB), Nucleic Acid Data Bank (NDB), Molecular Modeling Data Bank (MMDB).

#### **UNIT -II: GENE EXPRESSION AND DNA MICROARRAY**

Introduction, Basic steps for gene expression, genome information and special features, coding sequences (CDS), untranslated regions (UTR's), cDNA library, expressed sequence tags (EST). Approach to gene identification; codon-bias detection, detecting functional sites in the DNA. Internet resources of gene identification and detection of functional sites. Types of microarrays; Tools for microarray analysis: soft-finder, xCluster, MADAM, SAGE, Applications of microarray technology.

#### **UNIT - III: MOLECULAR VISUALIZATION TOOLS**

3-D Structural analysis of biomolecules – Rasmol, Deep View, Chemdraw, molmol, etc – computer modeling of proteins. Ligand based drug designing – Structure based drug designing.

#### **UNIT - IV: MOLECULAR MODELING**

Introduction, force field, quantum chemistry, Schrödinger equation, potential energy functions, energy minimization, local and global minima, saddle point, grid search, , various approximations; LCAO, HF, semi-empirical calculations; single point calculations, full-geometry optimization methods, ZDO, MNDO, CNDO, NDDO, AM1, PM3, RM1, conformational search, Z-matrix, docking, molecular modeling packages.

#### **UNIT -V: MOLECULAR MECHANICS**

Definition, balls and springs, force fields, bond-stretching, bond-bending, dihedral motions, out of plane angle potential, non-bonded interaction, coulomb interactions, united atoms and cut-offs, Derivative methods; First-order methods; Steepest descent, conjugate gradient,

Second order methods; Newton-Raphson method.

**REFERENCES:**

1. Bioinformatics Methods and Applications Genomics, Proteomics, and Drug Discovery (S. C. Rastogi, N. Mendiratta, and P. Rastogi). 2004
2. Introduction to Bioinformatics, (Atwood, T. K. and Parry-Smith, D. J). 1999
3. An introduction to Computational Biochemistry. (C. Stain Tsai, A John Wiley and Sons, Inc., publications).
4. Developing Bioinformatics Computer Skills. (Cynthia Gibas and Per Jambeck). 2001
5. Molecular Modelling for Beginners (Alan Hinchliffe). Second edition, 2008
6. A user guide to the UNIX system (Rebecca Thomas and Jean Yates)
7. <http://www.ncbi.nlm.nih.gov>

## **2. BIONANOTECHNOLOGY**

### **LEARNING OBJECTIVES:**

To study about the recent research techniques in nanotechnology and its biological applications.

### **LEARNING OUTCOMES:**

This course will provide the importance to understand the fundamental principles of nanotechnology and their application to biomedical engineering and to know the concepts to the nano-scale and to demonstrate a comprehensive understanding of state-of-the-art nano-fabrication methods.

### **UNIT-I: NANOBIOLOGY**

Bionanotechnology – Introduction, Concepts, Prospects, Nanoparticles - Physical, chemical and Biological Synthesis, quantum dots, nanotubes and nanowires.

### **UNIT-II: BIOMATERIALS**

Development of nanobiotechnology - timelines and progress overview. Types of Biomaterials. Biodegradable polymers. Biodegradation of solid polymers. Biocompatibility and Antimicrobial activity. Nanocircuitry - DNA nanostructures for mechanics, DNA based computation and nanomechanical devices, Biosensors and DNA micro array chips.

### **UNIT-III: MAGNETOSOME**

Natural Synthesis of Magnetic Nanoparticles: Mechanism of Formation: Components for the Formation of Nanostructured materials: Synthesis and application, Role of Plants in Nanoparticle Synthesis.

### **UNIT-IV: CHARACTERIZATION TECHNIQUES**

Techniques to construct nanostructures – Scanning probe instruments, nanoscale lithography. Techniques to predict nanostructures – TEM, SEM and AFM. Characterization techniques – NMR, Mass (MALDI-TOF) Spectroscopy, X-ray diffraction.

### **UNIT V : NANODRUGS**

Developing of Nanodrugs, Protocols for Nanodrug administration. Drug delivery systems – Polymer therapeutics: polymer drug conjugates; polymeric micelles; liposomes. Mechanical testing; elasticity; toughness; effect of fabrication on strength. Nanotechnology for tissue engineering. Application of nanomaterials in medicine and nanotoxicity.

### **REFERENCES:**

1. Nanotechnology: A Gentle Introduction to the Next Big Idea by Mark Ratner and Daniel Ratner, Pearson Education Publishers (2002).

2. Nanobiotechnology: Concepts, applications and perspectives by Christ M. Niemayer, Chad A. Mirkin, Wiley VCH publishers (2004).
3. Encyclopedia of Nanoscience and Nanotechnology by H.S. Nalwa (Ed.), American Scientific Publishers, California (2004).
4. Bionanotechnology: Lessons from Nature by David S. Goodsell, Jhonwiley (2006).
5. Bionanotechnology by Niyas Ahamed, Saliha Publications, 2017.
6. [https://www.shodhganga.inflibnet.ac.in/bitstream/10603/37488/10/10\\_chapter%201.pdf](https://www.shodhganga.inflibnet.ac.in/bitstream/10603/37488/10/10_chapter%201.pdf)
7. <https://www.saylor.org/site/wp-content/uploads/2011/06/Nanobiotechnology.pdf>
8. <https://www.caister.com/bionanotechnology>

### **3. CLINICAL BIOCHEMISTRY**

#### **LEARNING OBJECTIVES**

To learn about composition of clinical specimens, understand the clinical disorders and their diagnosis.

