MAHENDRA ARTS & SCIENCE COLLEGE

(Autonomous)

Affiliated to Periyar University, Salem.

Accredited by NAAC with 'A' Grade & Recognized u/s 2(f) and 12(B) of the UGC Act 1956

Kalippatti – 637 501, Namakkal (Dt), Tamil Nadu.

DEPARTMENT OF MATHEMATICS

COURSE OUTCOMES (COs)

M.Sc. MATHEMATICS

PRINCIPAL
MAHENDRA ARTS & SCIENCE COLLEGE
(Autonomous)
Kalippatti (PO) - 637 501, Namakkal (DT)

For the students admitted from the Academic Year 2019-2020 onwards

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMA01**		**Core Course – I- ALGEBRA**		
Batch **2019-2020**	Semester **I**	Hours / Week **6**	Total Hours **90**	Credits **5**

Course Objectives

This course introduces fundamental and advanced level concepts of Algebra. It covers concepts such as Sylows theorem, Direct product, Ideals and Quotient Rings, The field of Quotients of an Integral Domain, Euclidean Rings, Polynomial rings, Vector spaces, Dual spaces, Inner product spaces& modules. It provides technical skills to understand and develop various ideas about algebra.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	**Statement**	**Knowledge Level**
CO1	Identify the logic behind the execution of various Characterizations in groups. Understand the concept of Sylows theorem.	K1
CO2	Understand the concepts of Direct product, Ideals and Quotient Rings,	K2
CO3	Analyze the field of Quotients of an Integral Domain, Euclidean Rings.	K4
CO4	Develop the Polynomial rings and its theorems.	K3
CO5	Apply the concepts to Vector spaces, Dual spaces, Inner product spaces& modules.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMA02**		**Core Course – II- REAL ANALYSIS**		
Batch **2019-2020**	Semester **I**	Hours / Week **6**	Total Hours **90**	Credits **5**

Course Objectives

This course introduces fundamental and advanced level concepts in Real Analysis. It covers concepts such as Basic Topology, Countable, Compact Sets, Perfect sets, Connected sets, Cauchy Sequences, Some special sequences, Numerical Series, Power series, Summation by Parts, Addition and Multiplication of series, Rearrangement Theorems, Continuity, Continuity and Compactness, Continuity and Connectedness, Differentiation, The Continuity of Derivatives, L'Hospital's Rule & Taylor's Theorem. It provides technical skills to understand and develop various ideas about analysis.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Identify the logic behind the execution of various Characterizations in Basic Topology, Countable, Compact Sets, Perfect sets, Connected sets.	K1
CO2	Understand the concepts of Cauchy Sequences and Some special sequences.	K2
CO3	Analyze the field of Numerical Series, Power series, Summation by Parts, Addition and Multiplication of series, Rearrangement Theorems.	K3
CO4	Develop the Continuity, Continuity and Compactness, Continuity and Connectedness.	K4
CO5	Apply the concepts to Differentiation, The Continuity of Derivatives, L'Hospital's Rule & Taylor's Theorem.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMA03**		**Core Course – III- CLASSICAL MECHANICS**		
Batch **2019-2020**	Semester **I**	Hours / Week **6**	Total Hours **90**	Credits **4**

Course Objectives

This course introduces fundamental concepts in classical mechanics. It covers concepts such as Mechanical Systems, Lagrange's Equations, Hamilton's Equation, Hamilton – Jacobi Theory and Canonical Transformation. It provides technical skills to understand and develop various ideas about mechanics.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Identify the logic behind the execution of various Characterizations in Mechanical Systems.	K1
CO2	Analyze the Lagrange's Equation and its problems.	K3
CO3	Understand the concepts of Hamilton's Equation and its problems.	K2
CO4	Develop the Hamilton – Jacobi Theory and its problem.	K4
CO5	Apply the concepts Canonical Transformation and its characterization	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMA04**		**Core Course – IV- ORDINARY DIFFERENTIAL EQUATIONS**		
Batch **2019-2020**	Semester **I**	Hours / Week **5**	Total Hours **75**	Credits **4**

