M.Phil., MATHEMATICS

SEM	SUB. CODE	COURSE	SUBJECT TITLE	HRS /WK	CR.	MARKS
I	11MPMA01	Core Course - I	Research Methodology	4*	4	100
	11MPMA02	Core Course - II	Analysis, Differential Equations and Graph Theory	4*	4	100
	11MPMA03	Core Course - III	Recent Selected Trends in Mathematics	4*	4	100
	11MPMA04	Core Course - IV	Pedagogical Skills and MATLAB	4*	4	100
			TOTAL	**16**	**16**	**400**
II	11MPMA05	Project Work	Project Work	---	8	200
			TOTAL	**16**	**24**	**600**

* - One hour Library for each Course

CORE COURSE – I
RESEARCH METHODOLOGY

Sub Code:	**12MPMA01**	**Max Marks:**	**100**
Hours/Week:	**4**	**Internal Marks:**	**40**
Credit:	**4**	**External Marks:**	**60**

UNIT I

Research Methodology : An introduction – Defining the research problem – Research design.

UNIT II

Noetherian modules – Primary decomposition – Artinian modules

UNIT III

Real Analysis : Vector spaces – Integration as a linear functional - Topological preliminaries – Regularity properties of Borel measures.

UNIT IV

Complex Measures: Total variation-Absolute-Continuity-Consequences of the Random Nikodym theorem-Bounded linear functional of $\llcorner^p$- The Riesz representation Theorem.

UNIT V

Homotopy of paths – The Fundamental group – Covering spaces

Text Books:

T.B-1: C.R.Kothari, Research Methodology ,New Age International Publishers, 2nd Revised Edition, Reprint 2009.

T.B-2: N. S. Gopalakrishnan, Commutative Algebra, Oxonian Press Private Ltd, NewDelhi, Second Edition, 1988.

T.B-3: Walter Rudin, Real & Complex Analysis, Third Edition, Tata McGraw-Hill Publishing Company Limited, 2006.

T.B-4: James R. Munkres, Topology a First Course, PHI Learning Private Ltd., Reprint 2009.

UNIT I	Chapter : I, II & III Page No. 1 –54	**T.B-1**
UNIT II	Sections : 3.1 – 3.3	**T.B-2**
UNIT III	Chapter 2 : Sections 2.1 to 2.13, 2.15-2.18	**T.B-3**
UNIT IV	Chapter 6 : Sections 6.1 to 6.19 (Page No.124-142)	**T.B-3**
UNIT V	Chapter 9 : Sections 51,52,53	**T.B-4**

Reference Books :

1. David S. Dummit and Richard M. Foote, Abstract Algebra, Wiley-Student Edition, India, Second Edition, 2009.

2. G. De .Barra, Measure Theory and Integration, New Age International (P) Ltd., New Delhi, Reprint 2009.

3. P. R. Halmos, Measure Theory, D. Van Nostrand Company Inc, Princeton N.J.1950.

4. Serge Lang, Algebra, Addition- Wesley Publishing Company, Sydney, London, Second Edition,1970.

 5.Tom M. Apostol, Mathematical Analysis, Second Edition, Narosa Publishing House, Reprint 2002.

CORE COURSE – II
ANALYSIS AND APPLIED MATHEMATICS

Sub Code:	12MPMA02	**Max Marks:**	100
Hours/Week:	4	**Internal Marks:**	40
Credit:	4	**External Marks:**	60

UNIT I

Functional Analysis : General preliminaries on Banach Algebras: The definition and some examples – Regular and singular elements – Topological divisors of zero. The Spectrum – The formula for the spectral radius – the radial and semi – simplicity.

The structure of commutative Banach Algebra: The Gelfand mapping – Application of the formula r(x) = lim || x || - Involution in Banach Algebra. The Gelfand – Neumark theorem

UNIT II

Differential Equation (Linear and Non-Linear systems): Uncoupled linear systems – Diagonalization – Exponential of operators – The fundamental theorem for linear systems – linear system in R^2 – Complex Eigen values - Multiple Eigen Values - Some preliminary concepts and definitions – The fundamental existence – Uniqueness theorem.

