

## PROGRAMME OUTCOMES (MSc MATHEMATICS)

NAME OF THE PROGRAMME : MSc MATHEMATICS

ACADEMIC FRAME WORK AND CONTENT : Following and adhering to the curriculum , syllabus ,  
and evaluation system designed by periyar university,  
Salem -7 , Tamilnadu.

### OBJECTIVES

1. To enable students to acquire the essentialities of pure and Applied Mathematics
2. To make the students aware of importance of pure mathematics and applied mathematics  
and explore the subtle aspects of curriculum across the spectrum
3. To make students to identify , analyse , calculate and apply the ideas and concepts found in the  
Field of mathematics.
4. To make the students to apply mathematics to real life situation and help in problem solving.

### PROGRAMME OUTCOME

1. The students will gain the knowledge in the fundamental subjects of pure and applied maths
2. The students will able to explain the mathematical concepts with clear understanding and clarity
3. The students will conduct research independently with good mathematical background .
4. They will get through in lectureship / fellowship like CSIR, NET/JRF, GATE,NBHM,SET, TRB, etc.,
5. They can apply the mathematical techniques to solve the socio economic and industrial problems.
6. They acquire a suitable career in the field of Education / e-mathematics / research /industries.

### PROGRAMME SPECIFIC OUTCOMES

TITLE : LINEAR ALGEBRA

OBJECTIVES : The objective of this course is to develop a strong foundation in Linear Algebra that provide a basic for advanced studies not only in mathematics but also in other branches of like physics , computer science , engineering etc. particularly the attention is given to canonical forms of Linear transformations , diagonalizations of linear transformation, matrices and determinants.

COURSE OUTCOME : The students will be able to discuss the kernel and image of linear transformation in terms of nullity and rank of a matrix , they can compute the eigen values and eigen vectors of a square matrix and determine the dimension of the corresponding eigen space, can determine the whether the square matrix is diagonalizable, and compute its diagonalization, finding the minimal polynomial and the rational forms of a real square matrix, also they can find the

numbers of possible Jordan forms are there for a  $6 \times 6$  complex matrix with the given characteristic polynomial.

TITLE : REAL ANALYSIS

OBJECTIVES : To develop a deep and strong understanding of calculus including defining terms and proving theorems on functions, sequences, series, limits, continuity and derivatives and special techniques in problem solving.

COURSE OUTCOME : The students can be able to recollect the concepts related to metric spaces, such as continuity, compactness, completeness and connectedness. They can evaluate the limit and continuity, derivative of a function at the point. Can apply the mean value theorems for differential functions and can do and construct the simple proof in analysis.

TITLE : ORDINARY DIFFERENTIAL EQUATIONS

OBJECTIVES : To equip the students with knowledge of some advanced concepts related to ordinary differential equations and to understand the concepts related to the solution of ordinary differential equations.

COURSE OUTCOME : The students will understand and solve problems based on linear differential equations, they can solve the second order differential equations using various methods, enhance to explore some of the basic theory of linear equations with regular singular points also they learned various methods of first order differential equations with their solutions and understand the concepts of differential equations and their use in solving boundary value problems.

TITLE : MECHANICS

OBJECTIVES : To understand the Lagrangian and Hamiltonian equations for dynamical systems

COURSE OUTCOME : The students can be able to define the mechanical system of generalised coordinates, virtual work, energy and momentum. They can explain the derivation of Lagrange's equations and the concept of integral motions, can classify the Hamilton's equations and modified Hamilton's principle, also they can analyse the principle function of the generating function for canonical transformation namely, special transformations, Lagrange and Poisson Brackets.

TITLE : ABSTRACT ALGEBRA

OBJECTIVES : The objective of this course is to introduce the basic ideas of counting principle, Sylow subgroups, finite abelian groups, field theory and Galois theory and its application to the solvability of polynomial equations by radicals.

COURSE OUTCOME : The students can list all conjugate classes in a finite group, can give example to determine the number of Sylow subgroups and the number of nonisomorphic abelian groups, they can apply Eisenstein criterion to check the irreducibility of a given polynomial also they can associate a Galois group to the given polynomial through its splitting field and determine the solvable by radical or not.

TITLE : REAL ANALYSIS II

OBJECTIVES : The course will develop a deeper and more understanding of calculus including defining terms and proving theorems about sequence and series of functions, integration, special functions and multivariable calculus. The course will develop specialized techniques in problem solving.

COURSE OUTCOMES : The students will be able to determine the Riemann integrability and the Riemann-Stieltjes integrability of a bounded function and prove a selection of theorems concerning integration, recognize the difference between point wise and uniform convergence of a sequence of functions and illustrate the effect of uniform convergence on the limit function with to the continuity, differentiability, and integrability, can determine the limit point of a series of functions, they can know the fundamental theorem of calculus, integration by parts, gamma function, the concept of functions of several variables, inverse function theorem and implicit function theorem.

TITLE : PARTIAL DIFFERENTIAL EQUATIONS

OBJECTIVES : The objective of this course is to enable the students to understand the concepts related to the solution of partial differential equations arising in various fields.

COURSE OUTCOMES : Students will be able to understand fundamental concepts of partial differential equations of first order, second order etc. They can classify second order PDE and solve standard PDE using separation of variables method, they can understand the surfaces and curves in two dimensional spaces also they can solve various real life problems by formulating them in to partial differential equations. They know the method of solving linear and non linear partial differential equations.