Course Objectives

This course introduces fundamental concepts in ordinary differential equation. It covers concepts such as Linear Equations with Constant Coefficients, Linear Equations with Variable Coefficients, Linear Equations with Regular Singular Points and First Order Equation – Existence and Uniqueness. It provides technical skills to understand and develop various ideas about differential equations.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Identify the logic behind the Linear Equations with Constant Coefficients and related problems.	K1
CO2	Analyze Linear Equations with Constant Coefficients and its characterization.	K3
CO3	Understand the concepts of Linear Equations with Variable Coefficients and its problems.	K4
CO4	Develop the Linear Equations with Regular Singular Points and its problem.	K4
CO5	Apply the concepts First Order Equation – Existence and Uniqueness and its characterization	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMASS01**		**Soft skills-I - LATEX**		
Batch **2019-2020**	Semester **I**	Hours / Week **2**	Total Hours **30**	Credits **2**

Course Objectives

This course introduces fundamental concepts in Latex theory. It covers concepts such as Basic LaTex , Sample document and Key Concepts, type style , environments , Lists , Contering , tables , verbatim , vertical and horizontal spacing, Typesetting Mathematics, Equation environments, Fonts, hats and underlining, braces, arrays and matrices, Math miscellaxy, Math Styles, Bold Math, Symbols for number sets, binomial coefficient, classes and the overall structure, titles for documents, Sectioning commands, Spacing, Accented characters , Dashes and hyphens, quotation marks , Pinpointing the error, common errors and warning messages. It provides technical skills to understand and develop various ideas about document preparation.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	**Statement**	**Knowledge Level**
CO1	Identify the logic behind the Basic LaTex , Sample document and Key Concepts, type style , environments , Lists , Cantering , tables , verbatim , vertical and horizontal spacing	K1
CO2	Analyze the typesetting Mathematics, Equation environments, Fonts, hats and underlining, braces, arrays and matrices and its characterization.	K3
CO3	Understand the concepts of Math miscellany, Math Styles, Bold Math, Symbols for number sets, binomial coefficient, classes and the overall structure	K3
CO4	Develop the titles for documents, Sectioning commands, Spacing, Accented characters ,.	K4
CO5	Apply the concepts Dashes and hyphens, quotation marks , Pinpointing the error, common errors and warning messages	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMAE01**		**Elective – I- DISCRETE MATHEMATICS**		
Batch **2019-2020**	Semester **I**	Hours / Week **5**	Total Hours **75**	Credits **4**

Course Objectives

This course focuses on discrete concepts and to develop a set theory application. It implements the concepts such as Theory of inference, Set Theory, Algebraic Structures, Lattices and Boolean algebra, Graph Theory. In addition, it also covers the methods to process the set construction.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Define the Theory of inference concepts for building theory based applications.	K1
CO2	Illustrate the Set Theory and related results.	K2
CO3	Demonstrate the Algebraic Structures.	K3
CO4	Implement Lattices and Boolean algebra ideas.	K3
CO5	Apply the Graph Theory concept and its theorem.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMAE02**		**Elective – I- NUMBER THEORY**		
Batch **2019-2020**	Semester **I**	Hours / Week **5**	Total Hours **75**	Credits **4**

Course Objectives

This course introduces fundamental concepts in number theory. It covers concepts such as divisibility and prime numbers, congruence's and congruence's with a prime power modulus, Euler's function and the group of units, quadratic residues and arithmetic function. It provides technical skills to understand and develop various ideas about number analysis.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Identify the logic behind the divisibility and prime numbers and related problems.	K1
CO2	Analyze congruence's and congruence's with a prime power modulus and its characterization.	K3
CO3	Understand the concepts of Euler's function and the group of units and its problems.	K3
CO4	Develop the quadratic residues and its problem.	K4
CO5	Apply the concepts arithmetic function and its characterization	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMAE03**		**Elective – I- Programming in C++**		
Batch **2019-2020**	Semester **I**	Hours / Week **5**	Total Hours **75**	Credits **4**

Course Objectives

The course provides an introduction to object-oriented programming using C++ language. It provides the concepts such as data abstractions, classes, inheritance, method overloading and overriding, generic programming and standard template library. It enables the students to apply these features in program design and implementation.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	**Statement**	**Knowledge Level**
CO1	Define structure and object oriented problem solving approaches.	K1
CO2	Infer classes and objects for a given problem.	K2
CO3	Describe the constructors, destructors and type conversions for the problems .	K2
CO4	Illustrate the code reusability and extensibility by means of Inheritance and Polymorphism.	K3
CO5	Apply the concepts in file operations.	K3