#### **LEARNING OUTCOMES**

This course will provide the in depth knowledge on principles and practices of Clinical laboratory, composition of clinical specimens, understand the clinical disorders and treatments. This course will also provide an in depth information about free radicals in health and disease.

#### **UNIT - I: CLINICAL ENZYMES**

Uses of clinical enzymes in the diagnosis and monitoring of myocardial infarction, liver diseases and pancreatic diseases. Normal and abnormal serum values of the enzymes and their significance - acid and alkaline phosphatases, SGOT, SGPT,  $\alpha$ -amylase, isoenzymes - LDH, Creatine kinase and GGT.

#### **UNIT -II: BLOOD CHEMISTRY**

Normal and abnormal constituents of Blood - Glucose, Urea, Uric acid, Creatinine, Bilirubin, and Proteins. Lipid profile and its significance. Blood groups, Rh factor compatibility and Blood transfusion. Hemoglobinopathies: Anaemia, Thalassemia, Sickle cell anemia and Autoimmune diseases. Significance of proteins, albumin, Red blood cells and electrolytes.

#### **UNIT -III: LIVER DISEASES**

Types of Jaundice, Molecular basis and biochemical assessment, viral hepatitis, alcoholic hepatitis, cirrhosis, Gall stones and Fatty liver.

#### **UNIT -IV: CARDIAC DISEASES**

Ischaemic heart disease, Angina pectoris, Atherosclerotic plaques and Myocardial infarction. Cardiac profile tests. Biochemical and other techniques used in clinical chemistry - ELISA, RIA and IRMA. Non invasive techniques used in clinical practice, sonography, X-ray, MRI, CT Scan, ECG and IR technologies.

#### **UNIT -V: CANCER**

Cancer and its types. Molecular basis of carcinogenesis, Oncogenes, Benign and Malignant, Metastasis, Tumor markers and Tumor staging, Tumour markers- Diagnostic markers in cancer, potential targets for therapy, therapeutic application of oncogenes and their products. Tumour suppressor genes as targets, gene therapy, use of receptors.

#### **REFERENCES:**

1. Fundamentals of clinical chemistry by N.W. Teitz, W.B. Saunders company, 2<sup>nd</sup> Edition (1994).
2. Clinical biochemistry in diagnosis and treatment by Philip. D. Mayne, ELBS Publication, 6<sup>th</sup> Edition (1994).
3. Clinical Biochemistry–Metabolic and clinical aspects, William J. Marshall and Stephen K. Bangert, Pearson professional Ltd. (1995).
4. Textbook of Medical Biochemistry by N. Chatterjee, 4<sup>th</sup> edition, RanaShinde–Jaypee publication (2000).
5. Biochemistry by Zubay, G.L., W.M.C. Brown publishers. New York (2002).
6. <http://www.elsevier.com/locate/clinbiochem>
7. <http://guides.lib.purdue.edu/c.php?g=639977&p=5077504>
8. [libguides.library.qut.edu.au/biochem\\_clinicalbiochem](http://libguides.library.qut.edu.au/biochem_clinicalbiochem)
9. <https://www.ncbi.nlm.nih.gov/pmc/journals/1356/>
10. <http://www.springer.com/life+sciences/biochemistry+%26+biophysics/journal/12291>

## **4. ENVIRONMENTAL TECHNOLOGY**

### **LEARNING OBJECTIVES:**

To learn about bioremediation, effluent treatment, waste management and related technologies.

### **LEARNING OUTCOME:**

This course will provide the importance and need for solid and liquid waste management. The learner will know about the contributing factor for pollution and its treatment technologies.

### **UNIT-I: BIOREMEDIATION**

Bioremediation, *in situ* and *ex situ* bioremediation, constraints and priorities of bioremediation, Evaluating Bioremediation, Bioremediation of VOCs (volatile organic compounds).

### **UNIT -II: WATER POLLUTION**

Methods of monitoring. Biological methods- Detection methods for DO, BOD, Pathogen monitoring by heterotrophic plate count, multiple tube method, membrane filtration methods, Other emerging techniques such as enzyme detection, hybridization, PCR, gene probe technology etc. Strategies for controlling pathogen transfer. Detection of heavy metals in water.

### **UNIT -III: EFFLUENT TREATMENT SYSTEMS**

Sewage and waste water treatments systems. Primary, secondary and tertiary treatments. Measurement of treatment efficiencies. Biological treatments-aerobic versus anaerobic treatments. Environmental pollution control- Bioaugmentation and Biostimulation. Detection of heavy metals in tannery.

### **UNIT -IV: HAZARDOUS WASTE MANAGEMENT**

Use of microbial systems. Phytoremediation. Waste water treatment using aquatic plants, root zone treatment. Development of new biocatalysts to be applied in waste water biotechnology. Need for management of resources. Phosphine gas and hazardous gas.