UNIT III

Domination: The domination number of graph - Exploration - Stratification

UNIT IV

Advanced optimization techniques: Network Optimization Problem (NOP) – Various classes of NOP - Various classes of Shortest Path Problem – Terminology – Mathematical formulation of an MOSPP as an MOLPP – Classification of algorithmic approach of SOSPP and MOSPP – Basics of complexity of algorithm – Algorithm to compute Pareto optimal vectors - Maximum number of Pareto Optimal Paths – Detection of Negative cycle of an MOSPP - Generalization of Modified Dijkstra's Algorithm - Computational Complexity.

UNIT V

Fuzzy Graph: Paths and Connectedness- Fuzzy Bridges and Fuzzy Cut nodes- Fuzzy Forests and Fuzzy Trees.

Text Books:

T.B-1: G.F.Simmons, Introduction to Topology and Modern Analysis, Mc-Graw-Hill International Edition, Fifteenth Reprint 2011.

T.B-2: L.Perko, Differential Equations and Dynamical Systems, Springer International Edition, 3rd Edition, Reprint 2009.

T.B-3: Gary Chartrand and PingZhang,Introduction to Graph Theory,McGraw Hill,International Edition,2005.

T.B-4: Ismail Mohideen.S, A text Book of Network Optimization Problems,GoldenPublishers, 1stEdition2011.

T.B-5: A. Nagoor Gani and V. T. Chandrasekaran, A first look at Fuzzy Graph Theory, Allied Publishers Pvt. Ltd. Chennai, First Edition 2010.

UNIT I   Chapter 12 : Sections 64 to 69(Page No. 301 to 317)

              Chapter 13 : Section 70 to 73 (Page No. 318 to 326)   **T.B-1**

UNIT II   Chapter 1 : Section 1.1 to 1.7 and Chapter II – section 2.1 to 2.2 **T.B-2**

UNIT III   Chapter 13 : Section 13.1 and 13.2 **T.B-3**

UNIT IV   Chapter : 2, 3 & 4 **T.B-4**

UNIT V: Chapter 3 : Section 3.1 – 3.3 **T.B-5**

References :

1. Balmohan V Limaye,Functional Analysis – 2ndEdition,New Age International(P)Ltd.NewDelhi,Reprint 2009.

2.M.Murugan, Topics in Graph Theory and Algorithms, Muthali Publishing House, Annanagar, Chennai, First Edition 2003.

3. Sastry. V.N., and Ismail Mohideen. S., Modified Algorithm to Compute Pareto –Optimal Vectors, Journal of Optimization Theory and Applications, Vol. 103, No. 1, PP. 241 – 244, October 1999.

4. Sastry, V.N., Janakiraman, T.N. and Ismail Mohideen, S., New Algorithms for Multi Objective Shortest Path Problem, OPSEARCH, Vol. 40, No. 4, PP. 278 – 298, 2003

CORE COURSE – III
GUIDE PAPER

Sub Code: 12MPMA03   **Max Mark** 100

Hours/Week: 4   **Internal Marks:** 40

Credit: 4   **External Marks:** 60

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

Text Books:

References:

CORE COURSE – IV
EDUCATIONAL TECHNOLOGY IN MATHEMATICS AND MATLAB

Sub Code: 12MPMA04	**Max Marks:**	100
Hours/Week: 4	**Internal Marks:**	40
Credit: 4	**External Marks:**	60

UNIT I

Learning in higher education: What is Learning? - Learning Hierarchy – Information Processing – Learning Events – Learning Outcomes – Motivation.

Teaching technology – designs: Technology – Teaching Technology – Instructional Technology and Education Technology – Instructional Designs – Combination of Teaching Strategies and Instructional Designs.