Programme Code : **PMA**		**M.Sc., MATHEMATICS**		
Course Code: **M19PMA05**		**Core Course – V- ADVANCED ALGEBRA**		
Batch **2019-2020**	Semester **II**	Hours / Week **6**	Total Hours **90**	Credits **4**

Course Objectives

This course introduces fundamental and advanced level concepts of Algebra. It covers concepts such as Field theory, Galois Theory, Finite fields, Rings and Ring Homomorphism's, Noethorian rings and Artin rings . It provides technical skills to understand and develop various ideas about algebra.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	**Statement**	**Knowledge Level**
CO1	Understand the concepts of Field theory and its related results.	K2
CO2	Identify the logic behind the execution of Galois Theory and its results.	K2
CO3	Analyze the Finite fields an its theorems.	K4
CO4	Develop Rings and Ring Homomorphism's .	K3
CO5	Apply the concepts to Noethorian rings and Artin rings.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMA06**		**Core Course – VI- ADVANCED REAL ANALYSIS**		
Batch **2019-2020**	Semester **II**	Hours / Week **6**	Total Hours **90**	Credits **4**

Course Objectives

This course introduces fundamental and advanced level concepts in Real Analysis. It covers concepts such as The Riemann – steiltjes integral, Existence of the integral, properties of integral, Sequences and series of functions, Uniform Convergence, Linear transformations, the contraction principle, the implicit function theorem, The Rank theorem, determinants, Integration of differential forms and simplex and chains. It provides technical skills to understand and develop various ideas about analysis.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Identify the logic behind the execution of The Riemann – steiltjes integral, Existence of the integral, properties of integral.	K1
CO2	Understand the concepts of Sequences and series of functions, Uniform Convergence.	K3
CO3	Analyze the field of Linear transformations, the contraction principle, the implicit function theorem..	K3
CO4	Develop THE Rank theorem, determinants.	K4
CO5	Apply the concepts to Integration of differential forms and simplex and chains.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMA07**		**Core Course – VII- GRAPH THEORY** **		
Batch **2019-2020**	Semester **II**	Hours / Week **6**	Total Hours **90**	Credits **4**

Course Objectives

This course focuses on graph theory concepts and to develop a graph theory application. It implements the concepts such as Graphs and Sub graphs, Trees and Connectivity, Euler Tours and Matchings, Edge Colouring and Independent sets, Vertex Colorings and planar graphs . In addition, it also covers the methods to process the graph construction.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Define the Graphs and Sub graphs and tree concepts for building theory based applications.	K1
CO2	Illustrate the Connectivity and Euler Tours.	K2
CO3	Demonstrate the Matchings and Edge Colouring.	K4
CO4	Implement method for Independent sets and Vertex Colorings.	K3
CO5	Apply planar graphs and its theorem.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMAE04**		**Elective – II- NUMERICAL ANALYSIS**		
Batch **2019-2020**	Semester **II**	Hours / Week **5**	Total Hours **75**	Credits **4**

Course Objectives

This course introduces fundamental concepts in numerical analysis. It covers concepts such as Solving Nonlinear Equations ,Numerical Differentiation and Integration ,Numerical Solution of Ordinary Differential Equations ,Partial-Differential Equations . It provides technical skills to understand and develop various ideas about Applied Mathematics.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	**Statement**	**Knowledge Level**
CO1	Identify the logic behind the execution of solving non linear equations.	K1
CO2	Analyze Numerical Differentiation and Integration and its problems.	K3
CO3	Understand the concepts of Numerical Solution in Ordinary Differential Equations and its problems.	K3
CO4	Develop the Numerical solutions to Ordinary differential equations and its problem.	K4
CO5	Apply the concepts of Numerical solutions to partial differential equations and its characterization	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMAE05**		**Elective – II- FLUID DYNAMICS**		
Batch **2019-2020**	Semester **II**	Hours / Week **5**	Total Hours **75**	Credits **4**

