FATIMA COLLEGE (AUTONOMOUS), MADURAI – 625018

NAME OF THE PROGRAMME: M. SC. MATHEMATICS **PROGRAMME CODE: PSMA**

PROGRAMME OUTCOMES:

Students will be able to

PO1: Apply acquired scientific knowledge to solve major and complex issues in the society/industry

PO2: Attain research skills to solve complex cultural, societal and environmental issues

PO3: Employ latest and updated tools and technologies to solve complex issues

PO4: Demonstrate Professional Ethics that foster Community, Nation and Environment Building Initiatives.

PROGRAMME SPECIFIC OUTCOMES:

PSO 1: Develop proficiency in the analysis of complex mathematical problems and the use of Mathematical or other appropriate techniques to solve them.

PSO 2: Provide a systematic understanding of core mathematical concepts, principles and theories along with their applications.

PSO 3: Demonstrate the ability to conduct Research independently and pursue higher studies towards the Ph. D degree in Mathematics and computing.

PSO 4: Understand the fundamental axioms in Mathematics and develop Mathematical ideas based on them.

PSO 5: Provide advanced knowledge on topics in Pure Mathematics, empowering the students to pursue higher studies.

2019 - 2020

COURSE CODE	COURSE TITLE	NATURE OF THE COURSE (LOCAL/NATIONAL/ REGIONAL/ GLOBAL)	COURSE DESCRIPTION	COURSE OUTCOMES
19PG1M1	Algebra	Global	This course is designed to emphasis the study of Algebra.	CO1: Recall various properties of algebraic structures and explain counting principle. CO2: Describe Sylow's theorems and solve problems CO3: Distinguish Integral Domain and Euclidean Rings CO4: Classify Rings. CO5: Describe basic concepts of Solvable

				groups
19PG1M2	Real Analysis	Global	This course provides a comprehensive idea about the principles of Real Analysis.	CO1: Recall Sequence and series in Real line CO2: Differentiate Continuous functions and Uniformly continuous functions CO3: Describe Derivatives of functions CO4: Identify Riemann Integral and Riemann - Stieltjes Integral CO5: Explain Uniform convergence of functions
19PG1M3	Number Theory	National	This course discovers interesting and unexpected relationships between different sorts of numbers and to prove	CO 1: Define and interpret the concepts of divisibility CO 2: Explain properties of congruences CO 3: Apply the Law of Quadratic Reciprocity

			that these relationships are true	CO 4: Classify functions of number theory CO 5: Solve Linear Diophantine equation
19PG1M4	Classical Mechanics	National	This course provides a sound knowledge of the concepts and principles in mechanics	CO 1 : Describe the behaviour of a particle, the system of particles and D'Alambert's principle. CO 2 : Solve problems using Lagrangian formulation CO 3 : Explain Hamilton's principle in Physical reality CO 4 : Construct Lagrange's equation for non - holonomic system. CO 5 : Apply the laws of forces in central orbit to solve Kepler's problem
19PG2M5	Advanced Algebra	Global	This course enables the students to study some advanced	CO1: Appraise characteristic roots of linear transformations CO2: Explain Matrices and Nilpotent

			concepts in Algebra.	transformation CO3: Classify transformations CO4: Describe various concepts of fields CO5: Analyse Galois theory
19PG1M6	Advanced Real Analysis	Global	This course enables the students to study some advanced concepts in Real Analysis.	At the end of the course, the students will be able to CO1: Identify Riemann Integral and Riemann - Stieltjes Integral CO2: Explain Uniform convergence of functions CO3: Define Power Series and Fourier Series CO4: Describe Linear Transformations CO5: Explain Implicit function theorem and Rank theorem
19PG2M7	Differential	Global	This course will	CO 1:Define Linear differential equations

	Equations		provide the knowledge for solving of ordinary and partial differential equations in physical and other phenomena	with constant coefficients and prove different theorems and solve them . CO 2: Solving problems of the nth order in differential equations with variable coefficients. CO 3: Identify Regular singular points and derive Bessel's Equation. CO 4: Explain the methods of solving problems in partial differential equations of first order. CO 5: Define and form Partial differential equations of the second order and solve it.
19PG2M8	Graph Theory	Global	This course enables the students to study some advanced concepts in Graph	CO1: Build the knowledge of Connectivity in graphs CO2: Identify Eulerian and Hamiltonian

			Theory.	graphs CO3: Explain Digraphs, Matching's and Factorization in graphs CO4: Describe Planarity and Coloring in graphs CO5: Define and Explain Domination in graphs