UNIT II

Teaching technology Large groups: Psycho – dynamics of Group Learning – Lecture Method – Modified Forms of Lecture – Seminar – Symposium – Panel Discussion – Team Teaching – Project Approach – Workshop. Teaching in small groups: Small Group Instruction – Group Discussions – Simulation Approach – Role Playing - Buzz Group Technique – Brainstorming – Case Discussions – Assignment.

UNIT III

 Class room management: Teacher and Class Room Management – Class Room Management: A Conceptual Analysis – Discipline – A component of Class Room Management – Strategies for Class Room Management – Behavior Problems of Students in Colleges – Human Relations in Educational Institutions. Professional Growth: Need and Importance of Professional Growth – Professional Ethics.

UNIT IV

Communication skills: Introduction to life skills – Communication – emotional – functional – personality skills. Public speaking – Welcome speech- Introducing guests – Vote of Thanks – Speech on current topics like use of cell phones, beauty contests, pollution etc., Personality Development Soft skills – Body language – Goal setting – positive attitude – emotional intelligence, leadership qualities – problem solving Conversation in selected context – Introduction, permission, request, offer, greetings, sympathy, apology, suggestion, permission, telephonic conversation, compliant, warning, gratitude. Communication for career – Preparation – resume- group discussion - Interview – standard , Panel, walk-in, group, stress, mock interview (practice)

UNIT V

MATLAB: Introduction - What is MATLAB? – Does MATLAB Do symbolic calculations? – Will MATLAB Run on My Computer? – Where do I get MATLAB? – Basis of MATLAB: MATLAB windows – on line help – Input output, File types. Tutorial Lessons: A minimum MATLAB session – creating and working with arrays of numbers – creating and printing simple plots – creating , saving and executing a script file . Applications: Linear Algebra – curve fitting interpolation – Numerical Integration – Ordinary differential equation.

Text Books:

T.B-1: E .C. Vedanayagam, Teaching Technology For College Teachers, Striling Publishers Private Limited, 1988.
T.B-2: K. Alex, Soft Skills, S. Chand & company Ltd., New Delhi, First Edition 2009.
T.B-3: Rudra Pratap, Getting Started with MATLAB 7, Oxford University Press, 2006.

UNIT I   Chapter : 2 & 3   **T.B − 1**

UNIT II   Chapter : 4 & 5   **T.B − 1**

UNIT III   Chapter : 8 & 12   **T.B − 1**

UNIT IV   **T.B − 2**

UNIT V   Chapter : 1   Section 1.1 to 1.4 & 1.6 to 1.6.5
                    Chapter : 2   Section 2.1 to 2.4
                    Chapter : 3   Section 5.1 to 5.5   **T.B − 3**

Reference Books :

1. Brian R. Hunt, Ronald L. Lipsman, Jonathan. M. Rosenberg, A Guide to MATLAB for Beginners and Experienced Users, Cambridge University Press,Reprint 2008.
2. Cheryl Hamilton, Communicating for results, Wads Worth cenage learning, 9[th]Edition,USA,2005.
3. Leena Sen, Verbal and non verbal communication, Eastern Economy Editions, PHI Learning, 2nd Edition, 2011.
4.S.A.W.Bukari, Soft Skills Competencies for Success, Sanjee Book House, Trichy, 2009.

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PG & RESEARCH DEPARTMENT OF MATHEMATICS

CHOICE BASED CREDIT SYSTEM – M.Phil 2012 - 2013 ONWARDS

M.Phil (Mathematics)

SEM	SUB. CODE	COURSE	SUBJECT TITLE	HRS /WK	CR.	MARKS
I	12MPMA01	Core Course - I	Research Methodology	4*	4	100
	12MPMA02	Core Course - II	Analysis and Applied Mathematics	4*	4	100
	12MPMA03	Core Course - III	Area of Research	4*	4	100
	12MPMA04	Core Course - IV	Educational Technology in Mathematics and MATLAB	4*	4	100
	* - One hour Library for each Course **TOTAL**			16	16	400
II	12MPMA05	Project Work	Dissertation/Project Work	---	8	200 (150+50)
	TOTAL			16	24	600