E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.

(*An Autonomous Institution – Affiliated to Madurai Kamaraj University*)

Re-accredited (**3rd Cycle**) with Grade **A+** & **CGPA 3.51** by NAAC

DEPARTMENT OF MATHEMATICS

CBCS SYLLABUS

MASTER OF SCIENCE

PROGRAMME CODE - PM

COURSE STRUCTURE

(w.e.f. 2017 – 2018 onwards)

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CRITERION - I

1.2.2 Details of Programmes offered through Choice Based Credit System (CBCS) / Elective Course System

Syllabus copies with highlights of contents focusing on Elective Course System

To be Noted:

HIGHLIGHTED	COURSE
	Elective

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DEPARTMENT OF MATHEMATICS-PG

(w.e.f. 2017- 2018 Batch onwards)

Sem	Sub. code	Title of the Paper	Lecture hrs per week	Duration of Exam hrs.	Marks Allotted			
					C.A	S.E	Total	Credits
I	17PM11	Algebra	6	3	25	75	100	5
	17PM12	Analysis	6	3	25	75	100	5
	17PM13	Differential Equations	6	3	25	75	100	5
	17PM14	Differential Geometry	6	3	25	75	100	4
		Elective –I	6	3	25	75	100	4
II	17PM21	Advanced Algebra	6	3	25	75	100	5
	17PM22	Measure and Integration	6	3	25	75	100	5
	17PM23	Graph Theory with Applications	6	3	25	75	100	4
	17PM24	Statistics	6	3	25	75	100	4
		Elective - II	6	3	25	75	100	4
III	17PM31	Advanced Statistics	6	3	25	75	100	5
	17PM32	Complex Analysis	6	3	25	75	100	5
	17PM33	Mechanics	6	3	25	75	100	4
	17PM34	Topology	6	3	25	75	100	4
		Elective -III	6	3	25	75	100	4
IV	17PM41	Advanced Topology	6	3	25	75	100	5
	17PM42	Combinatorial Mathematics	6	3	25	75	100	4
	17PM43	Functional Analysis	6	3	25	75	100	4
	17PM44	Operations Research	6	3	25	75	100	5
	17PMPR	Project	6	3	20	80	100	5

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ELECTIVE PAPERS

Elective – I has to be chosen in Semester I from the following:

1. Number Theory -17PME1A
2. Visual Basic - 17PME1B

Elective – II has to be chosen in semester II from the following:

1. Numerical Methods - 17PME2A
2. Automata Theory and Formal Languages - 17PME2B

Elective – III has to be chosen in semester III from the following:

1. Fuzzy sets and Logic - 17PME3A
2. Stochastic Process - 17PME3B

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Title of the paper	:	**Number Theory**		
Semester	**:**	**I**	**Contact Hours:6**	
Sub Code	**:**	**17PME1A**	**Credits**	**:4**

Objectives :

1. To understand the techniques of analytic number.
2. To study some special functions.

Unit – I Introduction – Divisibility – Greatest Common divisor – Prime numbers - The fundamental theorem of Arithmetic – The series of reciprocals of the Primes - The Euclidean algorithm - The greatest common divisor of more than two numbers.

Unit – II Introduction – The Mobius function $\mu(n)$ – The Euler totient function $\Phi(n)$ – A Relation connecting φ and μ – A product formula for $\Phi(n)$ – The Dirichlet product of arithmetical functions – Dirichlet inverses and the mobius inversion formula – The Mangoldt function $\Lambda(n)$ – Multiplicative functions - Multiplicative functions and Dirichlet Multiplication – The inverse of a completely multiplicative function- Liouville's function $\lambda(n)$ - The divisor functions $\sigma_\alpha(n)$ - Generalized convolutions – Formal power series – The Bell series of an arithmetical function – Bell series and Dirichlet multiplication – Derivatives of an arithmetical functions – The Selberg Identity.

Unit - III Introduction – The big Oh notation-Asymptotic equality of functions – Euler's summation formula – Some elementary asymptotic formulas – The average order of $d(n)$ - The average order of the divisor functions $\sigma_\alpha(n)$ - The average order of $\Phi(n)$ - An application to the distribution of lattice points visible from the origin – The average

order of $\mu(n)$ and $\wedge(n)$ - The partial sums of a Dirichlet product - Applications to $\mu(n)$ and $\Lambda(n)$ - Another identity for the partial sums of a Dirichlet product .

Unit – IV Introduction – Chebyshev's functions $\chi(x)$ and I(x) – Congruences - Definition and basic properties of congruences - Residue classes and complete residue systems – Linear congruences – Reduced residue systems and Euler Fermat theorem – Polynomial congruences modulo p - Lagrange's theorem – Applications of Lagrange's theorem – Simultaneous linear Congruences – The Chinese Remainder theorem – Applications of the Chinese Remainder theorem – Polynomial congruences with prime power moduli - The Principle of cross classification – A decomposition property of reduced residue systems.