Course Code	Course Title	Nature Of The Course (Local/National/ Regional/Global)	Course Objectives
PG3M9	TOPOLOGY	Global	• To generalize the concepts which the students have learnt in Real Analysis and to train the students to develop logical thinking.
PG3M10	FUNCTIONAL ANALYSIS	Global	• To study the three structure theorems of Functional Analysis viz., Banach theorem, open mapping theorem and uniform bounded ness principle, Hilbert spaces and operator theory leading to the spectral theory of

			operators on a Hilbert spaces.
PG3M11	OPTIMIZATION TECHNIQUES	Global	• To make the students to become aware of and appreciate the potential of the theory of optimization and to introduce various decision making tools and techniques based on optimization.
PG3M12	COMBINATORICS	Global	• To introduce combinatorial techniques for solving enumeration problems.
ELECTIVE PG3ME1	Research Methodology	Global	• To enable the students to study the Research Methodology and some concepts of Measurability, L^p Spaces, Fourier Transforms and Banach algebras.
PG3ME1	JAVA PROGRAMMING	Global	• To develop OO Programming. • To develop Multithreaded Programs.
PG4M13	COMPLEX ANALYSIS	Global	• To introduce the students to the world of complex variable theory which is markedly different from analysis of real variable.
PG4M14	STATISTICS	Global	• The objective of this course is to develop an ability in

			the students to apply statistical methods to real life problem, to understand the limitations of these methods, to think probabilistically and to understand the estimation theory and to test the hypothesis of different types.
PG4M15	METHODS OF APPLIED MATHEMATICS	Global	• To enable the students to know the concepts of Calculus of variations, Integral equations, Neumann series and Fourier transforms.
ELECTIVE PG4ME3	Formal Languages	Global	• The aim of this course is to enable the students to understand the basic ideas of Automata Theory. The course deals with the following concepts: Regular expressions, two way finite automata, context free grammar and Push down automata.
PG4ME4	Web Designing using HTML	Regional	• To enable the student • To Design Web Pages • To give introduction to the Internet • To give an Exposure to resources and tools for using,

			managing and creating material for the Internet and World-Wide Web.

2018 - 2019

COURSE CODE	COURSE TITLE	NATURE OF THE COURSE (LOCAL/NATIONAL/ REGIONAL/GLOBAL)	COURSE OBJECTIVES
PG1M1	Algebra I	Global	• To introduce various algebraic structures. • To study the properties of these structures.
PG1M2	Real Analysis	Global	• To provide the students a comprehensive idea about the principles of Real Analysis. Real Analysis is the foundation of pure Mathematics and the idea of Real Analysis is used in Topology, Functional Analysis, Complex Analysis and Measure Theory.
PG1M3	Number Theory	Global	• The aim of this course is to help students to appreciate the elegant results in Number Theory.

			Students will learn the concepts like Divisibility, Congruences, Quadratic Reciprocity, some functions and Diophantine equations of Number Theory.
PG1M4	Mechanics	Global	• The aim of the course is to help the students to understand mechanics of a particle, Lagrange's equations, Hamilton's principles, Two body problem and Kepler's problem.
PGMEDC	Optimization Methods	National	• This course helps the students to convert real life problems into mathematical models and solve them using various techniques. Also they will learn Transportation Assignment Problems, Sequencing Problem , Network Scheduling by PERT/CPM, Game Theory, Permutation and Combination.
PG2M5	Algebra Ii	Global	• This Course introduces students to the third algebraic model, field theory, algebra of linear transformation and various types of operators.
PG2M6	Measure And	Global	• To provide the students a comprehensive idea about

	Integration		the measures on the real line, Integration of Functions of a real variable, Extension of Riemann integration, Abstract Measure Spaces, Signed Measures and their derivatives, Measure and Integration in a Product space .
PG2M7	Differential Equations	Global	• To give an in-depth knowledge of solving differential equations which is frequently used • in Physics, Chemistry, Biology, Economics and Mechanics.
PG2M8	Graph Theory	Global	• The aim of the course is to introduce to the students Graph Theory as an important branch of Mathematics and to motivate them to appreciate the applications of Graph Theory in various fields such as Chemistry, Physics, Operations Research, Sociology and Computer Sciences and Electrical Engineering etc.
PG3M9	Topology	Global	• To generalize the concepts which the students have learnt in Real Analysis and to train the students to

			develop logical thinking.
PG3M10	Functional Analysis	Global	• To study the three structure theorems of Functional Analysis viz., Banach theorem, open mapping theorem and uniform bounded ness principle, Hilbert spaces and operator theory leading to the spectral theory of operators on a Hilbert spaces.
PG3M11	Optimization Techniques	Global	• To make the students to become aware of and appreciate the potential of the theory of optimization and to introduce various decision making tools and techniques based on optimization.
PG3M12	Combinatorics	Global	• To introduce combinatorial techniques for solving enumeration problems.
ELECTIVE PG3ME1	Research Methodology	Global	• To enable the students to study the Research Methodology and some concepts of Measurability, L^p Spaces, Fourier Transforms and Banach algebras.
PG3ME1	Java	Global	• To develop OO Programming.