TITLE : TOPOLOGY

OBJECTIVES : To define what a topological space is, and to introduce concepts like open sets closed sets, limit points and continuous function of topological spaces and natural generalization of corresponding ideas for the real line and Euclidean space, to introduce different kinds of topologies also learn the concept of connectedness, compactness and arbitrary topological spaces. To introduce the countability and separation axioms and to study the Urysohn metrization theorem.

COURSE OUTCOMES : The students can able to define what a topological space is, and to identify the concepts of open sets closed sets limit points and continuous functions of the topological space and the students learnt how to contrast a continuous functions from topological space to another topological space, can create connectedness and compactness from existing one, he know under what conditions the topological space is metrizable also he know the relationship between countability and separation axioms.

TITLE : MEASURE THEORY AND INTEGRATION

OBJECTIVES : To gain understanding of the abstract measure theory and main properties of the Lebesgue integral, to make the students acquire basic knowledge of measure theory needed to

understand probability theory , statistics and functional analysis, to get ability to differentiate and integrate the Lebesgue integral.

COURSE OUTCOMES : The students will be able to know the meaning of outer and inner measures with their basic properties and know the meaning with examples of algebras , sigma- algebras , measurable sets , measurable space and measure space, develop the concepts of differentiation of monotone functions , functions of bounded variations , differentiation of an integral absolute continuity, study the random- nikodym theorem and its applications understand the concepts of convergence in measure and lebesgue integrability and demonstrate understanding of the

statements of the main results on integration on product spaces and an ability to apply these in examples.

TITLE : GRAPH THEORY

OBJECTIVES : The objectives of the course is to introduce students with the fundamental concepts in graph theory , with sense of some of its modern applications . they will be able to use these methods in subsequent courses in the design and analysis of algorithms, computability theory, software engineering and computer systems.

COURSE OUTCOMES : Understand the basic concepts of graphs , directed graphs ,and able to present a graph by matrices, can understand the properties of trees and able to find a minimal spanning tree for a given weighted graph. Also apply shortest path algorithm to solve chinese postman problem and the knowledge the graphs to solve the real life problems.

TITLE : COMPLEX ANALYSIS

OBJECTIVES :The objective of this course are to know the algebraic and topological properties of complex numbers, to provide understanding the analytic functions of a complex variable and their role in modern mathematics , to demonstrate ability to think knowledge of integration in complex analysis.

COURSE OUTCOMES : Students can be able to find the harmonic conjugate to a harmonic functions express analytic functions in terms of power series and Laurent series , construct conformal mappings between many kinds of domain . Use conformal mapping to solve the Dirichlet problem in a region, use Cauchy's integral theorem principles of Rouches theorem and determine residues , use the residues theorem to compute several kinds of real analysis, also they can be able to find Laurent series about isolated singularities, determine whether a sequence of analytic functions converges uniformly on compact sets.

TITLE : FUNCTIONAL ANALYSIS

OBJECTIVES : The main aim of this course is to provide basic concepts of functional analysis to facilitate the study of advanced mathematical structures arising in the natural sciences and the engineering sciences and to grasp the newest technical and mathematical literature.

COURSE OUTCOMES : Students can be able to understand the concepts of Banach and Hilbert spaces and to learn to classify the standard examples , know the properties of Hilbert spaces , including

orthogonal complements , orthonormal sets , complete orthonormal sets together with the identities and inequalities, can construct Banach algebras through Banach spaces.

TITLE : NUMERICAL ANALYSIS

OBJECTIVES : The objectives of this course are to make the students familiarize with the ways of solving complicated mathematical problems numerically, to provide Numerical methods for solving the non-linear equations , interpolation, differentiation , integration , ordinary and partial differential equations , describing and understanding error analysis numerical methods.

COURSE OUTCOMES : The students will be able to apply numerical methods to obtain approximate solutions to mathematical problems , understand how to approximate the functions using interpolating polynomials , perform error analysis for various methods , analyse and evaluate the accuracy of common numerical methods.

TITLE : DISCRETE MATHEMATICS

OBJECTIVES : The objective of this course is to understand the basic ideas of logic , proof methods and strategy , the growth of functions , counting techniques , pigeonhole principle , recurrence relations , solving recurrences generating functions , Boolean functions , apply Boolean algebra to circuits and getting networks , use finite state- machines to model computer operations.

COURSE OUTCOMES : The students will be able to express a logic sentence in terms of predicates , quantifiers and logical connectives , they can apply the rules of inference and methods of proof including direct and indirect proof forms , proof of contradiction and mathematical induction, solve discrete mathematical problems that involves permutations and combinations of the set , fundamental enumeration principles. Simplify Boolean functions using circuits with different types of gates.

TITLE : NUMBER THEORY

OBJECTIVES : The aim of this course is to teach the students about basics of elementary number theory starting with primes , congruences , quadratic residues ,primitive roots , arithmetic functions , and some Diophantine equations.

COURSE OUTCOMES : Find the quotient and remainders from integer division , apply Euclid algorithm and backward substitution, they understand the definition of congruences , residue classes and least residues , add and subtract integers , modulo n ,multiply integers and calculate powers , modulo n , they know to evaluate the quadratic residues , legendre symbols and solve its problems and can solve the certain types of Diophantine equations.

TITLE : PROJECT

OBJECTIVES : The aim of the course is to teach the students how to do the literature study of research works

COURSE OUTCOMES : The students can do the literature survey on their own in their interested area and can do the project work .