Unit – V Quadratic residues – Legendre's symbol and its properties – Evaluation of (-1/p) and (2/p) - The Jacobi symbol - Applications of Diophantine equations - Gauss sums and the Quadratic reciprocity law.

Text Book:-

Tom.M. Apostol, Introduction to Analytic *Number theory*. Narosa Publishing House (1998).

Chapters :-

Unit I - Chapter 1 : Sections 1 to 8

Unit II – Chapter 2: Sections 1 to 19

Unit III – Chapter 3 : Sections 1 to 12

Unit IV - Chapter 4 : Sections 1 and 2 and Chapter5 : Sections 1 to 11

Unit V - Chapter 9 : Sections 1 to 9

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Reference Books:-

1) S.G. Telang, Number Theory, Tata McGraw-Hill (2001).

2) S.B.Malik.Basic number Theory, Vikas Publishing House Pvt .,Ltd(2000)

3) K.Ramachandra. Theory of Numbers, Narosa Publishing House(2007)

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Title of the paper	:	**Visual Basic with Practical**	
Semester	**:**	**I**	**Contact Hours:6**
Sub Code	**:**	**17PME1B**	**Credits : 4**

Objective:

To develop programming knowledge working with application environment

Unit – I Introduction – First application – Programming environment

Unit – II Intrinsic Controls – Projects in VB6 – Working with properties – Methods – Events

Unit –III Data types – Constants – Variables – Making statements in programs.

Unit – IV Conditional statements – Loops – Arrays – Strings – Type casting.

Unit – V Creating menus – Dialog boxes and enhancement of programs – Key board – Mouse input programs – Graphics.

Text Book:

Bop Roselmen and Richard Peasley, Practical Visual Basic 6,(QUE Publications) – Prentice Hall of India (2000).

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Chapters :-

Unit – I: Chapter 1: Sections 1,2,3

Unit – II: Chapter 1: Sections 4,5,6

Unit – III: Chapter 2: Sections 7, 8

Unit – IV: Chapter 2: Sections 9,10,11,12

Unit – V: Chapter 3: Sections 13,14,15,17

Reference Books:-

1. Evangelos Petroutsos, Visual Basic *6,* BPB Publications,New Delhi-2005

2. Gary cornell. Visual Basic *6.* Tata Mcgraw Hill Education Pvt.,Ltd-2010

3. Steven Holzner. Visual BasicNET Programmming. Dreamkech Press-2010.

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Title of the paper	:	**Numerical Methods**		
Semester	**:**	**II**	**Contact Hours:**	**6**
Sub Code	**:**	**17PME2A**	**Credits**	**:4**

Objectives :

- To understand principles of Numerical methods and to apply them in solving Algebraic equations.

Unit – I Introduction- Bisection Method - Iteration Methods Based on First degree Equation - Iteration Methods Based on Second Degree Equation – Rate of Convergence – General Iteration Methods – System of Nonlinear Equations – Methods for Complex Roots.

Unit – II Introduction - Direct Methods – Error Analysis for Direct Methods – Iteration Methods – Eigen values and Eigen vectors – Power Method.

Unit – III Introduction - Lagrange and Newton Interpolations - Finite Difference Operators – Interpolating Polynomials Using Finite Differences – Hermite Interpolation – Piecewise and Spline Interpolation.

Unit – IV Introduction - Numerical Differentiation – Optimum Choice of Step Length – Extrapolation Methods – Numerical Integration – Methods based on Interpolation – Composite Integration Methods – Romberg Integration – Double Integration.

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Unit – V Introduction – Difference Equations – Numerical Methods – Runge - Kutta method.

Text Book :-

M.K. Jain , S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, 4th Edition, New Age International PVT., LTD. Publishers (2003).

Chapters:

Unit I:	Chapters II	– Sections 2.1 to 2.8
Unit II:	Chapters III	– Sections 3.1 to 3.5 and 3.11
Unit III:	Chapters IV	– Sections 4.1 to 4.6
Unit IV:	Chapters V	– Sections 5.1 to5.4 and 5.6, 5.7 and 5.9 to 5.11
Unit V:	Chapters VI	– Sections 6.1 to 6.3

Reference Books:-

1) S. Arumugam , A. Thangapandi Isaac & A. Somasundaram , Numerical Methods, Scitech Publications (India) PVT., LTD (2001).

2) S.S.Sastry.Introductory methods of Numerical Analysis. Prentice Hall of Pvt., Ltd., (1988)

3) T.K. Manickavasagom Pillay & S. Narayanan, Numerical Analysis, 1st Edition, S. Viswanathan (Printers & Publishers) PVT., LTD. (1994).

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Title of the paper	:	**Automata theory and Formal Languages**	
Semester	**:**	**II**	**Contact Hours:6**
Sub Code	**:**	**17PME2B**	**Credits :4**

Objective:

To study about Properties of Regular sets and Push down Automata.