Course Objectives

This course introduces fundamental concepts in fluid dynamics. It covers concepts such as Streamlines and path lines, Equation of continuity, Pressure at a point in a moving fluid, Some special two dimensional flows , Impulsive motion, Stokes stream function, Some special forms of the stream function for Axis symmetric irrotational motions, Stream function, Complex velocity potential for standard two-dimensional flows, Milne-Thomson circle theorem, Some hydro dynamical aspects of conformal transformation. It provides technical skills to understand and develop various ideas about mechanics.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Identify the logic behind the execution of Streamlines and path lines, Equation of continuity.	K1
CO2	Analyze the Pressure at a point in a moving fluid, Some special two dimensional flows.	K3
CO3	Understand the concepts of Impulsive motion, Stokes stream function.	K2
CO4	Develop the Some special forms of the stream function for Axis symmetric irrotational motions, Stream function.	K4
CO5	Apply the Complex velocity potential for standard two-dimensional flows, Milne-Thomson circle theorem, Some hydro dynamical aspects of conformal transformation.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMAE06**		**Elective – II- Practical- C++ Lab**		
Batch **2019-2020**	Semester **II**	Hours / Week **5**	Total Hours **75**	Credits **4**

Course Objectives

This course focuses on object oriented concepts and to develop an application. It implements the concepts such as inheritance, polymorphism, dynamic binding and generic structures to build reusable code. It enables the students to write programs using C++ features such as composition of objects, operator overloads, dynamic memory allocation, file I/O and exception handling. In addition, it also covers the methods to process the biological database.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	**Statement**	**Knowledge Level**
CO1	Define the object oriented concepts for building object based applications.	K1
CO2	Illustrate the different logic with suitable validation using control structures, classes and objects.	K2
CO3	Demonstrate the Constructor, Destructor and Inheritance.	K3
CO4	Implement method overloading and method overriding for different user specification.	K3
CO5	Apply programming skills to experiment Protein sequence.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMA08**		**Core Course –VIII- Partial Differential Equations**		
Batch **2019-2020**	Semester **III**	Hours / Week **5**	Total Hours **75**	Credits **4**

Course Objectives

This course introduces fundamental concepts in partial differential equation. It covers concepts such as Second order Partial Differential Equations, Elliptic Differential Equations, Parabolic Differential Equations, Hyperbolic Differential Equations and Integral Transform. It provides technical skills to understand and develop various ideas about partial differential equations.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	**Statement**	**Knowledge Level**
CO1	Identify the logic behind the Second order Partial Differential Equations and related problems.	K1
CO2	Analyze Elliptic Differential Equations and its characterization.	K3
CO3	Understand the concepts of Parabolic Differential Equations and its problems.	K4
CO4	Develop the Hyperbolic Differential Equations and its problem.	K4
CO5	Apply the Integral Transform and its characterization	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMA09**		**Core Course – IX- Topology**		
Batch **2019-2020**	Semester **III**	Hours / Week **6**	Total Hours **90**	Credits **5**

Course Objectives

This course introduces fundamental and advanced level concepts in Analysis. It covers concepts such as Topological spaces, product of spaces, Identification and Quotient spaces, Homotopy and Isotopy, Separation axioms, Compactness, Connectedness, Pathwise connectedness, Impedding theorems, Extension theorems , Compactifications, Hereditary Properties. It provides technical skills to understand and develop various ideas about topology.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	**Statement**	**Knowledge Level**
CO1	Identify the logic behind the execution of Topological spaces, product of spaces.	K1
CO2	Understand the concepts of Identification and Quotient spaces, Homotopy and Isotopy.	K2
CO3	Analyze the Separation axioms, Compactness.	K3
CO4	Develop the Connectedness, Pathwise connectedness, Impedding theorems.	K4
CO5	Apply the concepts to Extension theorems , Compactifications, Hereditary Properties.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMA10**		**Core Course – X- Measure Theory And Integration**		
Batch **2019-2020**	Semester **III**	Hours / Week **6**	Total Hours **90**	Credits **5**

Course Objectives

This course introduces fundamental and advanced level concepts in Analysis. It covers concepts such as Lebesgue Measure, Lebesgue integral, Differentiation and Integration, General Measure and Integration, Measure and Outer Measure. It provides technical skills to understand and develop various ideas about analysis.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Find the logic behind the execution of Lebesgue Measure.	K1
CO2	Understand the concepts of Lebesgue integral and related problems.	K4
CO3	Analyze Differentiation and Integration.	K3
CO4	Develop the concept of General Measure and Integration.	K3
CO5	Apply the concepts to Measure and Outer Measure.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMA11**		**Core Course – XI- Complex Analysis**		
Batch **2019-2020**	Semester **III**	Hours / Week **6**	Total Hours **75**	Credits **5**

