



MANNAR THIRUMALAI NAICKER COLLEGE

A Co-educational, Autonomous and Linguistic Minority Institution

Affiliated to Madurai Kamaraj University

Re-accredited with "A" Grade by NAAC

Pasumalai, Madurai – 625 004 Tamil Nadu.

CURRICULUM RELEVANCE TO THE LOCAL, REGIONAL, NATIONAL AND GLOBAL NEEDS

NAME OF THE PROGRAMME: M.Sc MATHEMATICS

PROGRAMME CODE: PMT

PROGRAMME OUTCOMES

PO1: Enhance the entrepreneurial abilities, life skills and research initiates through experiential learning practices and building self confidence

PO2: Collaborate with industry and alumnae to explore the new avenues in respective domains and raise the employability ratio

PO3: Equip with soft skills and critical thinking to produce an erudite and trustworthy generation to fit into versatile situations

PO4: Adhere to the ethical and environmental sustainability to create morally upright and empowered citizens to face industry/ Institution

PO5: Up-skill / Re-skill their primary knowledge and potentials to compete in the dynamic global environment.

PO6: To build confidence to appear for Competitive / Civil Service examinations and to conquer commanding positions in organizational level.



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PROGRAMME SPECIFIC OUTCOMES

PSO1: Demonstrate the understanding of mathematical concepts in the field of Science and Technology.

PSO2: Express their mathematical knowledge with others effectively in both oral and written form in an organized manner.

PSO3: Proficient in using digital learning platforms and update their knowledge, skills to fulfill the requirements at the workplace in their life span.

PSO4: Employ critical and analytical thinking in understanding the concepts of Mathematical Science and in appearing Competitive examinations SET/ NET/ TET.

PSO5: Choose appropriate mathematical and computational methods in order to solve different types of problems and work efficiently as a team member / leader..

PSO6: Work independently and do detailed study of various concepts of Science. Plan, execute, report the results of an experiment/investigation with the highest standard of ethics in research.



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Sl. No	Course Code	Course Name	Course Outcomes
1.	21PMTTC11	Algebra	CO1: Demonstrate the understanding of group, normal groups, quotient group and permutation groups. CO2: Use Sylow's theorem in algebraic structures CO3: Examine ideals, quotient rings and integral domain CO4: Analyse Euclidean ring CO5: Classify the irreducibility of polynomials, rings over field
2.	21PMTTC12	Analysis	CO1: Knowledge about limit, continuity, connectedness and its properties CO2: Identify the derivative of real valued functions with continuous concept and consequences CO3: Illustrate the derivatives of higher order, differentiation and integration CO4: Apply the fundamental theorem of sequence and series CO5: Importance of uniform convergence and Stone – Weierstrass theorem
3.	21PMTTC13	Ordinary Differential Equations	CO1: Analyze the existence and uniqueness of solutions of ordinary differential equations CO2: Solve homogenous equation and non-homogenous equation with



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			constant co-efficient C03: Develop the concepts of ordinary differential equation for homogeneous and non-homogenous equations. C04: Demonstrate the understanding of power series and special functions C05: Compute the solution by iterative procedure for exact equation.
4.	21PMTTC14	Graph Theory and its Algorithms	C01: The Incidence and Adjacency Matrices, Sub graphs, Vertex degrees, Paths and Connection, Cycles, Sperner's lemma, Trees, Cut edges and Bonds, Cut vertices C02: Euler tours, Hamiltonian cycles, The travelling salesman problem, Matchings, Matchings and Coverings in Bipartite graphs C03: Edge Chromatic Number, Vizing's Theorem, Chromatic number, Brook's theorem C04: Plane and Planar graphs, Dual Graphs ,Euler's formula ,Bridges , Kuratowski's Theorem, Directed Graphs, Directed Paths, Directed Cycles, Flows, Cuts, The Max-Flow Min –Cut theorem C05: Algorithms : connectedness and components – spanning tree – cut vertices and separability – directed circuits – shortest path algorithm – planarity testing