### **UNIT -V: BIOGAS**

Role of environmental biotechnology in management of resources. Reclamation of wasteland, biomass production, Biogas and biofuel production. Development of environmentally friendly processes such as integrated waste management.

### **REFERENCES:**

1. Bruce Rittman, Perry L. McCarty. Environmental Biotechnology: Principles and Applications. McGraw -Hill 2nd edition.
2. Raina M. Maier , Ian L. Pepper, Charles P. Gerba. Environmental Microbiology. Publisher: Academic Press.
3. Martin Alexander. Biodegradation and Bioremediation. Academic Press; 2nd

edition (April 15, 1999).

4. Gabriel Bitton (Author). Wastewater Microbiology, 2nd Edition. Wiley-Liss; 2<sup>nd</sup> edition.
5. Milton Wainwright. An Introduction to Environmental Biotechnology. Kluwer Academic Publishers, Boston. Hardbound.
6. [www.biotechonweb.com/environmental-biotechnology.html](http://www.biotechonweb.com/environmental-biotechnology.html)
7. [https://link.springer.com/chapter/10.1007/978-1-60327-140-0\\_1](https://link.springer.com/chapter/10.1007/978-1-60327-140-0_1)
8. <https://www.omicsonline.org/environmental-biotechnology-future.php>
9. [www.gate2biotech.com/environmental-biotechnology/](http://www.gate2biotech.com/environmental-biotechnology/)
10. [www.indiaenvironmentportal.org.in/category/28/thesaurus/water-pollution/](http://www.indiaenvironmentportal.org.in/category/28/thesaurus/water-pollution/)



## MCA – M. Phil Syllabus

### 1. AIM OF PROGRAMME

Research students of M.Phil programme are expected to acquire a broad knowledge in all areas of computer applications, and an overall perspective of the field, its structure, and its problems. They are expected to study at least one area (field of interest) in considerable depth and to make substantial contributions to that field through creative research ideas.

Students should be able to advance the basic understanding of information processes and to contribute to the creation and consolidation of knowledge in computer applications. In addition, they should be able to see and understand new problems within computer applications and other fields, to find imaginative solutions for them and to carry them through.

### 2. ELIGIBILITY OF ADMISSION

Candidate with Master's Degree in Computer Applications, Computer Science and Information Technology with not less than 55% of marks. All candidates should have passed two / three year PostGraduate degree programme.

### 3. DURATION OF THE PROGRAMME (MINIMUM - 1 YEAR, MAXIMUM – 2 YEARS)

The duration of the programme is one academic year consisting of two semesters (August to July). In order to be eligible for the award of the degree, the candidate should successfully complete the programme within two years considered from the date of enrollment in the first semester of the course.

### 4. PROGRAMME STRUCTURE

#	Part	Semester	Code	Subject Title	L	P	IM	SM	TM	CD
1	III	I		Research Methodologies	6		25	75	100	6
2	III	I		Frontier Areas in Research	4	2	25	75	100	6
3	III*	I		Research Specific Paper	4	2	25	75	100	6
4	III	II		Dissertation		12		100	100	12
<b>Total</b>					<b>14</b>	<b>16</b>	<b>75</b>	<b>325</b>	<b>400</b>	<b>30</b>

*Note: L-Lecture, P-Practical, IM-Internal Marks, SM-Semester Mark, TM- Total Marks, CD-Credit*

*\* Subject to change on every year as the availability of the Research Supervisor.*

## 5. SYLLABI IN DETAIL

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### RESEARCH METHODOLOGIES

6-0:100

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#### Learning Outcomes:

- *To understand research and research methods in Computer Applications,*
- *To be able to plan, and conduct your own research, taking professional limitations,*
- *To be able to communicate its results in the required report format.*

#### 1. INTRODUCTION

Definition and objectives of Research – Types of research, Various Steps in Research process, Mathematical tools for analysis, Developing a research question-Choice of a problem Literature review, Surveying, synthesizing, critical analysis, reading materials, reviewing, rethinking, critical evaluation, interpretation, Research Purposes, Ethics in research – APA Ethics code.

#### 2. QUANTITATIVE METHODS FOR PROBLEM SOLVING

Statistical Modeling and Analysis, Time Series Analysis, Probability Distributions, Fundamentals of Statistical Analysis and Inference, Multivariate methods, Concepts of Correlation and Regression, Fundamentals of Time Series Analysis and Spectral Analysis, Error Analysis, Applications of Spectral Analysis.

#### 3. TABULAR AND GRAPHICAL DESCRIPTION OF DATA

Tables and graphs of frequency data of one variable, Tables and graphs that show the relationship between two variables, Relation between frequency distributions and other graphs, preparing data for analysis.

#### 4. ANALYSIS OF ALGORITHM

Introduction – Upper Bound of Polynomial Form of Time Complexity – Solution of Some Common Recurrence Relations – Homogeneous Recurrences – Inhomogeneous Recurrences – Change of Variable – Example of Analysing Algorithms – Analysis of Merge Sort- Binary Search – Strassen's Matrix Multiplication- Travelling Salesperson.

#### 5. REPORTING

Structure and Components of Research Report, Types of Report, Layout of Research Report, Mechanism of writing a Research Report, Referencing in Academic Writing.