	Programming		• To develop Multithreaded Programs.
PG4M13	Complex Analysis	Global	• To introduce the students to the world of complex variable theory which is markedly different from analysis of real variable.
PG4M14	Statistics	Global	• The objective of this course is to develop an ability in the students to apply statistical methods to real life problem, to understand the limitations of these methods, to think probabilistically and to understand the estimation theory and to test the hypothesis of different types.
PG4M15	Methods Of Applied Mathematics	Global	• To enable the students to know the concepts of Calculus of variations, Integral equations, Neumann series and Fourier transforms.
ELECTIVE PG4ME3	Formal Languages	Global	• The aim of this course is to enable the students to understand the basic ideas of Automata Theory. The course deals with the following concepts: Regular expressions, two way finite automata, context free

			grammar and Push down automata.
PG4ME4	Web Designing Using Html	Regional	• To enable the student • To Design Web Pages • To give introduction to the Internet • To give an Exposure to resources and tools for using, managing and creating material for the Internet and World-Wide Web.

2017 - 2018

COURSE CODE	COURSE TITLE	NATURE OF THE COURSE (LOCAL/NATIONAL/ REGIONAL/GLOBAL)	COURSE OBJECTIVES
PG1M1	Algebra I	Global	• To introduce various algebraic structures. • To study the properties of these structures.
PG1M2	Real Analysis	Global	• To provide the students a comprehensive idea about the principles of Real Analysis. Real Analysis is the

			foundation of pure Mathematics and the idea of Real Analysis is used in Topology, Functional Analysis, Complex Analysis and Measure Theory.
PG1M3	Number Theory	Global	• The aim of this course is to help students to appreciate the elegant results in Number Theory. Students will learn the concepts like Divisibility, Congruencies, Quadratic Reciprocity, some functions and Diophantine equations of Number Theory.
PG1M4	Mechanics	Global	• The aim of the course is to help the students to understand mechanics of a particle, Lagrange's equations, Hamilton's principles, Two body problem and Kepler's problem.
PGMEDC	Optimization Methods	Global	• This course helps the students to convert real life problems into mathematical models and solve them using various techniques. Also they will learn Transportation Assignment Problems, Sequencing Problem , Network Scheduling by PERT/CPM, Game

			Theory, Permutation and Combination.
PG2M5	Algebra II	Global	• This Course introduces students to the third algebraic model, field theory, algebra of linear transformation and various types of operators.
PG2M6	Measure and Integration	Global	• To provide the students a comprehensive idea about the measures on the real line, Integration of Functions of a real variable, Extension of Riemann integration, Abstract Measure Spaces, Signed Measures and their derivatives, Measure and Integration in a Product space .
PG2M7	Differential Equations	Global	• To give an in-depth knowledge of solving differential equations which is frequently used • in Physics, Chemistry, Biology, Economics and Mechanics.
PG2M8	Graph Theory	Global	• The aim of the course is to introduce to the students Graph Theory as an important branch of Mathematics and to motivate them to appreciate the

			applications of Graph Theory in various fields such as Chemistry, Physics, Operations Research, Sociology and Computer Sciences and Electrical Engineering etc.
PG3M9	Topology	Global	• To generalize the concepts which the students have learnt in Real Analysis and to train the students to develop logical thinking.
PG3M10	Functional Analysis	Global	• To study the three structure theorems of Functional Analysis viz., Banach theorem, open mapping theorem and uniform bounded ness principle, Hilbert spaces and operator theory leading to the spectral theory of operators on a Hilbert spaces.
PG3M11	Optimization Techniques	Global	• To make the students to become aware of and appreciate the potential of the theory of optimization and to introduce various decision making tools and techniques based on optimization
PG3M12	Combinatorics	Global	• To introduce combinatorial techniques for solving

			enumeration problems.
ELECTIVE PG3ME1	Research Methodology	Global	• To enable the students to study the Research Methodology and some concepts of Measurability, L^p Spaces, Fourier Transforms and Banach algebras.
PG3ME2	JAVA Programming	Global	• To develop OO Programming. • To develop Multithreaded Programs.
PG4M13	Complex Analysis	Global	• To introduce the students to the world of complex variable theory this is markedly different from analysis of real variable.
PG4M14	Statistics	Global	• The objective of this course is to develop an ability in the students to apply statistical methods to real life problem, to understand the limitations of these methods, to think probabilistically and to understand the estimation theory and to test the hypothesis of different types.
PG4M15	Methods of	Global	• To enable the students to know the concepts of