Course Objectives

This course introduces fundamental and advanced level concepts in complex Analysis. It covers concepts such as Complex Functions, Analytical Functions as Mappings, Complex Integration, Fundamental Theorems, Harmonic functions and Power series expansions. It provides technical skills to understand and develop various ideas about analysis.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Find the logic behind the execution of Complex Functions and its properties.	K1
CO2	Understand the concepts of Analytical Functions as Mappings and related problems.	K4
CO3	Analyze Complex Integration, Fundamental Theorems.	K3
CO4	Develop the concept of complex integration.	K3
CO5	Apply the concepts to Harmonic functions and Power series expansions.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMASS02**		**Soft Skills-II - Scilab**		
Batch **2019-2020**	Semester **III**	Hours / Week **2**	Total Hours **30**	Credits **2**

Course Objectives

This course introduces fundamental concepts in Scilab theory. It covers concepts such as Learning Scilab, Starting Scilab, Typing Commands, Basic Arithmetic, Complex Numbers, Help in Scilab, The Help Command, The Help Window , Help on the Web, Adding a Line, Hints for Good Graphs, Plot data as points, Choose a good scale, Solving Equations, Matrices and Vectors, Creating Matrices, Systems of Equations, Polynomials, Graphs Function Plotting, Printing Graphs, Component Arithmetic, Graphs in Reports, and Advanced Graphics. It provides technical skills to understand and develop various ideas about document preparation.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Identify the logic behind Learning Scilab, Starting Scilab, Typing Commands	K1
CO2	Analyze basic Arithmetic, Complex Numbers, Help in Scilab, The Help Command, The Help Window , Help on the Web and its characterization.	K3
CO3	Understand the concepts of Adding a Line, Hints for Good Graphs, Plot data as points, Choose a good scale.	K3
CO4	Develop the Solving Equations, Matrices and Vectors, Creating Matrices, Systems of Equations, Polynomials.	K4
CO5	Apply the concepts Graphs Function Plotting, Printing Graphs, Component Arithmetic, Graphs in Reports, and Advanced Graphics.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMAE07**		**Elective – III- Calculus Of Variation And Integral Equations**		
Batch **2019-2020**	Semester **III**	Hours / Week **5**	Total Hours **75**	Credits **4**

Course Objectives

This course focuses on integral equations concepts and to develop an application of integration. It implements the concepts such as Variational problems with fixed boundaries, Variational problems with moving boundaries, Integral Equation, Solution of Fredholm integral equation, Hilbert – Schmidt Theory. In addition, it also covers the methods to process the calculus of variation and integral equations.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Define Variational problems with fixed boundaries.	K1
CO2	Illustrate the Variational problems with moving boundaries.	K2
CO3	Demonstrate Integral Equation.	K3
CO4	Implement method for Solution of Fredholm integral equation.	K3
CO5	Apply Hilbert – Schmidt Theory.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMAE08**		**Core Course – III- Optimization Techniques**		
Batch **2019-2020**	Semester **III**	Hours / Week **5**	Total Hours **75**	Credits **4**

Course Objectives

This course introduces fundamental and advanced level concepts in operation research. It covers concepts such as Integer linear programming, Deterministic dynamic programming, Decision analysis and games, Simulation modeling, Non-linear programming algorithms. It provides technical skills to understand and develop various ideas about real life problems.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Find the logic behind the execution of Integer linear programming.	K1
CO2	Understand the concepts of Deterministic dynamic programming and related results.	K4
CO3	Analyze Decision analysis and games and its theorems.	K2
CO4	Develop the concept of Simulation modeling.	K3
CO5	Apply the concepts to Non-linear programming algorithms.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMAE09**		**Core Course – III- Difference Equations**		
Batch **2019-2020**	Semester **III**	Hours / Week **5**	Total Hours **75**	Credits **4**

Course Objectives

This course focuses on difference equations concepts and to develop an application in differential equation. It implements the concepts such as Difference Calculus, Linear Difference Equations, Initial value problems for linear systems, Stability of linear systems, Asymptotic analysis of sums. In addition, it also covers the methods to process the applications of difference equations.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Define the theory of Difference Calculus for building applications.	K1
CO2	Illustrate the theory of Linear Difference Equations and its related results.	K2
CO3	Demonstrate the Linear Difference Equations and properties of difference equation.	K4
CO4	Implement method for Initial value problems for linear systems, Stability of linear systems.	K3
CO5	Apply Asymptotic analysis of sums and its applications.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMA12**		**Core Course – XII- Functional Analysis**		
Batch **2019-2020**	Semester **IV**	Hours / Week **6**	Total Hours **90**	Credits **5**

