



**SCHEME OF EXAMINATION
&
DETAILED SYLLABUS**



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COURSE STRUCTURE OF M.PHIL. (MATHEMATICS)					
Sem	Paper	Marks			Total Marks
		Term End Examination	Internal Assessment (Seminar, Test)	Viva	
I	Theory Paper 1 (Research Methodology) Common To All	80	20	-	100
	Theory Paper 2 (One Subject Specific paper)	80	20	-	100
	Computer Skill	80	-	20	100
II	Dissertation	SCRIPT 150	-	50	200
TOTAL					500

PAPER I - RESEARCH METHODOLOGY (COMMON TO ALL SUBJECT)

PAPER 2 - ONE PAPER FROM THE OPTIONS GIVEN (AS PER SUBJECT)

MATHEMATICS

- Advanced Numerical Analysis
- Analysis & Differential Equations
- Measure And Integration
- Real And Complex Analysis
- Fuzzy Set Theory And Fuzzy Logic
- Advanced Operations Research

PAPER 3 - COMPUTER SKILL (COMMON TO ALL)

THESIS / DISSERTATION

To be prepared by all students individually under a supervisor.

M.PHIL SYLLABUS

COMMON PAPER (APPLY TO ALL)

PAPER I - RESEARCH METHODOLOGY

UNIT-I

Research- Definition, Importance and Meaning of Research, Characteristics of Research, Types of research, Steps in research, Selection and Formulation of research problem, Sources of research problems, criteria / characteristics of a good research problem, errors in selecting a research problem.

UNIT-II

Hypotheses- meaning and characteristics of working hypotheses, problem in formulating hypotheses, sources of Hypotheses, Origin of hypotheses, types and significance of Hypotheses.

UNIT-III

Research Design- Meaning, Objectives and contents of Research, Types of experimental Research Design, Collection of Primary data-Observation Methods, questionnaire method and schedule methods.

UNIT-IV

Case study Methods-Its Characteristics Advantages and limitation, Sampling techniques: Sampling Theory, types of sampling, Steps in sampling, Sampling and Advantages and Limitations of Sampling, Calculation of standard error's T - test and Z - Test, Chi-square tests, ANOVA-One-way / Two- way and analysis of variance.

UNIT-V

Research Reports- Types of reports- contents- Format & Styles of reporting- steps in drafting reports- Editing the final draft-Evaluating the final draft. Analysis and Interpretation of Data and Report Writing, References and Bibliography.

REFERENCE BOOKS

- | | | |
|-----------------------------------|---|---------------|
| 1. Research Methodology | : | C.R. Kothati |
| 2. Research Methodology | : | H.K. Kapil |
| 3. Statistics (Theory & Practice) | : | B. N. Gupta |
| 4. Social Research & Statistical | : | R.N. Mukhargi |
| 5. Social Research | : | D.S. Baghel |
| 6. Statistical Methods | : | S. P. Gupta |

PAPER III - COMPUTER SKILL (PRACTICAL)

(COMMERCE, MATHS, CHEMISTRY, PHYSICS, EDUCATION, PHYSICAL EDUCATION, ZOOLOGY, BOTANY, MICROBIOLOGY, LIBRARY SCIENCE)

UNIT - I

WINDOWS OPERATING SYSTEM:

Introduction to Windows, Various Versions of Windows, Working with Windows O.S., Managing Files and Folders, Managing Windows and Desktop, Installing and Using Windows Applications.

UNIT - II

WORD PROCESSING USING MS WORD:

Word Processing - Concepts and Using, Using MS Word for Windows, Inserting & Editing text, Formatting Texts & Paragraphs, Page Layout, Refining a document, Print a Document. Working with Columns and Tables, Using Images in Word Document, Mail-Merge, Desktop Publishing with Word.

UNIT - III

MS-EXCEL:

Introduction to Spreadsheet, Spreadsheets & Worksheets, Working with MS Excel, Gathering data for simple calculations, Formatting data, Using Numbers, and Texts, Formulas and Functions in MS- Excel, Creating Charts & Graphs.

UNIT - IV

MS-POWER POINT:

Introduction to Multimedia, Using MS-Power Point, Creating Presentation with MS-PowerPoint, Insert Graphics, Images, Charts and Tables in PowerPoint, Add Special effects and animation in PowerPoint, Print Slides and Handouts.

UNIT - V

INTRODUCTION TO STATISTICAL PACKAGES:

Usage of to Statistical Packages for analysis in research - Lotus and Excel, SPSS; SYSTEM.

THESIS / DISSERTATION

To be prepared by all students individually under a supervisor. A synopsis should be submitted and approved by the DRC of the concerned department.