	Applied Mathematics		Calculus of variations, Integral equations, Neumann series and Fourier transforms.
ELECTIVE PG4ME3	Formal Languages	Global	• The aim of this course is to enable the students to understand the basic ideas of Automata Theory. The course deals with the following concepts: Regular expressions, two way finite automata, context free grammar and Push down automata.
PG4ME4	Web Designing using HTML	Regional	• To enable the student • To Design Web Pages • To give introduction to the Internet • To give an Exposure to resources and tools for using, managing and creating material for the Internet and World-Wide Web.

2016 - 2017

COURSE CODE	COURSE TITLE	NATURE OF THE COURSE (LOCAL/NATIONAL/ REGIONAL/GLOBAL)	COURSE OBJECTIVES
PG1M1	Algebra I	Global	• To introduce various algebraic structures. • To study the properties of these structures.
PG1M2	Real Analysis	Global	• To provide the students a comprehensive idea about the principles of Real Analysis. Real Analysis is the foundation of pure Mathematics and the idea of Real Analysis is used in Topology, Functional Analysis, Complex Analysis and Measure Theory.
PG1M3	Number Theory	Global	• The aim of this course is to help students to appreciate the elegant results in Number Theory. Students will learn the concepts like Divisibility, Congruences, Quadratic Reciprocity, some functions and Diophantine equations of Number Theory.

PG1M4	Mechanics	Global	• The aim of the course is to help the students to understand mechanics of a particle, Lagrange's equations, Hamilton's principles, Two body problem and Kepler's problem.
PGMEDC	Optimization Methods	Global	• This course helps the students to convert real life problems into mathematical models and solve them using various techniques. Also they will learn Transportation Assignment Problems, Sequencing Problem , Network Scheduling by PERT/CPM, Game Theory, Permutation and Combination.
PG2M5	Algebra II	Global	• This Course introduces students to the third algebraic model, field theory, algebra of linear transformation and various types of operators.
PG2M6	Measure and Integration	Global	• To provide the students a comprehensive idea about the measures on the real line, Integration of Functions of a real variable, Extension of Riemann integration, Abstract Measure Spaces, Signed Measures and their

			derivatives, Measure and Integration in a Product space .
PG2M7	Differential Equations	Global	• To give an in-depth knowledge of solving differential equations this is frequently used in Physics, Chemistry, Biology, Economics and Mechanics.
PG2M8	Graph Theory	Global	• The aim of the course is to introduce to the students Graph Theory as an important branch of Mathematics and to motivate them to appreciate the applications of Graph Theory in various fields such as Chemistry, Physics, Operations Research, Sociology and Computer Sciences and Electrical Engineering etc.
PG3M9	Topology	Global	• To generalize the concepts which the students have learnt in Real Analysis and to train the students to develop logical thinking.
PG3M10	Functional Analysis	Global	• To study the three structure theorems of Functional Analysis viz., Banach theorem, open mapping theorem and uniform bounded ness principle, Hilbert

			spaces and operator theory leading to the spectral theory of operators on a Hilbert spaces.
PG3M11	Optimization Techniques	Global	• To make the students to become aware of and appreciate the potential of the theory of optimization and to introduce various decision making tools and techniques based on optimization.
PG3M12	Combinatorics	Global	• To introduce combinatorial techniques for solving enumeration problems.
PG3ME1	JAVA Programming	Global	• To develop OO Programming. To develop Multithreaded Programs.
PG4M13	Complex Analysis	Global	• To introduce the students to the world of complex variable theory this is markedly different from analysis of real variable.
PG4M14	Statistics	Global	• The objective of this course is to develop an ability in the students to apply statistical methods to real life problem, to understand the limitations of these

			methods, to think probabilistically and to understand the estimation theory and to test the hypothesis of different types.
PG4M15	Methods of Applied Mathematics	Global	• To enable the students to know the concepts of Calculus of variations, Integral equations, Neumann series and Fourier transforms.
ELECTIVE PG4ME1	Fuzzy sets and Applications	Global	• The aim of this course is to enable the students to understand the basic ideas of Fuzzy Sets. The course deals with the following concepts: crisp set and Fuzzy set, operations on Fuzzy sets, Fuzzy relations, Fuzzy measures and its applications
PG4ME2	Web Designing using HTML & JAVA Script	Global	• To enable the student • To Design Web Pages • To give introduction to the Internet • To give an Exposure to resources and tools for using, managing and creating material for the Internet and World-Wide Web.