Course Objectives

This course introduces fundamental and advanced level concepts in functional Analysis. It covers concepts such as Banach Spaces, Banach Spaces and Hilbert Spaces, Hilbert Spaces, Operations on Hilbert Spaces, Banach Algebras. It provides technical skills to understand and develop various ideas about analysis.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Find the logic behind the execution of Banach Spaces and its properties.	K1
CO2	Understand the concepts of Banach Spaces and Hilbert Spaces and related results.	K4
CO3	Analyze Hilbert Spaces and its theorems.	K3
CO4	Develop the concept of Operations on Hilbert Spaces.	K3
CO5	Apply the concepts to Banach Algebras.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMA13**		**Core Course – XIII- Differential Geometry**		
Batch **2019-2020**	Semester **IV**	Hours / Week **6**	Total Hours **90**	Credits **5**

Course Objectives

This course focuses on differential geometry concepts and to develop an application in space science. It implements the concepts such as theory of Space curves, Local Intrinsic properties of surface, Local Intrinsic properties of surface and geodesic on a surface, Geodesic on a surface. In addition, it also covers the methods to process the space science technology.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	**Statement**	**Knowledge Level**
CO1	Define the theory of Space curves for building differential calculus based applications.	K1
CO2	Illustrate the theory of Space curves and its related results.	K2
CO3	Demonstrate the Local Intrinsic properties of surface.	K3
CO4	Implement method for Local Intrinsic properties of surface.	K3
CO5	Apply Geodesic on a surface and its applications.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMA14**		**Core Course – XIV- Mathematical Probability Theory**		
Batch **2019-2020**	Semester **IV**	Hours / Week **6**	Total Hours **90**	Credits **5**

Course Objectives

This course introduces fundamental and advanced level concepts in probability theory. It covers concepts such as Random Events and Random Variables, A parameters of the Distribution, Characteristic functions, Some probability distributions, Limit Theorems. It provides technical skills to understand and develop various ideas about probability theory.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Find the logic behind the execution of Random Events and Random Variables.	K1
CO2	Understand the concepts of A parameters of the Distribution and related results.	K4
CO3	Analyze Characteristic functions and its theorems.	K3
CO4	Develop the concept of Some probability distributions.	K3
CO5	Apply the concepts to Limit Theorems.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMAE10**		**Elective – IX- Design Theory**		
Batch **2019-2020**	Semester **IV**	Hours / Week **6**	Total Hours **90**	Credits **4**

Course Objectives

This course focuses on design theory concepts and to develop an graph theory application. It implements the concepts such as Steiner triple system, λ- fold triple system, Quasigroup identities & graph decompositions & Kirkman triple systems, Maximum packings & Minimum coverings, Mutually Orthogonal Latin Squares. In addition, it also covers the methods to process the frame construction.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Define the Steiner triple system concepts for building design based applications.	K1
CO2	Illustrate the λ- fold triple system.	K2
CO3	Demonstrate the Quasigroup identities & graph decompositions & Kirkman triple systems.	K3
CO4	Implement method Maximum packings & Minimum coverings.	K3
CO5	Apply Mutually Orthogonal Latin Squares.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMAE11**		**Elective-IV - Stochastic Process**		
Batch **2019-2020**	Semester **IV**	Hours / Week **6**	Total Hours **90**	Credits **4**

Course Objectives

This course introduces fundamental concepts in stochastic process. It covers concepts such as Stochastic Process, Markov Chains, classification of states and chains, Stability of Markov chain, Poisson process, Markov chain with discrete state space, Renewal process, Renewal process in continuous time , Markov Renewal and semi- markov processes. It provides technical skills to understand and develop various ideas about analysis.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	**Statement**	**Knowledge Level**
CO1	Identify the logic behind the execution of Stochastic Process, Markov Chains, classification of states and chains.	K1
CO2	Understand the concepts of Stability of Markov chain, Poisson process	K2
CO3	Analyze the Markov chain with discrete state space.	K3
CO4	Develop Renewal process, Renewal process in continuous time.	K4
CO5	Apply the concepts to Markov Renewal and semi- markov processes.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19PMAE12**		**Elective-IV - Fuzzy sets and Fuzzy logic**		
Batch **2019-2020**	Semester **IV**	Hours / Week **6**	Total Hours **90**	Credits **4**