#### TEXT BOOKS

1. C.R. Kothari, "Research Methodology Methods and Techniques", 2/e, Vishwa Prakashan, 2006.
2. Donald H.McBurney, "Research Methods", 5th Edition, Thomson Learning, 2006.
3. S.K.Basu, "Design Methods and Analysis of Algorithms", Prentice Hall of India, 2005, New Delhi.

Chapter 1: 1.0 – 1.5

Chapter 2: 2.2, 2.3, 2.5 (Only the Analysis of these Algorithms)

Chapter 4: 4.4.2 (Only the Analysis of this Algorithm)

**REFERENCE BOOKS**

1. Donald R. Cooper, Pamela S. Schindler, “Business Research Methods”, 8<sup>th</sup> Edition, Tata McGraw-Hill Co.Ltd., 2006.
2. Timothy J.Ross, “Fuzzy Logic with Engg Applications”, Wiley Publications, 2<sup>nd</sup> Edition.
3. P.J. van Laarhoven & E.H. Aarts, “Simulated Annealing: Theory and Applications (Mathematics and Its Applications)”.
3. David E. Goldberg, “Genetic Algorithms in Search, Optimization, and Machine Learning”.

**Learning Outcomes:**

- *Course gives the preparatory focus towards the research areas. This will enable the students to do their research.*

**1. DATABASE**

Definition - Structure - Relational algebra - Architectures for parallel databases An overview of Client-Server architecture - Structure of XML data - Document schema, Querying XML - Storage of XML data – Structured and Semi structured data model - Indexes for text data - Active database concepts - Temporal database concepts - Spatial databases - Deductive databases and Query processing - Mobile databases - Geographic information systems.

**2. NETWORK DESIGN AND ROUTING ARCHITECTURE**

Component Architecture – Reference Architecture – Architectural Models - Systems and Network Architecture. Design Metrics-Testing Network Design-Optimizing Network Design- Documenting Network Design- Routing Architecture: Addressing Mechanisms-Routing Mechanisms-Addressing Strategies-Routing Strategies-Architectural Considerations.

**3. SECURITY**

Database Security: Security Issues – Role of DBA – Authorization – Authentication – Access Control – Encryption – Statistical Databases - Information Security: Basic Principles – Risk Management Process – Disaster Recovery Planning – Law and Regulations – Sources of Standards. Data and Network Security: Intruders – Malicious Software – Firewalls – Electronic Mail security – Web security – IP security - WAP.

**4. MOBILE AND CLOUD COMPUTING**

Mobile Computing: Frameworks and Tools - Building Generic User Interfaces - Multichannel and Multimodal User Interfaces - Software and System Architectures for Delivering Multimodality- Internationalization and Localization - UML based development cycle for mobile applications. Cloud Computing: Benefits from Cloud Computing - Cloud Architecture – Cloud Service – Cloud Service Development Types – Cloud Service development tools.

**5. SOFT COMPUTING**

Computer and its role in research - Use of statistical software SPSS, GRETL etc., in research - Introduction to evolutionary algorithms - Fundamentals of Genetic algorithms - Simulated Annealing - Neural Network based optimization - Optimization of fuzzy systems.

**TEXT BOOKS**

**Unit 1** Abraham Silberschatz, Henry F. Korth and S. Sudharssan, "Database System Concepts", 6<sup>th</sup> Edition, Tata McGraw Hill, 2010.

**Unit 2** McCabe James, "Network Analysis, Architecture, and Design", Morgan Kaufmann Publishers.

Priscilla Oppenheimer, "Top-Down Network Design", Pearson Education India

**Unit 3** Hossein Bidgoli, Information Security, Volume 3, Threats, Vulnerabilities, Prevention, Detection, and Management, Wiley, 2006  
Michael Gertz, Sushil Jojodia, “Handbook of Database Security : Applications and Trends”, Springer publication.

**Unit 4** B’Far, “Mobile Computing Principles – Designing and Developing Mobile Applications with UML and XML”, Cambridge University Press, 2005.  
Michael Miller,” Cloud Computing: Web -Based Applications That change the way You Work and Collaborate Online”, First Edition, 2008, Pearson Education.

**Unit 5** Compiled Materials by the Department

**Learning Outcomes:**

To Enable the Research Scholars to learn in depth about the concepts of Data Quality Assurance and to open Avenues of Research in this field.

**1. DATA QUALITY**

Data Quality Dimensions – Models for Data Quality - Techniques for Data Quality – Methodologies for Data Quality Measurement and Improvement.

**2. DATA CLEANSING**

Process of Data Cleansing – Data Auditing – Workflow Specification and Execution – Post Processing and Controlling – Methods for Data Cleansing – Parsing – Data Transformation – Duplicate Elimination – Statistical Methods.

**3. DATA PROFILING**

Data Profiling with reference to Relational Databases and Business Intelligence - How to do Data Profiling – When to do Data Profiling – Benefits of Data Profiling Data De-Duplication .

**4. DATA DEDUPLICATION**

Methods of De-duplication – Inline Deduplication – Post Process Deduplication – Variable Chunking – Fixed Chunking Methods – Byte , Block , Record and File Level Deduplication Outlier Detection .

**5. OUTLIERS**

Occurrence and Causes – Identifying Outliers – Working with Outliers – Retention – Exclusion – Non – Normal Distribution – Set Membership and Uncertainties – Alternative Models .