M.PHIL. PAPER II (SUBJECT SPECIFIC)

CHOOSE ANY ONE OPTIONAL PAPERS FROM THE FOLLOWING GIVEN OPTIONS

MATHEMATICS

(A) ADVANCED NUMERICAL ANALYSIS

UNIT-I

Error in Numerical Calculations: Numbers and their accuracy, errors and their Analysis, General error formula, Error in a series Approximation.

UNIT-II

Two Point boundary value Problems: Linear ordinary differential equations, Non Linear ordinary differential equations, Non-uniform grid methods for the Seconds order Boundary value problems.

UNIT-III

Numeric Solution of Integral Equations: Integral equation, Finite difference methods, methods of degenerate Kernets, Method of Invariant Impeding, Method using Generalized Quadrature, Evaluation of singular integrals.

UNIT-IV

Numerical Solution of Partial Differential Equations : Finite difference Approximations to Derivatives, laplace's Equations jacobi's method, Gaussiedel and successive over Relaxation methods, Parbolic and Hyperbolic equations lterative method and choice of initial approximation.

UNIT-V

Finite Element Methods: Introduction, residual Methods, Verification methods, Elements, Assembly of elements equadic application value problems and initial value problems such as flow or local fluids, Flow of Viscous fluids, Transient heat condition.

REFERENCES:

1. Numerical Methods for Scientfic and Engineering computation: Jain lynger.
2. Numerical Analysis : Sastri, S.S.

(B) ANALYSIS & DIFFERENTIAL EQUATIONS

UNIT-I

LEBESGUE MEASURE:

Introduction: - Outer measure - sets & Lebesgue measure - A non measurable set - Measurable functions-Littlewood's three principals.

UNIT-II

THE LEBESGUE INTEGRAL:

Riemann integral - The Lebesgue integral of bounded function over a set of finite measure- The integral of a non-negative function-The general Lebesgue integral-Convergence in measure.

UNIT-III

DIFFERENTIATION & INTEGRATION:

Differentiation of monotone functions- Functions of bounded variation - Differentiation of an integrate Absolute continuity-Convert functions. (Section 5-5.1 to 5.5)

UNIT-IV

Introduction equations with constant coefficient : Introduction-The 2nd order homogeneous equation- Initial value problem for second order equations - Linear dependence - A formula for the Wronskian- The non-homogeneous equation of order two - The homogeneous equation of order 'n' - Initial value problem for nth order equations-Equations with real constant. (Section 2-2.1 to 2.9 omit 2.10 to 2.11, 2.12)

UNIT-V

Introduction-Initial value problem for the homogeneous equation-Solutions of the homogeneous equation-the Wronskian and linear independence-Reduction of order of a homogeneous equation - The non-homogeneous equation.

REFERENCES:

1. Real analysis by H.L. Royden. 3rd editing- Prentice Hall and Publication
2. An Introduction to Ordinary Differential equations by Eari a Cardington-Prentice Hall of India Publishers.

(C) MEASURE AND INTEGRATION

UNIT-I

Measurable spaces: Ring, Alzebras, Monotone classes, measurable space.

UNIT-II

Measurable functions: Labesgu Measurable functions, Alzebras of measurable functions, Sequences of measurable function convergence in measure, Riese's Theorem simple Functions, Luzin's Theorem.

UNIT-III

Outer measures: Outer measure (CARA THEODORY), Measurable sets, Algebra of measurable sets, Measures of Locally compact Hausdroff space.

UNIT-IV

Integration and Summable Function : Measurable dissection of set Lebegue Integral Passage of limit under the sign of integral, Lagesgue, Dominated Convergence theorem, Riez's Representation, Theorem, Regular measures. Lp-spaces, Lpspaces, Holder's inequality, Minkowshi's inequality, Completeness of Lp spaces.

UNIT-V

Product measures, Product measurable space section, Fubini's theorem, Integration of Vectior, valued function, Lioi's theorem, Measure induced by Random Measure and itsproperties, Randon-Nikodyn, Signed measures, hahn decomposition theorem. Absolutely cotiuous measure, Lebesugue Randuon- Nikodyn theorem.

REFERENCES:

1. Measure and interation : Berbarian. S.K.
2. Measure Theory : Halmos, P.R.

(D) REAL AND COMPLEX ANALYSIS

UNIT-I

POSITIVE BOREL MEASURES :

Vector Space-Topological Preliminaries-The Riesz representation theorem-Regularity properties of Borel measures.

UNIT-II

L^p SPACES :

Convex function and inequalities-The L^p Spaces-Approximation by continuous functions.

UNIT-III

ELEMENTARY HILBERT SPACE THEORY :

Inner product and linear functionals-Orthonormal sets-Trigonometric series.