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			– isomorphism
5.	21PMTTC15	Classical Mechanics	C01: Demonstrate the understanding of the fundamental concepts in dynamics of system of particle. C02: Derive D'Alembert 's principle, Lagrange's equations and Hamilton's principle C03: Represent the complicated mechanical systems using the Lagrangian and Hamiltonian principle. C04: Explain the concepts of one –dimensional problem and Classification of orbits. C05: Derive Bertrand's theorem, The Kepler problem, the Laplace – Runge- Lenz vector.
6.	21PMTTC21	Advanced Algebra	C01: Explain the properties of Inner Product Spaces. C02: Use linear transformation for characteristic roots and vectors C03: Represent Canonical forms, Triangular form, Nilpotent transformations C04: Determine the Trace and transpose,



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			determinants C05: Evaluate the normal transformation
7.	21PMTTC22	Partial Differential Equations	C01: Solve the Linear first order partial differential equations using various methods C02: Analyze the Semi-linear, Quasi-linear & Non-linear first order partial differential equations. C03: Classify the second order partial differential equations C04: Apply the concepts of partial differential equations in solving boundary value problems. C05: Determine the solutions for homogeneous and non-homogeneous partial differential equations.
8.	21PMTTC23	Numerical Analysis	C01: Demonstrate the understanding of direct methods and iterative methods for equations C02: Apply proper methods for solving transcendental, algebraic and system of equations C03: Evaluate interpolation and extrapolation using tabular values C04: Associate tabular values with integration and differentiation C05: Use iterative methods for PDE



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9.	21PMTTC24	Fuzzy Algebra and its Applications	C01: Interpret fuzzy set theory, representation, operation and extension principle C02: Identify fuzzy numbers and its linguistic variables C03: Validate fuzzy relation, projections and its equivalence. C04: Analyse multi valued logic and fuzzy logic with inference theory C05: Apply fuzziness in real valued problems
10.	21PMTN21	Mathematics for Competitive Examinations	C01: Understand the concepts of Mathematics along with analytical ability C02: Develop the mathematical problem solving skill C03: Evaluate the problems on data interpretation C04: Identify the time related problems and solving C05: Illustrate appropriate methods for solving Permutation and Combination
11.	21PMTTC31	Field Theory And Lattices	C01: Explain the notion of field theory. C02: Analyze the relationship between the ring, field and Galois theory. C03: Develop the proof of solvable group for radicals. C04: Explain the finite division rings



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			C05: Classify the different types of lattices
12.	21PMTTC32	Complex Analysis	C01: Explain the concepts of complex function and power series C02: Analyze the properties of Analytical Function C03: Analyze the Cauchy's theorem for different closed curves C04: Construct arguments effectively in proof of theorems in complex analysis C05: Develop the series of complex function using Jensen's and Poisson formula
13.	21PMTTC33	Topology	C01: Compare basis and sub basis in topological spaces. C02: Apply metric space in a topological space C03: Analyze metrization and compactness of spaces C04: Explain the countability axioms and separation axioms and separability C05: Develop the logical arguments related to continuous functions on topological spaces.
14.	21PMTE31	Operations Research	C01: Identify various decision-making tools. C02: Analyze various models in inventory problems. C03: Apply suitable method



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			in game theory. C04: Explain Poisson Queuing Models C05: Classify the constrained and unconstrained Problems
15.	21PMTE32	Nonlinear Differential Equations	C01: Understand the dynamics of basic population models C02: Find approximate solutions of nonlinear equations using averaging and perturbation methods C03: Master the concepts of stability in different perspectives C04: Have an idea on qualitative properties of solutions of linear and nonlinear systems C05: Improve their problem solving capabilities
16.	21PMTE33	Statistics	C01: Select the concepts of Probability theory and Mathematical Statistics. C02: Apply properties of Random variables Moments, Characteristic function, Binomial distribution, Poisson distribution, Normal distribution, and Stochastic Convergence. C03: Solve today's complex world problems by applying the concepts obtained in the course C04: Analyse mean, variance, moments for various distributions using Characteristic function, Probability Generating function, One point



