PG AND RESEARCH

DEPARTMENT OF MATHEMATICS

HAJEE KARUTHA ROWTHER HOWDIA COLLEGE,

(An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai)
Re-Accredited with "A" Grade by NAAC, by Banglore

Uthamapalayam – 625 533.

Syllabus for Master of Philosophy - Mathematics

(Academic Year 2017-18 Onwards)

PROGRAMME SPECIFIC OUTCOMES:

PSO1. Develop research level thinking in the field of pure and applied mathematics

PSO2. Assimilate complex mathematical ideas and arguments

PSO3. Apply domination theory in installing common facility in appropriate points in town planning. Further labeling theory is used to allot radio frequency for transmission of messages.

PSO4. Develop abstract mathematical thinking and to improve own learning and performance

HAEE KARUTHA ROWTHER HOWDIA COLLEGE (AUTONOMOUS)

UTHAMAPALAYAM

M.Phil MATHEMATICS SYLLABUS

Academic Year 2017-2018 Onwards

I Semester

Three Theory Papers Code

Core I- Research Methodology: Associative Algebra	17MMAC11
Core II- Advance Mathematics: Advanced Analysis	17MMAC12
Elective Papers:	
A . Graph Theory	17MMAE11
B . Stochastic Process	17MMAE12

For each paper- Internal 40 marks and external 60 marks

Mark splitting pattern (Internal):

Conducting three tests (Average of Best two) - 25 marks

Seminar - 15 marks

No marks for assignment

II Semester:

Dissertation only- 200 marks

Evaluation of dissertation - 150 marks

(Average of internal and external examiners)

Viva- voce - 50 marks

Question pattern

Max. marks: 60 Time 3 hrs.

Part A (5x6 = 30 marks)

Answer **ALL** questions choosing either (a) or (b)

(One question from each unit with internal choice)

Part B (3x10 = 30 marks)

Answer **ANY THREE** questions (out of five questions)

(one question from each unit)

M.Phil Scheme of Examination

Sem	Course Code	Title of the Course	Credit	Internal Marks	External Marks	Total Marks
I	17MMAC11	Research Methodology: Associative Algebra	4	40	60	100
	17MMAC12	Advance Mathematics: Advanced Analysis	4	40	60	100
	17MMAE11 **Or** 17MMAE12	Elective A.Graph Theory	4	40	60	100
		Elective B. Stochastic Process	4	40	60	100
II	17MMACEV	Dissertation	8	150	50	200
	Total		20	270	230	500

Research Methodology

Programme: M.Phil.,Maths **Course Category: Core - I**

Semester : I **Hours: 5**

Course Code: 17MMAC11 **Credits: 5**

Course Outcome:

CO1: Develop research level thinking in the field of pure and applied mathematics

Unit I

Associative algebra – Group algebras – Endomorphism algebra- Matrix algebras- Quaternion algebra – Finite dimensional algebras – Quaternion algebras- Isomorphism of Quaternion algebras.

Unit II

Modules – Changes of scalars – Lattice of Sub modules – Simple modules – Semi simple modules – structure of semi simple modules – Chain conditions – The Radical of ring – tensor product of modules.

Unit III

Structure of semi simple algebras – Semi simple – Minimal right ideals – Simple algebras – Matrices of homeomorphisms - The density theorem – Wedderburn structure theorem – Mascheke's theorem.

Unit IV

The Radical – radical of an algebra – Nakayam's Lemma – The Jacobson radical – The radical of an Artinian algebra – Nilpotent algebras- The radical of a Group algebra – Ideals in Artinian Direct decompositions – Local algebras – Fitting's lemma.

Unit V

Simple algebras – centers of simple algebras – The density theorem The Jacobson – Bourbaki theorem – Central simple algebras- The Braner Group - The Noehter – Skolem Theorem – The Double Centralizer Theorem.

Text Book

R.S.Pierce **"The Associative Algebras**" GIM 88, Springer Verlag 1982.

ADVANCE MATHEMATICS

Programme: M.Phil.,Maths **Course Category: Core**

Semester : I **Hours: 5**

Course Code: 17MMAC12 **Credits: 5**

Course Outcome:

CO1: Assimilate complex mathematical ideas and arguments

Unit I

Abstract Integration:

Set – Theoretic notations and terminology – The concept of measurability – Simple functions – Elementary properties of measures – Arithmetic on $[0, \infty]$ – integration of positive functions – integration of complex functions – The role played by sets of measure zero.

