FATIMA COLLEGE (AUTONOMOUS), MADURAI – 625018

2020 - 2021

CRITERION 1 - CURRICULAR ASPECTS

1.1.1 Curricula developed and implemented have relevance to the local, national, regional and global developmental needs which is reflected in Programme outcomes (POs), Programme specific outcomes (PSOs) and Course Outcomes (COs), of the Programmes offered by the Institution.

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.

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

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	CO 1: Define and interpret the concepts of divisibility CO 2: Explain properties of congruences

			between different sorts of numbers and to prove that these relationships are true	CO 3: Apply the Law of Quadratic Reciprocity 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
19PGM1EDC/ 19PGM2EDC	Optimization Methods	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 concepts in Algebra.	CO1: Appraise characteristic roots of linear transformations CO2: Explain Matrices and Nilpotent transformation CO3: Classify transformations CO4: Describe various concepts of fields CO5: Analyse Galois theory
19PG2M6	Advanced Real Analysis	Global	This course enables the students to study some advanced concepts in Real Analysis.	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 Equations	Global	This course will provide the knowledge for solving of ordinary and partial differential equations in physical and other phenomena	CO 1: Define Linear differential equations 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 Theory.	CO1: Build the knowledge of Connectivity in graphs CO2: Identify Eulerian and Hamiltonian 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
19PG3M9	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, Abstract Measure Spaces, Signed Measures, Measure and Integration in a Product Space.
19PG3M10	Optimization Techniques	Global	❖ To enable 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.

19PG3M11	Combinatorics	Global	❖ To introduce topics and techniques of discrete and combinatorial methods. Topics that will be studied include generating functions , recurrence relations, the principle of inclusion and exclusion, Polya's theory of counting and methods to solve different equations.
19PG3M12	Topology	Global	❖ To generalize the concepts which the students have learnt in Real Analysis and to train the students to develop logical thinking.
19PG3ME1/19PG3ME2	Fuzzy sets and Applications/Numerical Analysis	Global	❖ To enable the students to understand the basic concepts of Crisp sets, Fuzzy sets, operations on fuzzy set, fuzzy relations and applications of fuzzy sets.

19PG4M13	Complex Analysis	Global	❖ To introduce the students to the world of complex variable theory which is markedly different from analysis of real variable.
19PG4M14	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.
19PG4M15	Methods of Applied Mathematics	Global	❖ To enable the students to know the concepts of Calculus of variations, Integral equations, Neumann series and Fourier transforms.

19PG4M16	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 8 operators on a Hilbert spaces.
19PG4ME3	Formal Languages	Global	❖ To introduce some fundamental concepts in automata theory and formal languages including grammar, finite automaton and regular grammars.
19PG4ME4	Algebraic Graph Theory	Global	❖ To study the automorphism group of a graph, cayley graphs, transitive graphs, homomorphism and matrix theory of graphs.

19PG4M17	Project		❖ To study the automorphism group of a graph, cayley graphs, transitive graphs, homomorphism and matrix theory of graphs.