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			distribution and Two point distribution C05: Derive various distributions and prove the theorems on Stochastic Convergence.
17.	21PMTE34	Integral Equations	C01: Explain the kinds of kernels C02: Solve linear Volterra and Fredholm integral equations using appropriate methods C03: Formulate complex problems of ordinary and partial differential equations with techniques of Integral transform C04: Apply integrals equation in transforms C05: Determine a wide range of differential and integral equations by Fourier transforms
18.	21PMTE35	Cryptography	C01: Demonstrate the understanding the fundamentals of cryptography C02: Demonstrate standard cryptographic Algorithms used to analyze confidentiality, integrity and authenticity. C03: List the security issues in the network, key distribution and management schemes C04: Explain in detail about Data encryption standard (DES) Structure C05: Analyze the Advanced Encryption standard(AES)



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19.	21PMTE36	Mathematical Modelling	C01: Use differential equations in solving mathematical models. C02: Analyze the Occurrence, classification and characteristics of Mathematical Models. C03: Apply problem solving techniques in Mathematical Modeling to bring solutions to various real life situations. C04: Examine the principles governing the motion of satellites through notions of Mathematical Modeling and interpret the techniques in Mathematical Models to analyse the motion of fluids. C05: Explain suitable models for population dynamics, medicine and reducing various forms of Pollution
20.	21PMTTC41	Measure Theory And Integration	C01: Explain the concepts of Lebesgue integral. C02: Analyze the geometrical meaning of measurable functions and integrations. C03: Apply the techniques of measure theory to evaluate integrals C04: Compare Riemann with other integrals. C05: Identify four derivatives and Lebesgue differentiation theorem.



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21.	21PMTTC42	Functional Analysis	CO1: Explain the concepts of Normed Spaces, Banach Spaces, Compactness and Dimensions CO2: List the operators and its properties. CO3: Analyze the Orthogonal complements, ortho-normal sets and sequences CO4: Make use of the bounded linear functional, various operators and Hahn-Banach Theorem CO5: Analyze Uniform boundedness, open mapping, closed graph theorem, Strong and weak convergence
22.	21PMTPR 1	Project	CO1: Apply the skill of presentation and communication techniques CO2: Motive as an individual or in a team in development of projects. CO3: Analyze the available resources and to select most appropriate one CO4: Make use of the fundamentals of Mathematics to search the related literature survey CO5: Evaluate the real life problems by using Mathematics and its Application.



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23.	21PMTE41	Number Theory	C01: Explain the numbering concepts. C02: Apply the concepts of prime numbers and principles to solve problems C03: Solve the system of linear congruencies with different module using the Chinese Remainder Theorem. C04: Categorize the various arithmetic functions. C05: Examine the quadratic residues and quadratic non-residues using congruences.
24.	21PMTE42	Combinatorial Mathematics	C01: Understand the rules of Sum and Product of Permutations and Combinations. C02: Discuss distributions of Distinct Objects into Non-distinct Cells and Partitions of Integers. C03: Identify Solutions by the technique of Generating Functions and Recurrence Relations with Two Indices. C04: Make use of the concepts of Permutations with Restrictions on Relative Positions and the Rook Polynomials. C05: Analyze equivalence classes of functions in Polya's Theory



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25.	21PMTE43	Differential Geometry	C01: Demonstrate the Understanding the concept of space curves. C02: Identify metric on a surface, direction coefficients on a surface and nature of points on the surface. C03: Analyze Geodesic and their differential equations C04: List topological aspects of surfaces. C05: Analyse the Weingarten Equations, Gaussian equations, Mainardi-Codazzi equations
26.	21PMTE44	Stochastic Process	C01: Classify simple stochastic process models in the time domain. C02: Apply the generalization of Poisson process C03: Compare Markov and Erlang process C04: Identify the qualitative and quantitative analysis of Stochastic process model. C05: Explain models for real life problems.
27.	21PMTE45	Fluid Dynamics	C01: Find the gradient , divergence , curl of orthogonal coordinates C02: Identify the Euler's equations of motion and equations of continuity C03: Solve the equations of motion of a fluid when it is at rest and in motion C04: Analyze two dimensional and three dimensional flows



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			C05: Examine Two-Dimensional flow using cylindrical Polar coordinates
28.	21PMTE46	Multivariable Calculus	C01: Apply derivatives of functions of two or more variables C02: Solve the gradient and directional derivatives for a function at a given point. C03: Find the total differential of a function of several variables C04: Solve a function of two or more variables, organizing work into main steps carefully justifying determination of critical points. C05: Analyse multiple integrals either by using iterated integrals or approximation methods.