UNIT-IV

EXAMPLES OF BANACH SPACE TECHNIQUES :

Banach space-Consequence of Baire's Theorem-Fourier series of continuous functions-Fourier coefficient of L^1 Functions-The Hahn-Banach Theorem.

UNIT-V

COMPLEX MEASURES :

Total variation-Absolute Continuity-Consequence of Randon-Nikodym heorem-bounded Linear Functional L^p the Riesz representation theorem.

UNIT-VI

INTEGRATION ON PRODUCT SPACE:

Measurability on Cartesian Products-Product measures-The Fubini heorem-Completion of Product Measure-Convolutions.

UNIT-VII

FOURIER TRANSFORMS :

Formal Properties-The Inversion theorem-the Plancherel Theorem-the Banach Algebra L^1 .

UNIT-VIII

ELEMENTARY PROPERTIES OF HOLOMORPHIC FUNCTIONS :

Complex Differentiation-Integration over paths-The local Cauchy theorem-The power series representation-The open mapping theorem-The Global Cauchy theorem-the Calculus of residues.

REFERENCES:

1. "Real & Complex Analysis" by walter rudin II Edition - Tata McGraw Hill Publishing Co. Limited, New Delhi.

(E) FUZZY SET THEORY AND FUZZY LOGIC

UNIT-I

CLASSIFICATION OF SETS AND FUZZY SETS:

Basic concepts of classical set and fuzzy set, basic operations and properties of classical and fuzzy sets, basic concept of classical relation and fuzzy relation and composition.

UNIT-II

MEMBERSHIP FUNCTIONS, FUZZIFICATION AND DEFUZZIFICATIONM FUZZY RELATION AND COMPOSITION:

Basic concept of function and fuzzy function , standard forms and boundaries, fuzzification, defuzzification, fuzzy numbers and operations. Integration and differentiation of fuzzy functions.

UNIT-III

CLASSICAL LOGIC, FUZZY LOGIC AND FUZZY RULE BASED SYSTEM:

Basic concept of classical logic fuzzy logic, appropriate reasoning, natural languages, linguistic hedges, fuzzy rule based system.

UNIT-IV

FUZZY NON-LINEAR SIMULATION AND FUZZY DECISION MAKING:

Fuzzy relational equation, partitioning, non-linear simulation using fuzzy rule based system, fuzzy synthetic evaluation, fuzzy ordering, preference & consensus.

UNIT-V

PROBABILITY AND UNCERTAINTY:

Basic concept of probability theory and possibility, comparison of probability and possibility, fuzzy event, uncertainty, measure of fuzziness.

TEXT BOOKS :

1. Fuzzy logic with engineering application -T.J. Ross, McGraw Hill Pub.
2. First course on fuzzy theory & application- K.H. Lee, Springs Int.

REFERENCES BOOKS:

1. Fuzzy set, Fuzzy logic theory & appl. G.J. Klier, Prentic Hall.
2. Fuzzy set theory & its appl. H.J. Zimmerman, Allied Pub.
3. Principles of Fuzzy logic-Novak , Kluwer Academic Pub.

(F) ADVANCED OPERATIONS RESEARCH

UNIT-I

Inventory control: Deterministic and probabilistic model, price break inventory, Replacement, Renewal theory, maintenance and Reliability.

UNIT-II

Transportation Problem: A streamlined simplex method for the transportation, Problem, Stepping stone method, Transshipment problem.

Assignment Problem: Traveling sales person problem.

UNIT-III

Queuing Theory: The Birth and Death process, queuing models involving non-exponential distributions, Priority-discipline queuing model, and Queuing networks.

UNIT-IV

Project Management: Networks, shortest Route problem, Minimal spanning tree Problem, Maximum flow problem, project planning and control with PERTCPM.

UNIT-V

Simulation: Phases of Simulation model, Monte Carlo Simulations.

REFERENCES:

1. Operations Research : Hiller & Liberman
2. Numerical Analysis : Within and Heddley
3. Optimization Moderation Modeling with LINDO : Linus Scharge
4. Operation research by S.D. Sharma, Kedarnath - Ramnath Publication
5. Operation research by Kanti Swarup

DISSERTATION

Students individually will carry out a detail study on a topic and implement a related system. The study must include literature survey, methodology and proposed work, experimental details and results, modifications to be included and future directions, applications etc. A report is to be prepared and submitted under the guidance of a supervisor. The report should contain design, implementation and experimental details. The topics involved in the work should be related to the courses undertaken by the student till this portion of progression under the programme and have contemporary relevance. It can involve research and development oriented works and be carried out with an eye on the needs of the industry. The work must be defended through a presentation in front of a panel constituted by selected experts. The quality of the work should be reflected by at least one publication in conference proceedings/ journals etc.