Unit – I Strings, alphabets and languages – graphs and trees – Inductive proof – set notation –Relations.

Unit – II Finite state system – Basic definitions – non deterministic finite automata – Finite automata with moves – Regular Expression – Two way finite automata – finite Automata with output – Applications of finite automata.

Unit – III The pumping lemma for regular sets – closure properties of regular sets – The Myhill – Nerode theorem and Minimization of finite automata.

Unit – IV Motivation and Introduction – context free grammars – derivation trees – simplification of context free grammars – Chomsky normal form –Greibach normal form – The Existence of inherently ambiguous context free languages.

Unit – V Informal descriptions – Definitions – Pushdown automata and context free languages - The pumping Lemma for CFL's – closure properties of CLF's – Decision Algorithms for CLF's.

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Text Book:

John. E. Hopcroft, Jeffrey D.Ullman. Introduction to Automata Theory Languages and computation Narosa Publishing House, 1999.

Reference Books:

1) Automata and Languages, Alexander Meduna, Springer (2000).
2) Dr.M.K. Venkataraman, Dr.N.Sridharan, N.Chandrasekaran, Discrete Mathematics. The National Publishing Company(2009).
3) Shyamalendu Kandar, Automata Theory and Formal Languages Dorling Kindersley(India) Pvt.Ltd(20

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Title of the paper :**Fuzzy Sets & Logic**
Semester :**III** **Contact Hours:6**
Sub Code :**17PME3A** **Credits :4**

Objective :

To Introduce the basic ideas of Fuzzy Mathematics.

Unit – I

Introduction ,Crisp Sets: An Overview, The Notation of Fuzzy Sets, Basic Concepts of Fuzzy Sets, Classical Logic: An Overview, Fuzzy Logic.

Unit – II

General Discussion, Fuzzy Complement, Fuzzy Union , Fuzzy Intersection, Combinations of Operations, General Aggregation Operations.

Unit – III

Crisp and Fuzzy Relations, Binary Relations, Binary Relations On a Single Set, Equivalence and Similarity Relations.

Unit – IV

Compatibility or Tolerance Relations, Orderings.

Unit – V

Morphisms, Fuzzy Relation Equations**.**

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Text Book: –

George J.Klir and Tina.A.Folger, *Fuzzy Sets,Uncertainty and Information* Prentice Hall of India, 2013.

Chapters:–

Unit I : Chapter 1: sections 1 .1 to 1.6

Unit II : Chapter 2: sections 2.1 to 2.6

Unit III: Chapter 3: sections 3. 1 to 3.4

Unit IV: Chapter 3: sections 3.5 and 3. 6

Unit V : Chapter 3: sections 3.7 and 3.8

Reference Books:-

1) Bhargava A.K *Fuzzy Set Theory Fuzzy Logic and Their Applications,* S.Chand & Company Pvt. Ltd.2013.

2) Chennakesava,R.Alavala, *Fuzzy Logic and Neural Networks Basic Concepts & Applications,*New Age International Publishers 2008.

3) George J.Klir and Boyuan, *Fuzzy sets Fuzzy Logic, Theory and Applications,* Prentice Hall of India , 2002.

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Title of the paper	**:Stochastic Processes**	
Semester	**: III**	**Contact Hours:6**
Sub Code	**: 17PME3B**	**Credits :4**

Objective:

To Create awareness and interest in Stochastic Process and gain knowledge of applied probability in Stochastic Process.

Unit – I

Generating Functions-Laplace Transforms-Laplace(stieltjes)-Transform of a Probability Distribution of a Random Variable-Classification of Distributions.

Unit – II

Introduction-Specification of Stochastic Processes and Stationary Processes – Martingales.

Unit – III

Definition and Examples- Higher Transition Probabilities-Generalization of Independent Bernoulli Trials: Sequence of Chain-Dependent Trials-Classification of States and Chains-Determination of Higher Transition Probabilities- Stability of a Markov System.

Unit – IV

Graph Theoretic Approach –Markov Chain with Denumerable Number of States-Reducible Chains- Statistical Inference for Markov Chains- Markov Chains with Continuous State Space- Non Homogeneous Chains.

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Unit– V

Poisson Process-Poisson Process and related distributions-Generalisation of Poisson process-Birth and Death Process – Markov processes with discrete State Space (Continuous Time Markov Chains)

Text Book :-

Medhi. J. *Stochastic Processes*,2nd Edition, New Age International Publishers,1984.

Chapters:-

Unit I : Chapter 1: Sections 1 to 4
Unit II : Chapter 2: Sections 1 to 4
Unit III : Chapter 3: Sections 1 to 6
Unit IV : Chapter 3:Sections 7 to 12
Unit V : Chapter 4: Sections 1 to 5

Reference Books :-

1) Basu K. (I I S) *Introduction to Stochastic Process,*Narosa Publishing House.2003.
2) Pradip Kumar ghosh *Theory of Probability and Stochastic Process,* University Press(India)Pvt.,Ltd,2010.