**TEXT BOOKS**

**Unit 1** Batini.C, Scannapieco.M, “Data Quality: Concepts, Methodologies, and Techniques”, Springer Publication.

**Unit 2 to Unit 5** Compiled Material by the Department

**LEARNING OUTCOME:**

- *To understand some of the problems that companies face due to the growing volume of data*
- *To understand how big data and analytics is impacting IT and operations*
- *To learn about the new IT infrastructure designed to support big data and analytics*

**1. FOUNDATIONS OF BUSINESS ANALYTICS**

Data - Basic of Business Analytics – Analytic Tools and Methods - Analytics on Spreadsheets – Requirements for Integrating Business Analytics.

**2. DESCRIPTIVE ANALYTICS**

Visualizing and Exploring Data - Descriptive Statistical Measures - Probability Distributions and Data Modeling - Sampling and Estimation - Statistical Inference.

**3. PREDICTIVE ANALYTICS**

Predictive Modeling and Analysis - Regression Analysis - Forecasting Techniques - Simulation and Risk Analysis - Introduction to Data Mining.

**4. PRESCRIPTIVE ANALYTICS**

Linear Optimization - Applications of Linear Optimization - Integer Optimization - Nonlinear and Non-Smooth Optimization - Optimization Models with Uncertainty.

**5. BUSINESS ANALYTICS AND MAKING DECISIONS**

Customer Analytics – Social Analytics – Operational Analytics - Decision Analysis.

**TEXT BOOKS**

1. David Roi Haroon and Galit Shmueli, “Getting Started with Business Analytics: Insightful Decision-Making”, CRC Press.
2. James R Evans, “Business Analytics: Methods, Models and Decisions”, Pearson, 2012.

**REFERENCES**

1. Johannes Ledolter, “Data Mining and Business Analytics with R”, Wiley Publication.

**LEARNING OUTCOME:**

- *Course focuses on basic concepts in networks and information security.*
- *Aims to introduce techniques used in implementing security in network communications.*
- *Gives them an understanding and practical experience of common threats and attacks in networked systems.*

**1. INTRODUCTION TO NETWORK SECURITY**

Introduction-Characteristics of Networks, Security Concepts: Kinds of security breaches – Threats and Risks - Points of vulnerability - Passive and Active Attacks - Security Services – Confidentiality – Authentication - Non-Repudiation – Integrity - Access Control – Availability – Methods of Defence – Control Measures – Effectiveness of Controls - Model for Internetwork Security - Internet Standards and RFCs Access Control Mechanisms - Access Matrix - HRU – TAM - ACL and Capabilities.

**2. CRYPTOGRAPHY AND ALGORITHMS**

Security Attacks - Model for Internetwork Security - Conventional Encryption Model - Steganography - Data Encryption Standard. Principles of Public Key Cryptosystems - RSA Algorithm - Key Management – Diffie Hellman Key Exchange - Prime and Relatively Prime Numbers - Fermat's and Euler's Theorems - Testing of Primality - Euclid's Algorithm - Chinese Remainder Theorem.

**3. AUTHENTICATION AND SECURITIES**

Message Authentication: Hash Functions - Digest Functions - Digital Signatures - Authentication Protocols. Network Security Practice: Authentication - Applications - Electronic Mail Security - IP Security - Web Security.

**4. INTRUSION DETECTION SYSTEMS**

Detection and Recovery: Introduction - Internal and External Threats to Data – Attacks - Need and Types of IDS - Intrusion Prevention Systems. Network IDSs: Protocol based IDs - Application Protocol - Host based - Hybrid based IDs – Architectures - Auditing Information Systems Security - Evidence Collection and Analysis Tools - Information Leakage - Detection and Countermeasures.

**5. NETWORK SECURITY APPLICATIONS**

Authentication Mechanisms: Passwords – Cryptographic Authentication protocol - Smart Card – Biometrics - Digital Signatures and seals – Kerberos - X.509 LDAP Directory. Web Security: SSL Encryption – TLS – SET. E-mail Security: Pretty Good Privacy (PGPs) / MIME. IP Security - Access and System Security - Intruders - Intrusion Detection and Prevention –



Firewall - Hardware Firewall - Software Firewall - Application Firewall - Packet Filtering - Packet Analysis - Proxy Servers - Firewall setting in Proxy - ACL in Proxy.

## TEXT BOOKS

1. William Stallings, Cryptography and Network Security: Principles & Practice, Prentice Hall, 3rd Edition, 2002.
2. William Stallings, "Network Security Essentials", 3rd Edition, Pearson Education, 2006.
3. Hossein Bidgoli, Information Security, Volume 3, Threats, Vulnerabilities, Prevention, Detection, and Management, Wiley, 2006

## REFERENCES

1. Kahate ,Cryptography and Networks Security - 1st Edition 2005, TMH, New Delhi.
2. Edward Amoroso, "Fundamentals of Computer Security Technology", Prentice-Hall, 1999.
3. Pfleeger and Pfleeger, Security in Computing, Pearson Education, 3rd Edition, 2003.
4. Singh, Brijendra, "Network Security and Management", PHI, 2007.
5. Hans, "Information and Communication Security", Springer Verlag, 1998.