Unit II

Positive Borel Measures:

Vector spaces – Topological preliminaries – The Riesz – Representation theorem – Regularity properties of Borel measure.

Unit III

Lebesgue Measure:

Lebesgue measure – continuity properties of measurable functions.

Unit IV

L^p – Spaces:

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

Unit V

Fourier transforms:

Formal properties – The inversion Theorem – The Planchered theorem – The Banach algebra L^p

Text book:

Real and Complex Analysis (III-Edition) Walter Rudin Mc Graw – Hill International Editions 1987 Chap : 1,2, 3&9

ELECTIVE –A

GRAPH THEORY

Programme: M.Phil.,Maths **Course Category: Elective**
Semester : I **Hours: 5**
Course Code: 17MMAE11 **Credits: 5**

Course Outcome:

CO1: Apply domination theory in installing common facility in appropriate points in town planning. Further labelling theory is used to allot radio frequency for transmission of messages.

Unit I :

Domination in Graphs – Dominating sets in graphs – Bounds on the domination number in terms of order, size, degree, diameter and girth.

Unit II :

Changing and unchanging properites of domination parameters.

Unit III :

Factorization and decomposition of Graphs – Graceful labeling of graphs – Harmomonius labeling of graphs.

Unit IV :

The Ramsey number of graphs – Turan's theorem – Rainbow Ramsey theorem.

Unit V :

Product Graphs.

Text Book :

1. T.W.Haynes, S.T.Hedetniemi and P.J.Slater, Fundamentals of Domination in Graphs, Marcel Dekker Inc.1998.
2. G.Chartrand and L.Lesniak, Graphs and Digraphs, Fourth Edition, Chapman and Hall CRC, 2005.
3. Gary Chartand and Ping Zhang, Introduction to Graphs Theory, Tata Mcgraw- Hill, 2005
4. A Text Book of Graph Theory Volume I and II by R.Balakrishan and Renganathan.

Reference Books :

1. V.R.Kuli, Theory of domination in graphs, Vishwa International Publications, Gulbarga, 2010.
2. K.R.Parthasarathy, Basic Graph Theory, Tata Mcgraw – Hill Publishing Company, 1994
3. Douglas West, Introduction in Graph Theory, Prentice, Hall of India, 2010.

ELECTIVE –B - STOCHASTIC PROCESS

Programme: M.Phil.,Maths **Course Category: Elective**
Semester : I **Hours: 5**
Course Code: 17MMAE12 **Credits: 4**

Unit 1:

Random Variables and Stochastic Process

Generating Functions Laplace Transform Laplace (stileltjes) Transform of a Probability ,Distribution of a random classification of Distribution stochastic Process An Introduction.

Unit 2:

Markov Chains

Definition and examples – Higher Transition Probabilities –Sequence of Chain dependent -Trails-Classification of states and chains-Determination of higher transition probabilities-Stability of a Markov System-Graph theoretic approach-Markov chain with Denumerable number Of states.

Unit 3:

Markov process with discrete scale space Poisson process and its Extensions

Poisson process- Poisson process and Related Distributions- Generalization of Poisson process -Birth and Death process- Markov process with Discrete state space(Continuous Time Markov Chain)

Unit 4:

Markov process with Continuous states space

Introduction- Brownian motion-Wiener process- Differential Equations for a Wiener process-Kolmogorov Equation- First passage Time Distribution for Wiener process,Ornstein- Uhlenbeck Process

Unit 5:

Martingales

Introduction- Defintions and examples- properties of martingales- Continuous parameter Martingales

Text Book

J.Medhi “Stochastic processes” (2 nd Edition) New age International Pvt Publisher- 2009

DISSERTATION

Programme	: M. Phil., Mathematics	Part	: Dissertation
Semester	: II	Hours	: 6
Course Code	: 17MMACEV	Credits	: 8

Course Outcomes

CO1: Formulate a research a topic

CO2: Familiar with the various stages of research process

CO3: Ability to analyze and evaluate the chosen topics

In the II semester the students have to write a dissertation. Regular attendance is compulsory.
(200 marks: Dissertation 150 and Viva voce 50)