Course Objectives

This course introduces fundamental concepts in Fuzzy sets and Fuzzy logic. It covers concepts such as Form classical sets to fuzzy sets; Fuzzy sets versus crisp sets, Operations on fuzzy sets, Fuzzy arithmetic, Fuzzy relations and Fuzzy Logic. It provides technical skills to understand and develop various ideas about analysis.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	**Statement**	**Knowledge Level**
CO1	Identify the logic behind the execution of the form classical sets to fuzzy sets; Fuzzy sets versus crisp sets	K1
CO2	Understand the concepts of an operations on fuzzy sets.	K2
CO3	Analyze the concept of fuzzy arithmetic	K3
CO4	Develop the idea about the fuzzy relations.	K4
CO5	Apply the concepts to the fuzzy logic and its related theorems.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19EMA01**		**EDC - Quantitative Aptitude**		
Batch **2019-2020**	Semester **IV**	Hours / Week **5**	Total Hours **75**	Credits **4**

Course Objectives

This course introduces fundamental concepts such as Numbers, system in Quantitative aptitude. It covers concepts such as Numbers, H.C.F. and L.C.M. of numbers, Simplification , Square roots and Cube Roots , Average, Problems on numbers , problems on Ages, Percentage , Profit and Loss, Ratio and Proportion , Partnership. It provides technical skills to understand and develop various department examinations like Group Exams, TNPSC, RRB, SSC & IBPS.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Identify the logic behind Numbers, H.C.F. and L.C.M. of numbers and its problem.	K1
CO2	Understand the concepts of Simplification, Square roots and Cube Roots , Average and its problem.	K2
CO3	Analyze the problems on Problems on numbers , problems on Ages, and its problem.	K2
CO4	Develop the Percentage, Profit and Loss and its problem. .	K2
CO5	Apply the concepts to solve a problem for Ratio and Proportion , Partnership.	K3

Programme Code : **PMA**		**M.Sc. MATHEMATICS**		
Course Code: **M19EMA02**		**EDC - Operation Research**		
Batch **2019-2020**	Semester **IV**	Hours / Week **5**	Total Hours **75**	Credits **4**

Course Objectives

This course introduces fundamental concepts of Operation Research. It covers concepts linear Programming, Simplex Method, Big M method, Transportation Problem, Assignment problem, PERT / CPM. It provides technical skills to understand the concepts in applied mathematics.

Course Outcomes:

On the successful completion of the course, students will be able to

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of basic idea of the linear programming.	K1
CO2	Understand the Solution of the Big M method.	K2
CO3	Demonstrate understanding of the importance of the Transportation Problem.	K4
CO4	Develop the idea about the Assignment problem.	K3
CO5	Understanding the concept of PERT / CPM.	K4

Head of the Department

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Namakkal District.

Principal

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DEPARTMENT OF MATHEMATICS

PROGRAMME OUTCOMES (POs) OF M.Sc. MATHEMATICS

Academic year 2020-2021

PO1: Higher degree of technical skills in problem solving and application development.

PO2: Aptitude skills that will help to take up research in pure and applied Mathematics.

PO3: Reasoning skills required to learn advance mathematics and Probing attitude and a search for deeper knowledge in science.

PO4: The relevance and applications of Mathematics in scientific phenomenon Positive approach towards Higher Education in Mathematics.

PO5: Employability Skills that will enable the students to explore career in Teaching and Research in Mathematics.

PO6: Gaining the basic with strong background to contribute more in basic research.

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DEPARTMENT OF MATHEMATICS

PROGRAMME SPECIFIC OUTCOMES (PSOs) OF M.Sc. MATHEMATICS

Academic year 2020-2021

PSO 1: Provide a deeper knowledge of mathematical techniques and develop the ability to create their own research ideas.

PSO 2: Develop the ability to handle Mathematical software to develop the research articles in the future.

PSO 3: Inculcate the capacity to transfer the mathematical knowledge for their industrial career.

PSO 4: Induce the interest to communicate Mathematics effectively and precisely using technology.

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