## 6. EVALUATION AND CERTIFICATION

Each paper shall have 75 marks for the End-Semester Examination and 25 marks for Continuous Assessment. The specializations paper (of the respective disciplines) syllabus, question paper setting and evaluation will be carried out by the guide. There is no passing minimum for CA. The duration for each written semester examination shall be three hours. A candidate shall be declared to have passed if s(he) secures not less than 50% of the marks in the Continuous Assessment and the End-Semester Examination taken together in each of the course.

### 6.1 CONTINUOUS ASSESSMENT (CA)

The CA components are as follows:

2 CA Tests	15 marks						
<table border="1"> <tr> <td>Research Methodologies – Practicing various Tools, Reports</td> <td>10 marks</td> </tr> <tr> <td>Application Domain - Paper Work, Technical Reports</td> <td>10 marks</td> </tr> <tr> <td>Guide Paper - Literature Survey, Paper Publication</td> <td>10 marks</td> </tr> </table>	Research Methodologies – Practicing various Tools, Reports	10 marks	Application Domain - Paper Work, Technical Reports	10 marks	Guide Paper - Literature Survey, Paper Publication	10 marks	
Research Methodologies – Practicing various Tools, Reports	10 marks						
Application Domain - Paper Work, Technical Reports	10 marks						
Guide Paper - Literature Survey, Paper Publication	10 marks						

The pattern of the CA Question Paper for the courses is as follows:

Time: 2 Hrs	Marks: 75
<b>Section – A [ 5 x 6 = 30 Marks ]</b> (Out Of SIX Questions FIVE shall be answered)	

**Section – B [ 3 x 15 = 45 Marks ]**  
(THREE Questions – internal choice)

## **6.2 END-SEMESTER EXAMINATION**

The pattern of the question paper for the courses is as follows:

Time: 3 Hrs	Marks: 75
<b>Section – A [ 5 x 5 = 25 Marks ]</b> (Answer any FIVE Questions - at least one question from each unit but not more than two questions from one unit. (Out Of EIGHT Questions FIVE shall be answered))	
<b>Section – B [ 5 x 10 = 50 Marks ]</b> (FIVE Questions – internal choice, one question from each unit)	

## **6.3 DISSERTATION**

Regular candidates shall submit the dissertation to the department at the end of the second semester. If a candidate is not able to submit his/her dissertation within the period stated above, s(he) will be given two extensions of 3 months each with penalty fee.

If a candidate does not submit his/her dissertation even after two extensions, his/her registration shall be treated as cancelled and s(he) has to re-register for the course.

### **REVISION OF DISSERTATION**

If the examiner who values the dissertation makes a qualified recommendation such as revision of dissertation then the candidate is advised to revise the dissertation in the light of the suggestions made by the examiner and re-submit his/her dissertation.

### **DISSERTATION EVALUATION**

The external examiner shall be selected by the controller of Examinations from a panel of three experts suggested by the department. The dissertation will be evaluated both by the external examiner and the research advisor (internal) for a maximum of 80 marks each and the average shall be taken.

There shall be a Viva-Voce examination, which shall be conducted by two examiners, one is the research advisor (internal) and the other is one who evaluated (external) the dissertation. The viva-Voce will be evaluated both by the external examiner and research advisor for a maximum of 20 marks each and the average shall be taken.

A candidate shall be declared to have passed in dissertation if s(he) secures not less than 50% of the marks prescribed for the Viva-Voce Examinations.

#### **6.4 PASSING REQUIREMENT AND GRADE CLASSIFICATION**

a) The candidate who passes all examinations in first attempt shall be classified as follows:

<b>Average of all subjects</b>	<b>Classification</b>
75% and above	DISTINCTION
60% to 74%	FIRST CLASS
50% to 59%	SECOND CLASS

b) A Candidate who passes in more than one attempt shall not be eligible for the classification of distinction or first class. S(he) shall be declared to have passed in second class.

## M.Phil. English

### Scheme of Courses

Paper	Code	Subject	Hours/Week		Credits	Max. Marks		
			L	P		CIA	Sem	Total
I		Research Methodology	6	-	6	25	75	100
II		English Language Teaching (or) Literary Criticism	6	-	6	25	75	100
III		Guide Paper - Indian Writing in English (Area of Specialization)	6		6	25	75	
IV		Dissertation		12	12	20 (Viva)	80 (Dis)	100
		<b>Total</b>	<b>18</b>	<b>12</b>	<b>30</b>			<b>400</b>

## M.Phil. English

### Paper - I: Research Methodology

#### Unit - I: Research

1. Attitudes to Research
2. Historical Perspective
3. The role of research, research approach and defining research component
4. Selecting a topic
5. Conducting Research
6. Compiling a working bibliography

#### Unit - II: Research Skills

1. Evaluation of Sources
2. Taking notes
3. Outlining
4. Writing Drafts
5. Language and style
6. Ethics of research and plagiarism

#### Unit - III: The Mechanics of Writing

1. Spelling
2. Punctuation
3. Use of numbers, Quotation, Underlining, Italics
4. Titles of works
5. Capitalization, ellipsis and other alteration of sources
6. Typographical consideration

#### Unit - IV: Documentation

1. Documenting sources and MLA style and APA style
2. List of works cited and other source lists
3. Format of the works cited

4. Arrangement of entries
5. Citing books, non-periodical publications, articles, periodical publications, print and
6. Citing non-print sources, electronic publications, sources in the text, abbreviations, and foot notes, biographic notes and Tables and figures.