PG4ME3	Formal Languages	Global	• The aim of this course is to enable the students to understand the basic ideas of Automata Theory. The course deals with the following concepts: Regular expressions, two way finite automata, context free grammar and Push down automata.

2015 - 2016

COURSE CODE	COURSE TITLE	NATURE OF THE COURSE (LOCAL/NATIONAL/REGIONAL/GLOBAL)	COURSE OBJECTIVES
PG1M1	Algebra I	Global	• To introduce various algebraic structures. • To study the properties of these structures.
PG1M2	Real Analysis	Global	• To provide the students a comprehensive idea about the principles of Real Analysis. Real Analysis is the foundation of pure Mathematics and the idea of Real Analysis is used in Topology, Functional Analysis, Complex Analysis and Measure Theory.

PG1M3	Number Theory	Global	• The aim of this course is to help students to appreciate the elegant results in Number Theory. Students will learn the concepts like Divisibility, Congruences, Quadratic Reciprocity, some functions and Diophantine equations of Number Theory.
PG1M4	Mechanics	Global	• The aim of the course is to help the students to understand mechanics of a particle, Lagrange's equations, Hamilton's principles, Two body problem and Kepler's problem.
PGMEDC	Optimization Methods	Global	• This course helps the students to convert real life problems into mathematical models and solve them using various techniques. Also they will learn Transportation Assignment Problems, Sequencing Problem , Network Scheduling by PERT/CPM, Game Theory, Permutation and Combination.
PG2M5	Algebra II	Global	• This Course introduces students to the third algebraic model, field theory, algebra of linear

			transformation and various types of operators.
PG2M6	Measure and Integration	Global	• To provide the students a comprehensive idea about the measures on the real line, Integration of Functions of a real variable, Extension of Riemann integration, Abstract Measure Spaces, Signed Measures and their derivatives, Measure and Integration in a Product space
PG2M7	Differential Equations	Global	• To give an in-depth knowledge of solving differential equations this is frequently used in Physics, Chemistry, Biology, Economics and Mechanics.
PG2M8	Graph Theory	Global	• The aim of the course is to introduce to the students Graph Theory as an important branch of Mathematics and to motivate them to appreciate the applications of Graph Theory in various fields such as Chemistry, Physics, Operations Research, Sociology and Computer Sciences and Electrical Engineering etc.

PG3M9	Topology	Global	• To generalize the concepts which the students have learnt in Real Analysis and to train the students to develop logical thinking.
PG3M10	Functional Analysis	Global	• To study the three structure theorems of Functional Analysis viz., Banach theorem, open mapping theorem and uniform boundedness principle, Hilbert spaces and operator theory leading to the spectral theory of operators on a Hilbert spaces.
PG3M11	Optimization Techniques	Global	• To make the students to become aware of and appreciate the potential of the theory of optimization and to introduce various decision making tools and techniques based on optimization.
PG3M12	Combinatorics	Global	• To introduce combinatorial techniques for solving enumeration problems.
PG3ME1	JAVA Programming	Global	• To develop OO Programming. • To develop Multithreaded Programs.

PG4M13	Complex Analysis	Global	• To introduce the students to the world of complex variable theory this is markedly different from analysis of real variable.
PG4M14	Statistics	Global	• The objective of this course is to develop an ability in the students to apply statistical methods to real life problem, to understand the limitations of these methods, to think probabilistically and to understand the estimation theory and to test the hypothesis of different types.
PG4M15	Methods of Applied Mathematics	Global	• To enable the students to know the concepts of Calculus of variations, Integral equations, Neumann series and Fourier transforms.
ELECTIVE PG4ME1	Fuzzy sets and Applications	Global	• The aim of this course is to enable the students to understand the basic ideas of Fuzzy Sets. The course deals with the following concepts: crisp set and Fuzzy set, operations on Fuzzy sets, Fuzzy relations, Fuzzy measures and its applications

PG4ME2	Web Designing using HTML & JAVA Script	Regional	• To enable the student • To Design Web Pages • To give introduction to the Internet • To give an Exposure to resources and tools for using, managing and creating material for the Internet and World-Wide Web.
PG4ME3	Formal Languages	Global	• The aim of this course is to enable the students to understand the basic ideas of Automata Theory. The course deals with the following concepts: Regular expressions, two way finite automata, context free grammar and Push down automata.