#### **Unit –V: Format of the Thesis**

1. General thesis  
The format, page numbers, typing/printing, margin spacing, Heading and title, Tables and illustrations, electronic submission, writing the First draft, Revising and preparing final draft.
2. Empirical thesis(Social and Natural Sciences)  
Introduction, purpose of study significance, Hypothesis, procedure for data collection, Findings, conclusions and Recommendations.

#### **Reference Books**

1. Anderson Jonathan et.al, **Thesis and Assignment Writing**, New Delhi, Wiley Eastern. 1977.
2. Brooks and Warren. **Modern Rhetoric**.
3. Gibaldi, Joseph. **MLA Handbook for writers of Research papers**. VII edition, New Delhi. Affiliated East- West Press Pvt. Ltd. 2004.
4. Inerson. **Thesis Writing**. Prentice Hall.
5. Parsons C.J. **Thesis and Project work**. London: George Allen & Unwin Ltd., 1973.
6. Stern.H.H.Chapter 1. **Fundamental Concepts of Lnuage Teaching**. Pages 53-68, OUP 1983-1984.
7. APA style

## **Paper - II: English Language Teaching(or)Literary Criticism**

### **Unit- I: History of English Language Teaching**

1. Language Teaching in the Nineteenth Century
  - a) Grammar Translation Method
  - b) Individual Reformers
  - c) The Reform Movement
  - d) Natural methods of language teaching from Montaigne to Berlitz
2. English language teaching since 1900.
  - a) The teaching of English as a foreign or second language since 1900: a survey
  - b) The history of English language teaching, since 1900.
  - c) Herald E. Palmer
  - d) Michael West and the New Method
  - e) The Basic issue
  - f) Carnegie and after
  - g) A.S. Hornby and the post war consensus
  - h) The impact of applied linguistics
  - i) The notion of communication

### **Unit - II: Concepts of English Language Teaching**

1. Trends in linguistic theory: Language and Society
  - a. Skinner and Chomsky
  - b. The study of language comprehension and production
  - c. Language acquisition in childhood
  - d. The psychology of learning
  - e. The theoretical and experimental study of learning
  - f. Early Associationism
  - g. Educational psychology enters the scene
  - h. The postwar years: Turning to psychology for answers
  - i. The sixties: Questioning Psychological Assumptions.
  - j. The attack on the Psychology of Audio lingualism.
  - k. The Seventies: fresh theorizing and empirical research.
  - l. Socio linguistics, ethno linguists and psycholinguistics
2. Trends in Linguistic theory: Language and Mind
  - a. Universal grammar and its relevance
  - b. Mentalism, Rationalism and Innateness
  - c. Other areas of psycholinguistics
  - d. Cognitive science and Artificial Intelligence

### **Unit - III: Second Language Acquisition**

1. Talking about Language Teaching
  - a. The centrality of syntax and morphology
  - b. Competence Vs performance
  - c. Acquisition Vs learning
  - d. The role of the first language
  - e. The natural route of development
  - f. Contextual variation in language learner language
  - g. Individual learner differences
  - h. The role of the input

- i. Learner process
- j. The role of formal instruction
- k. A framework for investigation SLA

#### **Unit – IV: Learner and Learning Process and Strategies**

1. Learner Factors
  - a. Personal Factors
  - b. General Factors
  - c. Intelligence and aptitude
  - d. Cognitive style
  - e. Attitudes and motivation
  - f. Personality- Extroversion/Introversion/ Social skills inhibition
2. Learner Strategies
  - a. Formulaic speech
  - b. Creative Speech- Formation hypotheses
  - c. Production strategies
  - d. Communication strategies- Their types and typology.

#### **Unit - V: Language Teaching Theories as Theories of Teaching Method**

1. Major Trends in 20<sup>th</sup> Century Language Teaching Alternative Approaches and Methods
  - a. The oral Approach and Situational Language Teaching
  - b. The Audio lingual Method
  - c. Total Physical Response
  - d. The Silent way
  - e. Community Language Learning
  - f. Suggestopedia
  - g. Multiple Intelligences
  - h. Whole Language
  - i. Neuro-Linguistic Programming
  - j. The Lexical approach
  - k. Competency – Based Language Teaching
2. Language Teaching and Planning
  - a. Communicative competence
  - b. The Communicative Approach to language teaching
  - c. The Natural Approach
  - d. Content –Based Instruction
  - e. The Sociology of language teaching and learning:
    - Economic and technological Development
    - Educational and technological Development
    - Educational framework
    - Second language planning
  - f. Curriculum
  - g. Educational technology

#### **Reference Books**

1. Ellis, Rod, **Understanding Second Language Acquisition.** OUP 1985.
2. Lyons, John **Language and Linguistics- An Introduction** CUP 1981

- Richards, Jack C. and Theodore S. Rodgers. **Approaches and Methods in Language Teaching** – II edition CUP 2001.

### Recommended Reading

- Howatt: A.P.R **A History of English Language Teaching**, OUP 1984
- Stern H. H. **Fundamental Concepts of Language Teaching** OUP 1983/1984

## Literary Criticism

### Unit - I: Classical Criticism

- Aristotle : Poetics
- Horace : Ars Poetica

### Unit - II: Modern Criticism

- Cleanth Brooks : The Language of Paradox
- Sigmund Freud : Creative Writer and Day Dreaming
- Northrop Frye : The Archetypes of Literature
- Helen Gardner : The Sceptre and the Torch

### Unit - III: Structural Criticism

- Roman Jakobson : Linguistics and Poetics
- Mark Schorer : Technique as Discovery
- Todorov : The Figure in the Carpet
- Ferdinand de Saussure : Nature of the Linguistic Sign

### Unit - IV: Post Structuralist Criticism

- Wolfgang Iser : The Reading Process: A Phenomenological Approach
- Jacques Derrida : Structure, Sign and Play in the Discourse of Human sciences
- Greenblatt : Shakespeare and the Exorcist
- Colin MacCabe : Language, Linguistics and the Study of Literature

### Unit - V: Gender Studies, Post Colonialism and Translation Studies

- Elaine Showalter : Feminist Criticism in the Wilderness
- Gareth Griffith, Ashcroft and Tiffin : The Empire Writes Back
  - Introduction
  - Cutting the Ground
- Susan Bassnett- Mc Curie : Types of Translation- Specific problems of Literary Translation
- Juliet Mitchell : Femininity, Narrative and Psychoanalysis.

### Reference Books

- Barry, Peter. Beginning Theory, Manchester University Press, 2002.
- Bassnet, Susan and Harish Trivedi. Post-colonial Translation: Theory and Practice. Routledge 1999.
- Bassnet, Susan. **Translation Studies** , Methuen Co. Ltd, New York 1980.
- Belsey, Catherine, **Critical Practice**. Routledge: New York and London, 2002.



5. Emerson. **English Literary Criticism.**
6. Lodge, David, **Twentieth century Literary Criticism.**
7. Lodge, David and Nigel wood. **Modern Criticism and Theory.** Pearson Education Ltd, 1988.
8. Norris, Christopher. **An Introduction to Literature and Cultural Theory of Deconstruction.** New york, Routledge, 2005.
9. Panja, Shormishta, **Textual Application- Critical Theory,** Delhi: Worldview, 2002
10. The Penguin's **Literary Criticism.**
11. Ramaswami and V.S. Sethuraman Ed. **The English Critical Tradition An Anthology of English Literary Criticism.** Vol II. Madras. Macmillian Indian Ltd, 1978,1986
12. Sethuram V.S. Ed. **Comtemporay Criticism- An Anthology,** Madras MAcmillian India Ltd 1989
13. Scott, Wilbur. **Five Approaches of Literary Criticism.** London: Colluer Books, 1962
14. Tyson, Lois. **Critical theory Today,** Routledge: New York & London 2006
15. Waugh, **Patricia Literary Theory and Criticism: An Oxford Guide.** New Delhi: OUP 2006.
16. Wolfreys, Julian: **Introducing Literary Theories- A Guide and Glossary,** Edinburgh University Press, 2001.
17. Horace **Ars Poetica**
18. Gayathri C. Spivak **"Can the Subaltern Speaks?"**

### **Guide Paper**

#### **Paper - III: Indian Writing in English (Area of Specialization)**

#### **Unit – I Poetry**

- |                     |                                          |
|---------------------|------------------------------------------|
| 1. Toru Dutt        | - Our Casuarina Tree                     |
| 2. Nissim Ezekiel   | - Background                             |
| 3. Kamala Das       | - Looking Glass                          |
| 4. A.K. Ramanujam   | - Looking For a cousin on a swing        |
| 5. Parthasarathy    | - Exile                                  |
| 6. Gauri Despande   | - The female of the Species              |
| 7. Nirad C. Chaudri | - The Autobiography of an unknown Indian |

#### **Unit – II Critical Works**

- |                   |                               |
|-------------------|-------------------------------|
| 1. Macaulay       | - Minutes on Indian Education |
| 2. Sri Aurobindo  | - The Future Poetry           |
| 3. Salman Rushdie | - Imaginary Homelands         |

#### **Unit – III Novels**

- |                   |                           |
|-------------------|---------------------------|
| 1. Amitav Ghosh   | - The Shadow Lines        |
| 2. Arunthathi Roy | - The God of Small Things |

#### **Unit – IV Drama**

- |                  |                            |
|------------------|----------------------------|
| 1. Tagore        | - Water Lilly (Mukthadara) |
| 2. Girish Karnad | - Tughlaq                  |

### **Question Paper Pattern for M.Phil English**

CIA Component

Assignment	-	5 Marks
Seminar	-	5 Marks
CIA Test	-	15 Marks

### **Question Paper Pattern for M.Phil English**

Question Paper Pattern for Semester Examinations

Section –A (5 x 6 = 30 Marks)

1. (a) or (b)
2. (a) or (b)
3. (a) or (b)
4. (a) or (b)
5. (a) or (b)

Two questions from each unit, with internal choice

Section – B Answer any THREE (3 x 15 = 45 Marks)

One Question from each of the five units.